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ABSTRACT

After a detailed study of the reserve processing activities of the Columbia University Library System, it was decided that an attempt to design a reserve system which would make the fullest use of computers would be undertaken. This would be an integrated system developed over a period of time in a series of clearly defined phases. Three different phases were distinguished which could be developed in series or simultaneously, depending on such factors as operating software and hardware availability. After three years a fully tested system, called Reserves Processing has been developed for Phase One and implemented in two working environments. The Reserves Processing system accepts input in the form of brief bibliographic citations, inventory data and course information, creates a master machine stored reserve file, produces a variety of records to assist in the processing of reserve books, and prints a variety of lists to be used for reference purposes. All of these operations, except input, are done as off-line, batch-processed operations. Only input is done in an on-line mode. This report includes a general systems description intended for the non-technical reader as well as program and hardware specifications and intended for the technical reader. (Author/JB)

FINAL REPORT
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A COMPUTER BASED SYSTEM FOR RESERVE ACTIVITIES IN A UNIVERSITY LIBRARY

By

Paul J. Fasana
Raymond DeBuse
H. James Hetland
and
J. Peter Moncrieff

Systems Office, The Libraries

Columbia University in the City of New York

New York, New York 10027

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September 1969

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

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1. INTRODUCTION AND SUMMARY

1.1. Changing Patterns of University Instruction and Their Effect on the Library.

During the past twenty years methods of instruction in colleges and universities have changed significantly. The effect on the library has, in general, been subtle but pervasive. In certain instances, though, change has caused acute problems. An example of such a problem area is that of "course reading".

The tendency in the past 10 to 20 years has been away from using a single text-book for a course and toward using selected readings from a number of sources. As a result, the academic library has had to assume an active role in the teaching process by providing special reference and reading service to students. Since students are no longer required to buy all texts that they will read in a course, the library has had to provide this support through special "reserve" collections containing multiple copies of a title.

1.2. The Concept of Reserve Collections and Procedures.

Libraries have developed the concept of "the reserve collection," together with special procedures, to handle the problem of course reading. This has solved certain problems but in turn created others. Examples of the range of problems that have arisen as a result of the reserve collection concept are the following:

1. Creation of a large but temporary collection of books
2. Movement of large quantities of books onto and off reserve status
3. Creation of special records for controlling reserve processing
4. Short term, sometimes hourly, circulation
5. Information service to students and professors

1.3. A Functional Description of the Reserve Process.

The major functions (or activities) of reserve processing are as follows:

1.3.1. Identify titles to be included. Since titles included in a reserve collection change from semester to semester, the library must communicate with professors in advance of a semester to find out what titles will be needed. Once this is known the library must establish whether the titles are owned and in what quantity they are available.

1.3.2. Assemble the reserve collection. Because of the unique reference and circulation procedures, reserve collections are usually housed in a special location. This requires that volumes be moved creating significant logistical problems, since the movement of books must usually be done in a short period of time. This is further aggravated by the fact that once a semester is finished, the reserve collection must be broken up and returned to its original location. Often times this assembling and disbursing of books occur at the same time.

1.3.3. Create records for control and reference. Various records are produced expressly for the reserve operation. Each of these records is a reformatting or rearrangement of a limited number of data elements. These include a highly abbreviated set of bibliographic data (e.g., author, simple title, and date), course information, and inventory.

1.3.4. Provide inventory control. A complete, accurate, and up-to-date record of the number of copies of a title is essential at each step in the processing cycle and for reserve reference service.

1.3.5. Provide reference service. Rapid identification and location of materials is essential for reserve reference service. Simple reference (or look-up) procedures allowing the highest degree of patron self-service, is desirable.

1.3.6. Provide circulation control. Large numbers of books are checked out for short periods of time. Circulation procedures must be simple, accurate, and up-to-date.

1.4. Reserve Collections and Procedures within the Columbia University Libraries.

In order to understand the complexities and magnitude of reserve operations, a brief description of reserve procedures at Columbia University is given in the following section. While details of operation and volume of transactions between Columbia and other academic libraries may differ, the basic functions performed are similar regardless of size or subject. This assumption is based not only on analysis of the various different reserve environments within the Columbia system but also reserve activities in other colleges and universities.

The Columbia University Library System is made up of 36 separate department libraries, each specializing in a subject area or serving a particular department. More than half of these libraries maintain specialized reserve collections and provide reserve service. In any one semester, the variation of reserve activity among these libraries is wide, ranging from several titles in Philosophy Library to 8,000 titles in the College Library. In order to understand the types of problems encountered in a typical reserve environment, a brief overview of the College Library reserve activities would be helpful.

Approximately 400 reserve lists are received from professors each semester. A list may contain anywhere from 1 to 150 titles, with an average of about 15 - 25 titles per list. Each list must be individually processed; this requires that each title be searched and verified in catalogs and printed indexes. Once identified, the physical volumes must be assembled from existing bookstocks, through inter-library loan, or specially ordered, and special records must be created to control the reserve collection.

The amount of effort expended in this one Library alone is enormous. The efficiency with which it was done and the resultant service was seriously hampered by the following factors.

1.4.1. Critical scheduling. Reserve lists from professors were expected shortly before the beginning of each semester and books were expected to be available by the time the first class met for that semester. A significant percentage of professor's lists arrived late. Processing of books onto reserve status was a major effort done under extreme pressure and with limited

staff. The difficulty was compounded by the fact that reserve books from the previous semester were deprocessed during the same period.

1.4.2. Volume of work. A typical reserve list had, on an average, 15 titles; each title required an average of 5 copies. This meant that approximately 20,000 to 30,000 physical items were involved in reserve processing each semester; this did not include books being deprocessed from reserve status from the previous semester A complicating factor was that since there was no way of knowing when a particular title would be used, processing of books either onto or off of reserve status was done as a single, massive effort.

1.4.3. Records. Every title placed on reserve required at least three special reserve records; work records, public reference records, and circulation records. Roughly, twenty to fifty thousand records were specially typed each semester.

1.4.4. User service. Servicing of the reserve collection was entirely separate from regular reference and circulation activities. User service was severly hampered because of the following factors:

1. Lack of complete, up-to-date records

2. Significant book losses during the semester making inventory records even more inaccurate

3. Ignorance as to which titles were used and how often. (This last factor severly hampered the librarian's ability to decide how many copies of a title should be provided and to plan or schedule reserve processing efficiently.)

1.5. An Approach to the Solution of the Reserve Problem.

After detailed study of these factors it was decided that:

1. Reserve functions are fairly autonomous and have minimal contact (or interface) with other library activities. Therefore, it would be feasible to design, develop, and implement a new reserve system without disturbing or dislocating other library operations.

2. Many of the activities essential to reserve processing, such as inventory control, repetitive typing, data handling, and record creation, are ideally suited to the capabilities of computers. Therefore, the design of a new reserve system should explore the possibility of using computers wherever possible.

3. The one aspect of reserve processing which seems to vary from one system to another is the volume of work handled. All other operations performed display a high degree of similarity. If computers are used, differences in processing volume become less critical. Therefore, the desirability of designing a computer-based reserve system which is general and transferable is greatly increased.

1.6. What Was Done.

As a result of these conclusions, it was decided that an attempt to design a reserve system which would make the fullest use of computers would be undertaken.

The reserve activities of several departmental libraries within the Columbia University Library System, having varying processing volumes and serving different subject areas, were studied and specifications for a single, generalized system design were formulated to satisfy the requirement of each of the various reserve systems studied. Emphasis in this preliminary design phase focused on identifying and defining reserve functions common to all reserve environments observed. Once accomplished, these specifications were reviewed with a number of working librarians to establish whether all requirements of the reserve activity had been satisfied. In addition, reserve environments outside the Columbia Library System were studied and compared with the

preliminary reserve specifications. Very few modifications or changes to the original set of specifications were necessary.

1.7. Developing a Computer-Based System.

Translating the abstract functions identified and described in the preliminary set of specifications into a practical working system was then undertaken. Ideally, a fully on-line, real-time, interactive mode of computer operation was deemed necessary to satisfy the complete range of processing activities. But this possibility, though technically feasible with third generation computers, was not achievable on a practical level at that time (nor is it today). Therefore, the objective of designing and implementating a total reserve processing system in one step was discarded and replaced with the concept of developing an integrated system over a period of time in a series of clearly defined phases or steps.

Three different phases were distinguished and described which could be developed in series or simultaneously, depending on such factors as operating software and hardware availability. In Phase One, a master reserve file in machine readable form would be created integrating input activities, inventory control procedures, and the production of records for internal processing and reference. In a second phase, on-line circulation control and inventory monitoring procedures would be developed and integrated. In a third phase, reserve processing would be integrated with a master bibliographic system.

The time frame estimated at that time (1967) to achieve all three phases was three to five years. Time estimates of this sort tend to be optimistic. Today, after three years of work, only Phase One has been fully realized. Various aspects of Phase Two have been developed or experimented with, including a fully operational off-line circulation system. Virtually nothing of Phase Three has been accomplished excepting for preliminary specifications. Present time estimates for the development and implementation of all three phases call for an additional three to four years (roughly two years beyond our original estimate).

At present a fully tested system, called Reserves Processing has been developed for Phase One and implemented in two working environments. The Reserves Processing system as it operates at present accepts input in the form of brief bibliographic citations, inventory data and course information, creates a master machine stored reserve file, produces a variety of records to assist in the processing of reserve books, and prints a variety of lists to be used for reference purposes. All of these operations, except input, are done as off-line, batch-processed operations. Only input is done in an on-line mode.

The remainder of this report is devoted to describing the Reserves Processing System. Part 2 of this report is a general systems description intended for the non-technical reader. Part 3 contains program and hardware specifications and is intended for the technical reader.

2. SYSTEM DESCRIPTION

2.1. Objectives.

The Reserves Processing System was designed to fulfill the following general objectives.

2.1.1. Personnel. To stabilize (or reduce) personnel requirements both professional and clerical for reserve activities. Reserve processing volume has exhibited during the past decade a geometric growth, with the number of titles processed doubling every five to six years. Assuming that this exponential growth will continue and the present manual system is maintained, personnel requirements by 1970 will have increased by 20 to 30 percent, by 1975 they will have increased by 60 to 70 percent.

2.1.2. Efficiency. To increase processing efficiency of reserve activities. Manual procedures have been expanded to what seem to be their logical limits. There is serious doubt that the simple expediency of adding more personnel will adequately solve the problem of increasing volume. In essence, it is highly likely that manual procedures will be unable to handle the reserve processing volume by 1975. Alternate methods using new technologies, especially computers, offer at present the best, possible solution.

2.1.3. Control. To achieve greater control over internal book processing and inventory control activities. With an ever increasing volume of reserve books to be handled, the ability of the librarian to control the movement and inventory of these books is seriously threatened. As this ability to control is reduced, the quality and level of service is adversely affected.

2.1.4. Core collection. To gain a more precise and quantitative understanding of the reserve collection. A seemingly significant percentage of the same titles (30 percent or more) are used from one semester to another. In addition, in any one semester a large number of courses require the same titles. This suggests that a "core collection" of reserve titles exists which are identifiable.

2.1.5. Use Patterns. To gain a more precise understanding of the use made by students of reserve collections. The number of titles placed on reserve by professors increases but the actual use by students of these titles is unknown and suspect. Intuitively the librarian feels that his estimate of the number copies of a title that are placed on reserve and the actual use of reserve books by students do not correlate.

2.1.6. Cost. To reduce the overall cost of the reserve operation. It seems that using computers will stabilize personnel costs over the next ten years. In addition, the increased control and reporting capability which computers provide may be able to stabilize, or possibly reduce, book costs through greater control of book handling procedures, better understanding of reserve use patterns, and more precise knowledge of the nature of the reserve book collection.

2.1.7. Scheduling of Reserve Processing. To ascertain when during a semester a title will be used. Professor's Reserve Lists are received at the beginning of a semester and, since it has been impossible to establish when a title will actually be needed (and even if it were known it would be difficult to use this information efficiently in a manual system), the librarian has processed large numbers of titles onto reserve status in the shortest period of time. This has created a situation wherein impossible and inefficient work loads occur during the first weeks of a semester. The ability of the computer to review large amounts of data rapidly offers the possibility of using computers to schedule processing activities and eliminate inefficient workloads.

2.1.8. Accuracy. To increase the accuracy and currency of records used for inventory control. Because of the uneven nature and the extreme pressure under which reserve processing is done, inventory and control records are often inaccurate and incomplete, seriously degrading the efficiency of other parts of the system. A simple, accurate method for creating records and storing data is necessary. The computer has the ability to store large quantities of data and to update it rapidly and accurately.

2.1.9. Growth. To design a system which can accommodate future growth. The computer can accept an increasing volume of data without a corresponding increase in processing time.

2.1.10 Flexibility. To design a system which is flexible and able to accommodate change. Reserve procedures are continually changing. The rate of change will be accelerated as better understanding of the nature of reserve activities is gained.

2.1.11. Service. To design and implement a system which is simple and efficient for students and professors to use. With the increased efficiency of internal procedures, more staff will be released to extend better service to users.

2.1.12. Generalized (or Transferable) Systems. To design a system which is general enough to be transferred and used in a number of reserve environments. This becomes especially desirable if a computer-based system is envisioned because of the high cost of developing and writing computer programs. (Certain of these objectives, such as core collection identification, automatic scheduling and user pattern evaluation, are only partially achieved in the Reserve Processing System as it is implemented at present. Complete realization of all of these objectives will only be attained when the integrated system has been completely developed, implemented, and run for a period of time.)

2.2. Overview.

All processing activities and products of the Reserve Processing System are organized around a single file, called the Master Reserve File, which is stored on randomly accessed computer disc packs. The Master Reserve File contains virtually all titles that have been used for reserve since the initiation of the system. Initially, or the first semester the system was used, this meant that considerable conversion effort was necessary to create a basic file, but with each succeeding semester, input effort has been greatly reduced. Though there probably will never be a time when new input will be entirely eliminated, the number of new titles that will have to be input at the beginning of each semester will be relatively small and stable.

New titles are entered into the Master Reserve File by encoding bibliographic, inventory, and course information. Bibliographic information is permanent and remains in the master file indefinitely. Inventory information varies reflecting the total number of copies available at any point in time. Course information is input as received (usually at the beginning of a new semester) causing the status of a title (e.g., on active reserve) to change; as course information is superseded, it is preserved temporarily in the master file and then released to a permanent historical file.

Input is done using on-line computer terminals, keypunches, or tape typewriters. File updating and processing is done in a "batch" mode and on whatever cycle is best suited to the existing need (e.g., daily during peak processing periods, on demand during slack periods).

The basic function of the main processing program is to review course requirements and compare them with the available inventory for each title being placed on active reserve. If there is a copy shortage the library is notified. If copies are available, inventory cards for each copy to be placed on reserve are produced. Various lists and products both for internal use by library staff and for public reference use are also produced. The most important lists produced are Master Worklists to assist the librarian in controlling bibliographic, course, and inventory processing; a Public Reference List used by patrons to identify books on active reserve; and Course Lists used for public reference and to notify professors of titles on reserve for the current semester.

The most important products are processing cards (called ON and OFF, cards used to control the physical movement of books from storage or some other location to the reserve shelves.

A number of auxiliary programs are available to produce special lists, such as historical statistics, sequence lists, cross reference lists, and professor's lists.

The net effect of the system is tighter control over all aspects of processing by the librarian, a reduction of clerical effort, the ability of being able to spread out work over a longer period of time, and better service to students and professors. (See Figures 1-4).

2.3. Input

2.3.1. Data Collection and Verification. Four kinds of data are used in the system: bibliographic, inventory, course, and order information. Data are gathered from various sources. Bibliographic information is taken from library card catalogs; inventory information is taken from official shelf lists; course information is taken from lists supplied by professors in the form of course reading lists; and order information is taken from order files.

The collection cycle is initiated by the library sending request forms (See Figure 5), instruction sheet (See Figure 6), and a cover letter (Figure 7) to all professors scheduled to teach courses during a particular semester. The forms are sent well in advance of the beginning of the semester to allow enough time for professors to complete them and return them prior to the beginning of the semester (approximately one month before). The library begins processing of completed forms as they are returned. The processing cycle is initiated by a librarian who reviews all completed forms, checking for obvious errors, and adding copy requirements based on expected enrollment, past experience, and probable availability of multiple copies. (This last step is at present an ambiguous and intuitive process; a feature of the system which is not yet completely developed is to accumulate and record data that can be used to assist the librarian in this decision process.)

The processing cycle from this point on becomes almost entirely a clerical effort consisting of checking existing files to verify titles, ascertaining actual availability and inventory, and reporting to the machine system. The librarian is consulted only when a problem arises.

2.3.1.1. Course Information. Course information is made up of the following data elements:

a) Professor's name
b) Course number(s)
c) Number of copies required
d) Semester(s)

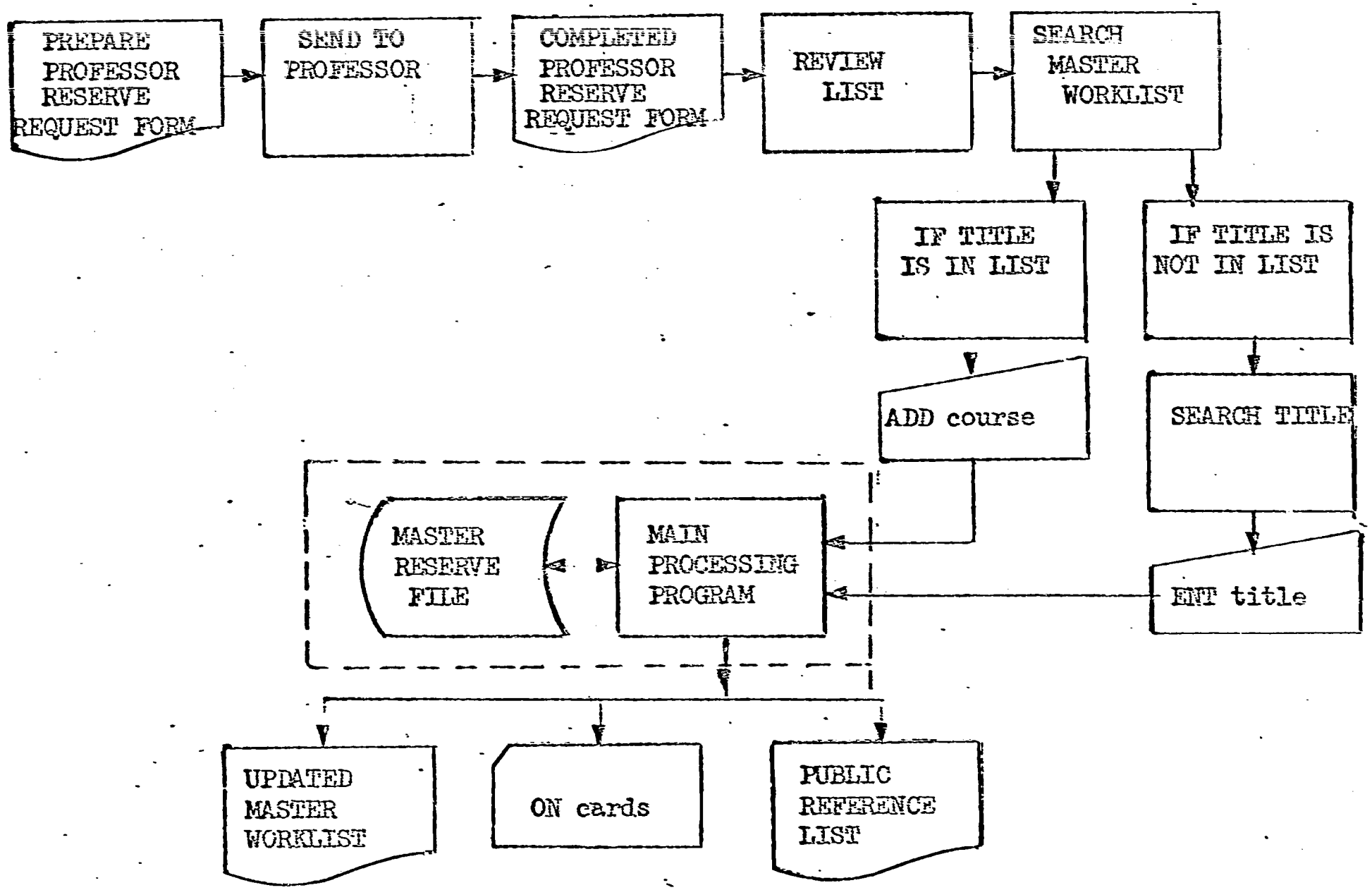


FIGURE 1
PROCESSING PROFESSOR
RESERVE REQUEST LISTS

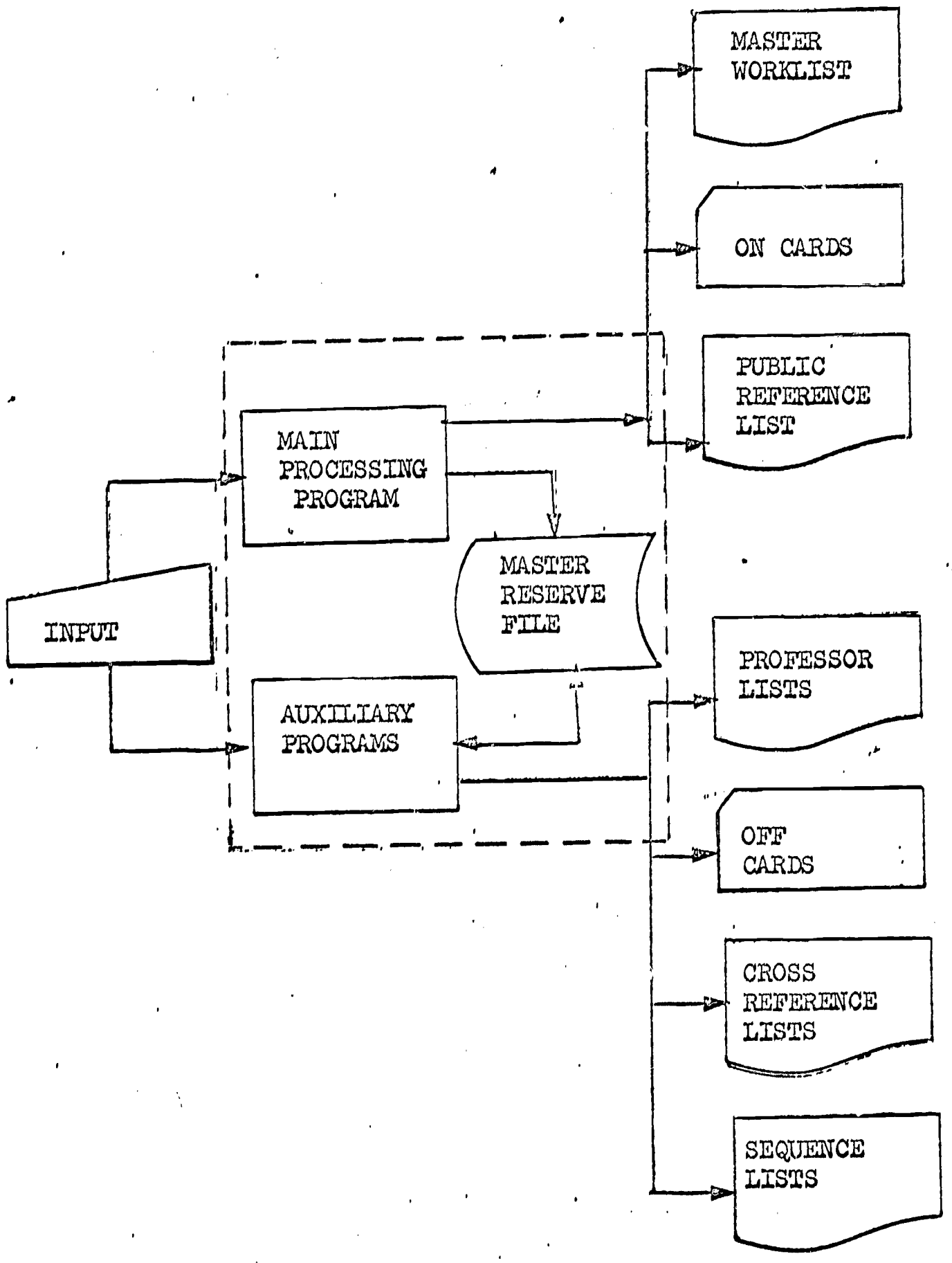


FIGURE 2
BLOCK DIAGRAM - RESERVE PROCESSING

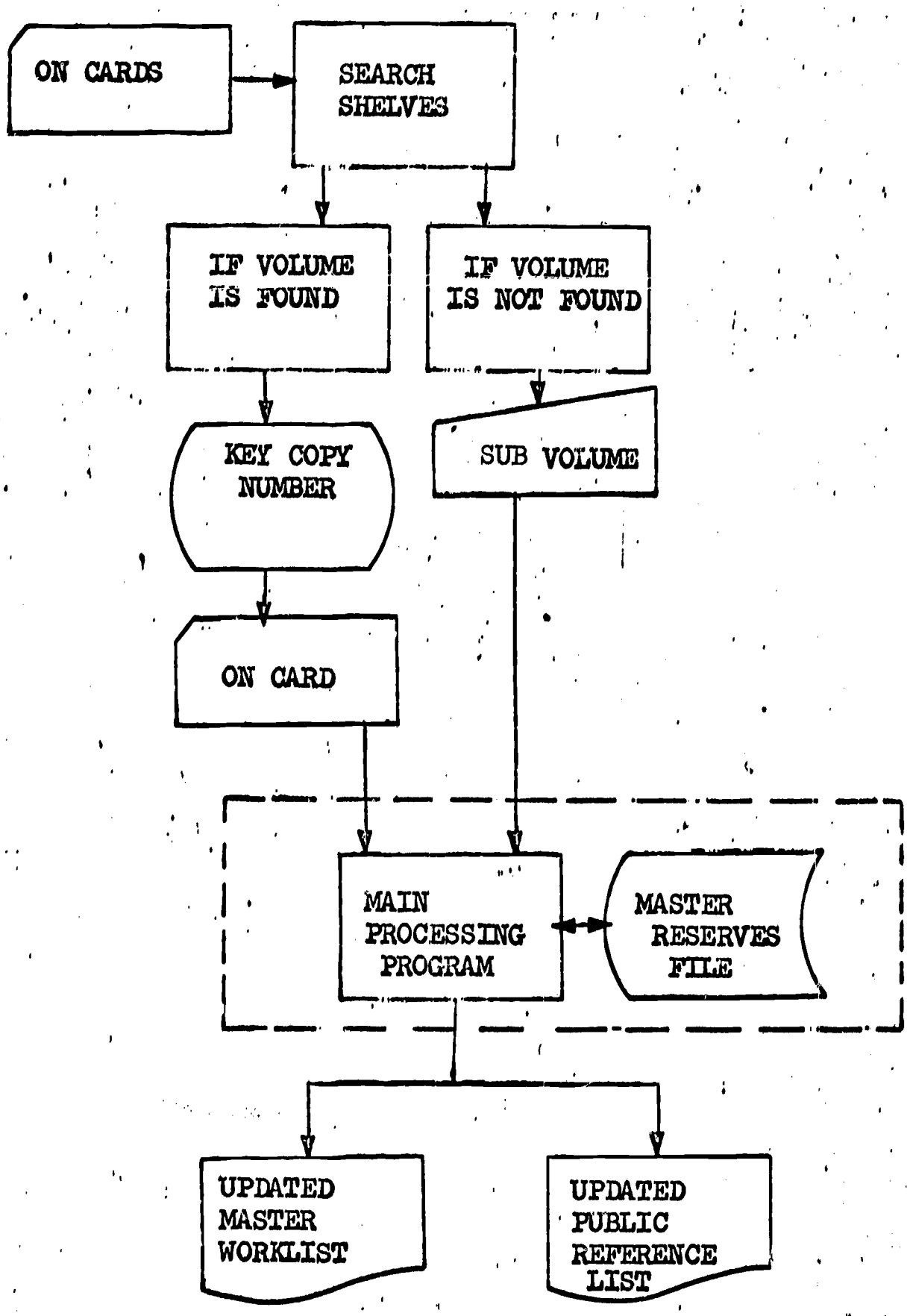


FIGURE 3
PROCESSING BOOKS ONTO RESERVE STATUS

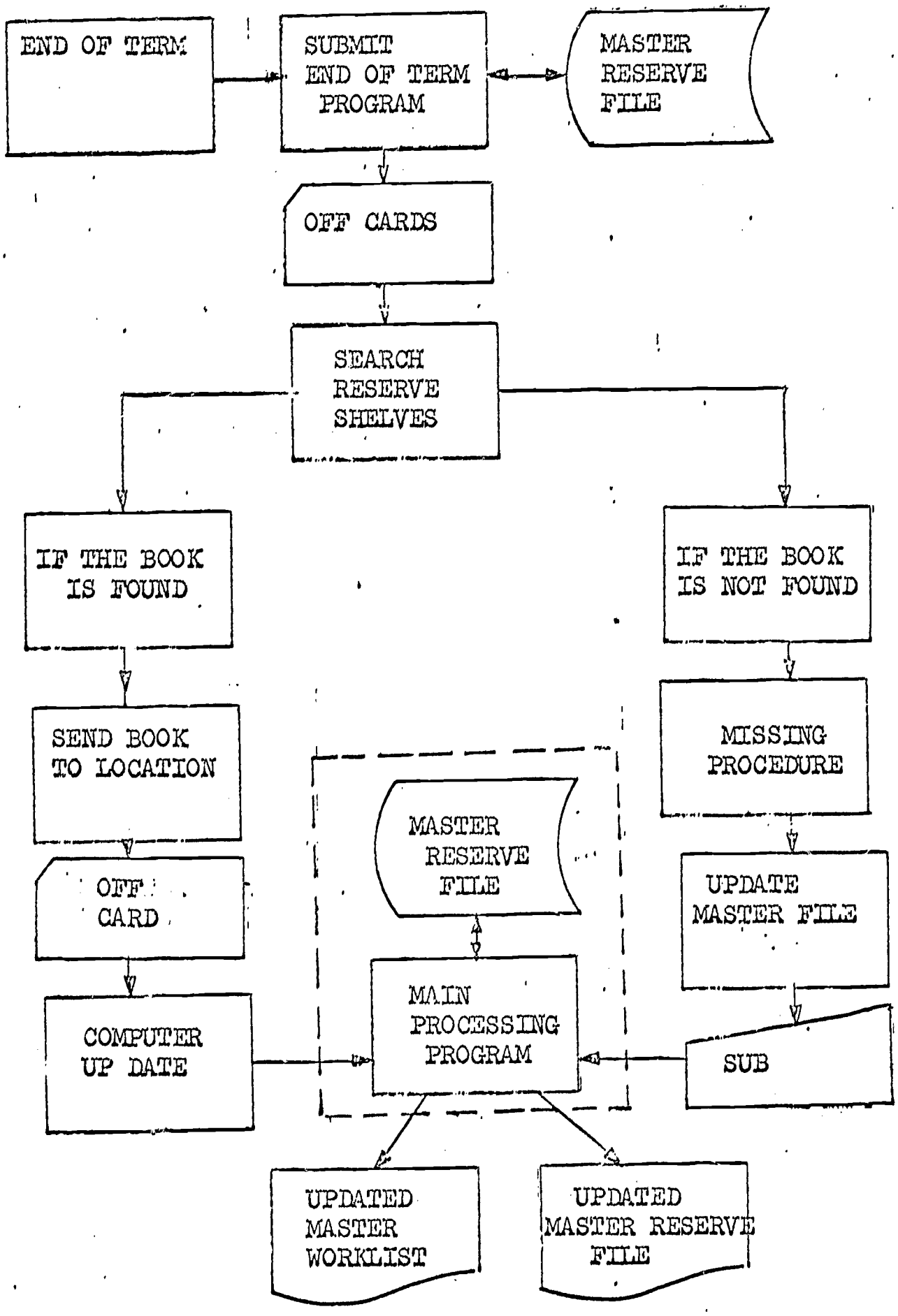


FIGURE 4
PROCESSING BOOKS OFF RESERVE STATUS

2.3.1.2. Bibliographic information. At present, minimal bibliographic data is included in the system. (In a future version of the system when a master bibliographic file is available, this part of the record may be augmented and taken automatically from the master file.) Bibliographic information consists of:

a) Author (Full Name)
b) Title (Usually Short Title Only)
c) Edition Statement
d) Date
e) Call number
f) Location (i.e., the particular collection from which copies are being taken)
g) Cross References

If a title already exists in the Master Reserve File (established by checking the Master Worklist) a message is sent to the computer and inventory processing is initiated automatically.

If a title does not appear in the Master Worklist, a search form, called a Verification Form, (Fig. 8), is filled out and checked against the main library catalog, where main entry is verified, call number added and any missing information supplied. If a title is not in the main catalog, the search form is sent to the order process.

2.3.1.3. Inventory Information: Inventory information consists of:

a) Copy numbers representing actual copies available.
b) Circulation restrictions.
c) Processing Status. (A plus (+) means that the item is being processed onto active reserve status; a minus (-) means that the item is being taken off of active reserve; no symbol indicates that the item is either on active reserve or in storage, depending upon whether there is a current course need.)

2.3.1.4. Order Information: Order information consists of the total number of copies that are on order for a given entry.

2.3.2. Data encoding: The system is designed to allow formal data encoding to occur at different points in the processing cycle, allowing the librarian to:

a. encode an entry after it is completely searched and verified

b. encode an incomplete entry and add additional data at a later time

c. revise information and/or status of an entry already resident in the file.

In each case, formal messages have been designed to facilitate this reporting function.

2.3.2.1. Encoding Entries: The system is designed to accommodate input in a variety of forms. The desired mode, that of direct on-line entry in a real time environment, was not attainable on a sustained level during development and implementation of the system. Therefore, three alternate input systems were developed. They are:

a. encoding on a 029 keypunch for batch submission and processing

b. encoding on a Dura tape typewriter for batch submission and processing.

c. Using an IBM 2741 terminal for on-line data entry and remote submission and batch processing.

There is little doubt that the most efficient and economical method of input is using an on-line terminal. Not only is there an increase in typing speed, but also a significant reduction of input typing errors. Whenever possible, input is done on the 2741 terminal; keypunch and tape-typewriter input is used primarily as a backup at present.

COLUMBIA UNIVERSITY LIBRARIES

RESERVE READING LIST FORM

Instructor:

Campus Address:

Telephone Extension:

Office Hours:

Course (Name and Number):

Expected Enrollment:

Return Completed List by _____

To: _____
(Department Library)

Comments:

For Library Use Call #		Citation (Include Author, Title, Edition, Place of Publication, Publisher, and Date). Place one check (✓) next to those items which will be used during the first three weeks of the course. Place two checks next to those items which students will be expected to buy.
		Kant, Immanuel. Groundwork of the Metaphysic of ✓Morals. T ns. and analysed by J.H. Paton. ✓✓New York, Harper & Row, 1964. EXAMPLE ONLY

FIGURE 5A

PROFESSOR RESERVE REQUEST FORM
(FRONT SIDE)

73(269)5M

Ack
Cy

COLUMBIA UNIVERSITY LIBRARIES

RESERVE READING LIST FORM

Sternstein
9-4-69

Instructor: Jerome L. Sternstein

Return Completed List by AUG 15 1969

Campus Address: Dept. of History
Fayerweather Hall

To: COLLEGE LIBRARY
(Department Library)

Telephone Extension: (?)

Comments:

Office Hours:
(?)

Course (Name and Number):
Age of Industrialism, C3137

Expected Enrollment:
25-100 (?)

For Library Use Call #		Citation (Include Author, Title, Edition, Pla of Publication, Publisher, and Date). Place check (✓) next to those items which will be u during the first three weeks of the course. two checks next to those items which students will be expected to buy.
	Need 05	Kant, Immanuel. Groundwork of the Metaphysic ✓Morals. T ns. and analysed by J.H. Pa ✓✓New York, Harper & Row, 1964. EXAMPLE
032127		~~✓Morgan, H. Wayne. From Hayes to McKinley Syracuse, Syracuse Univ. Press, 1966~~ Callow, Alexander. TheTweed Ring, 1966, Oxford Univ. Press.
059632		✓ Kirkland, Edward C. Industry Comes of Business, Labor, and Public Policy, 1860-1897, New York: Holt, Rinehart Winston, 1961
080108		✓ Josephson, Mat thew. The Politicos, 1 1898, (1938) Harcourt, Brace pb.
062855		✓ Kirkland, Dream and Thought in the Bu Community, Quadrangle pb.

R73(269)5M

14 b.

FIGURE 5B

PROFESSOR RESERVE REQUEST FORM AS COMPLETED BY THE PROFESSOR AND PROCESSED BY THE LIBRARIAN. (THE SIX-DIGIT NUMBERS ARE MASTER RESERVE SEQUENCE NUMBERS.)

Columbia University in the City of New York | New York, N.Y. 10027

THE LIBRARIES

INSTRUCTION SHEET FOR COMPLETING

THE RESERVE READING LIST FORM

PLEASE READ THE FOLLOWING INSTRUCTIONS BEFORE COMPLETING THE ATTACHED READING LIST FORM.

1. Please submit a separate list for each course that you will be teaching. Type one title per block. Alphabetize your lists by author. In general, titles are kept on current reserve for one semester only.

2. Provide as complete a citation as possible, following the example given. If a particular edition of a work is necessary, please specify the edition needed, otherwise the library will use the most readily available edition(s) of the work.

3. If possible, request in-print items rather than rare, expensive, or out-of-print items. The library has great difficulty in locating and acquiring out-of-print or costly materials in quantity. If the library is unable to locate any item which you have requested, you will be notified.

4. List only books which students are required to read. Do not list books which are for recommended or supplementary reading only. Please indicate those books which students are expected to buy. The Library will not place these books on reserve in quantity. If possible, indicate those items which will be used during the first three weeks of the course, so that the library can try to have the books available when they are needed.

5. The library should know the anticipated number of students enrolled in order to provide optimum service. If your estimated number should change significantly after you have submitted your list, please notify the library so that it can take proper action.

LISTS ARE PROCESSED IN THE ORDER THEY ARE RECEIVED.

PLEASE RETURN YOUR LIST PROMPTLY.

R73.1(467)2000

FIGURE 6

INSTRUCTION SHEET FOR THE RESERVE REQUEST FORM.

Columbia University in the City of New York | *New York, N.Y. 10027*

THE LIBRARIES

Butler Library

Since catalogs for courses to be given next fall are not available, we have examined the galley proofs for the bulletins of Columbia College, the School of General Studies, and Graduate Faculties. You are included in the list of persons who will be teaching in the fall term.

Would you please fill in the enclosed reserve reading list forms according to the attached instructions? The completed forms plus a copy of your syllabus should be returned to the College Library by August 15, 1969. The earlier the lists are returned to us for processing the more certain you can be that the required items will be on reserve for all semester. Extra forms are available upon request, x3534.

Only material which is required reading for all the students taking the course is placed on reserve. We do not put textbooks nor bound volumes of journals on reserve. We will xerox articles needed for the course. Reserve materials circulate for only two hours during the day and overnight from 3 p.m. until 10 a.m. the following morning.

It is important that you indicate on the forms the expected enrollment or the number of students who registered for the course last fall. Depending on the size of your class, the number of items to be read, and the type of assignment made, it may be more feasible for the books to remain on the open shleves without restrictive two-hour circulation.

Mrs. Herschman or I will be happy to answer any questions you may have about the reserve book operation. You can reach us, Monday through Friday from 8:30 until 5 at x3534, or x4338.

Yours truly,

(Mrs.) Ann M. Wilkinson
College Librarian

AW/[illegible]

FIGURE 7

COVER LETTER TO ACCOMPANY THE INSTRUCTION SHEET AND THE PROFESSOR RESERVE REQUEST FORM.

Date _____

COL BC Other

Book

Copies needed: _____
Copies on current reserve _____
Copies collected COL _____
BC _____
Copies recalled COL _____
BC _____

In Print?
Place _____
Publisher _____
Date _____
Price _____

Request _____
Date requested _____
Received _____

Missing
Note written _____

Periodical article
Copies needed: _____
Copies on current reserve _____
Copies in xerox files _____
Collected
Request Volume _____
Sent to xerox _____
Missing _____
Note written _____

Copy numbers
College
BC
Other

Courses

FIGURE 6A
VERIFICATION FORM (USED TO SEARCH TITLES NEW TO THE MASTER RESERVE FILE)

Date 9-18-69

COL BC Other

6L
506
S125
V.1

Muller-Vollmer, Kurt
Towards a Phenomenological Theory of Literature
1963

Book

Copies needed: 1
Copies on current reserve _____
Copies collected COL _____
BC _____
Copies recalled COL _____
BC _____

In Print?
Place _____
Publisher Humanities
Date _____
Price 6.00

Request _____
Date requested _____
Received _____

Missing
Note written _____

Periodical article
Copies needed: _____
Copies on current reserve _____
Copies in xerox files _____
Collected
Request Volume _____
Sent to xerox _____
Missing _____
Note written _____

Copy numbers
College
BC
Other

Courses Eng 6405x Said

FIGURE 6B
EXAMPLE OF A COMPLETED VERIFICATION FORM

Source documents in the form of Verification Forms, or request forms from professors, are sent to the input typist. The source documents contain all of the information gathered about an entry, together with general input processing instructions. No special pre-editing or coding is required; the typist routinely identifies the types of data and processing needed and supplies the appropriate data code and/or processing function code as part of the keying effort.

2.3.2.2. Entering a Record. (The terms "entry" and "record" are used interchangeably.) An entry as used in the system differs from the normal concept of a bibliographic entry. As the system is designed to maintain control of individual physical volumes; a record is kept of each discreet physical item. On one level, this means discreet listing of all multiple copies. On another level, this means separate entry for each volume of a multi-volume work. Thus, a two-volume work is entered into the reserve file as two entries, one for the first volume and its copies; the second for the second volume and its copies.

```
ENT
AUTH     ADAMS, HENRY
TITL     FORMATIVE YEARS.  V1
DATE     1948
CALL     G 973  AD1231 V1
COPY     01
Q

ENT
AUTH     ADAMS, HENRY
TITL     FORMATIVE YEARS.  V2
DATE     1948
CALL     G 973  AD1231  V2
COPY     1
Q
```

2.3.2.3. Input for File Building. "File Building" is defined as entering a new record into the Master Reserve File. This can be done by entering a name plus any other information that is available. This allows the librarian to use the system as a working area imputing as little or as much information as is available and adding to it over a period of time. The computer coordinates all of these

bits of information and processes an entry automatically when sufficient data has been accumulated or reminds the librarian when additional information is required.

Each bit of data is tagged with machine interpretable mnemonics at the time of input typing. A new line is typed for each data element.

EXAMPLE:

```
ENT
AUTH     AARON, DANIEL
TITL     AMERICA IN CRISIS
DATE     1952
CALL     C 973     AA75
COPY     01  02  03  04  06  07  08  09  10
Q
```

In addition to typing data elements and codes, each entry must have a transaction type code, which instructs the computer to do one of several operations. Several transaction codes are identified; these include:

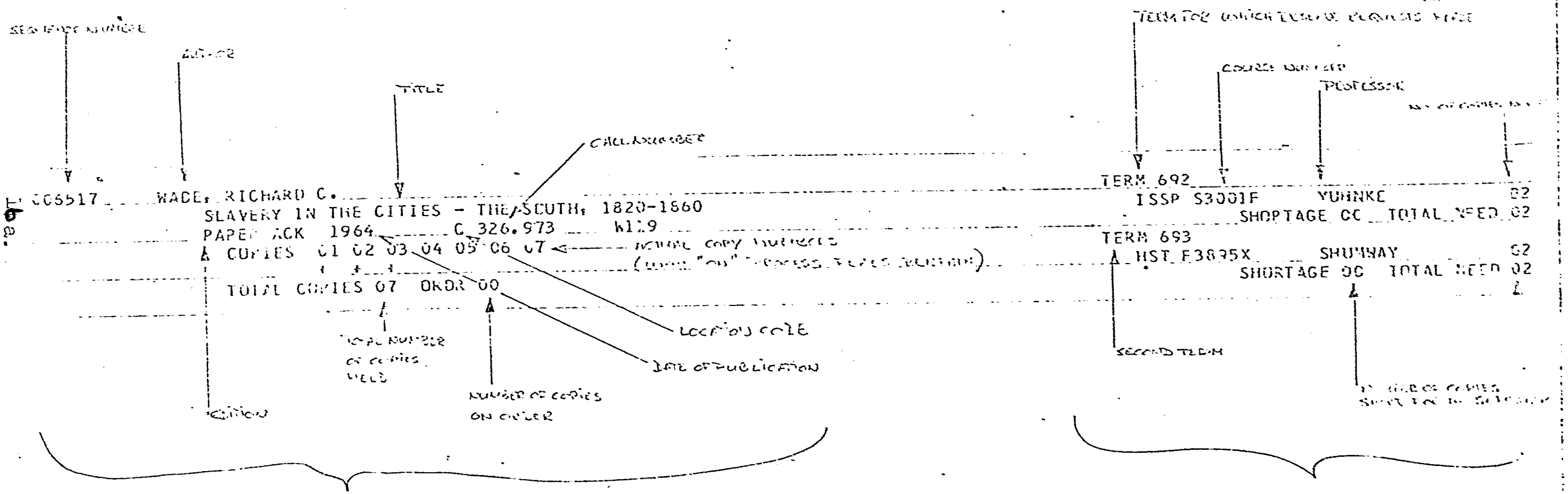
ENT (to enter a new record)
ADD (to add course, inventory and order information to a record)
SUB (to delete course, inventory and order information from a record)
MOD (to modify bibliographic information in a record)
DEL (to delete complete record from the file)

(These transactions are discussed in detail in Section 2.3)

In typing an entry, the typist enters the transaction type code first, types the tagged data elements, and terminates the message by typing a "Q".

EXAMPLE:

```
ENT
AUTH     ABIR, MORDECHAI
TITLE    ETHIOPIA - THE AGE OF THE PRINCES
DATE     1968
```



BIBLIOGRAPHIC, INVENTORY, AND ORDER INFORMATION

COURSE INFORMATION
(A TOTAL OF 5 COURSES AND 3 SEMESTERS CAN BE ACCOMMODATED)

FIGURE 9

SAMPLE WORKLIST ENTRY

RESERVES WORKLIST OF 8/19/69 SUPPLEMENTS WORKLIST OF 8/15/69

TERM 693

028575 KANT, IMMANUEL
PROLEGOMENA TO ANY FUTURE METAPHYSICS
C 193KS F45
COPIES 01 02 03 04
+ + + +
TOTAL COPIES 04 ORDR 00
HST F3411X HACKETT
SHORTAGE 00 TOTAL NEE

TERM 692

018851 KAS F, ALLEN
PROSPECTS FOR SOVIET SOCIETY
1968 B DK274.3 1968 K3 1965A
COPIES 01 02 03
+
TOTAL COPIES 03 ORDR 03
GOVT S35250 KRISCH
SHORTAGE 00 TOTAL NEE

TERM 693

GEOG G4401X LEWIS
SHORTAGE 00 TOTAL NEE

TERM 693

086226 KAY, GEORGE
CHIEF KALABA S VILLAGE
1964 G 392.6989 R34 NO.35
COPIES 01
+
TOTAL COPIES 01 ORDR 00
GEOG G4501X HANCE
SHORTAGE 02 TOTAL NEE

TERM 693

118931 KAY, GEORGE
CHIEF KALABAS VILLAGE
1964 B D1963.K2 .K3
COPIES 01
+
TOTAL COPIES 01 ORDR 00
GEOG G4501X HANCE
SHORTAGE 02 TOTAL NEE

TERM 693

111710 KEY, VLADIMIR O.
AMERICAN STATE POLITICS
1956 C 353.9 K52
COPIES 01 02 03 04 05 06 07 08
+ + + + + + + +
TOTAL COPIES 08 ORDR 00
GOVT C3311X GOETCHEUS
SHORTAGE 00 TOTAL NEE

TERM 692

034 KEY, VLADIMIR O.
POLITICS PARTIES AND PRESSURE GROUPS
1964 C 329 K52121
COPIES 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
+ + + + + + + +
TOTAL COPIES 16 ORDR 00
GOVT S3311J PIOUS
SHORTAGE 00 TOTAL NEE

TERM 693

GOVT CC C1205X GOETCHEUS-PIOUS
GOVT C3311X GOETCHEUS
GOVT F3311X PIOUS
SHORTAGE 00 TOTAL NEE

TERM 692

112 KEY, VLADIMIR O.
PUBLIC OPINION AND AMERICAN DEMOCRACY
1964 C 304.5 K52
COPIES 01 02 03 04 05 06 07 08 09 10 11 12 13 14
+ + + + + + + +
TOTAL COPIES 14 ORDR 00
GOVT S3311J PIOUS
SHORTAGE 00 TOTAL NEE

TERM 693

GOVT CC C1205X GOETCHEUS-PIOUS
GOVT F3311X PIOUS
SHORTAGE 00 TOTAL NEE

FIGURE 10

SAMPLE PAGE FROM THE MASTER WORKLIST.

HARTMAN, GEOFFREY H.
WORDSWORTH'S POETRY 1787-1814
1964

HASKINS, GEORGE L.
PETITIONS OF REPRESENTATIVES IN THE PARLIAMENTS OF EDWARD I
XEROX ED.

HASLUCK, F.W.
CHRISTIANITY AND ISLAM UNDER THE SULTANS. V1
1929

HASLUCK, F.W.
CHRISTIANITY AND ISLAM UNDER THE SULTANS. V2
1929

HALNY, E.
EVIDENCE AT POINT OF PIKES FOR A PREHISTORIC MIGRATION FROM N. ARIZ.
XER X ED.

HAUSER, ARNOLD
SOCIAL HISTORY OF ART. V2

HAUSER, PHILIP M.
HANDBOOK FOR SOCIAL RESEARCH IN URBAN AREAS
1965

HAUSER, PHILIP M.
STUDY OF POPULATION
1964

HAUSER, PHILIP M.
STUDY OF URBANIZATION
1965

HAVIGHURST, ALFRED F.
PIERCE THESIS
1958

HAWLEY, AMOS
HUMAN ECOLOGY
1950

HAWLEY, AMOS H.
ECOLOGY AND HUMAN ECOLOGY
XEROX ED. 1944

HAWKIN, LAWRENCE
GOOD CITY
1966

HAYDEN, THOMAS
IS THERE A MILITARY INDUSTRIAL COMPLEX
XEROX ED.

HAYES, CARLTON J.H. - GENERATION OF MATERIALISM
SEE RISE OF MODERN EUROPE. V17: GENERATION OF MATERIALISM BY C. HAYES

HAZARD, JOHN
SOVIET LEGAL SYSTEM. V1
2ND ED.

FIGURE 11
SAMPLE PAGE FROM THE
POPULATION REFERENCE LIST.

```
CALL    C DT384  S.A55  1968
COPY    01  02
ORDR    03
PROF    WRIGHT
CRSE    HST  G4920X
TERM    693
NEED    05
Q
```

2.3.2.4. Update Input. Records in the file are updated in several ways, using the various processing functions. The most frequently used processing function is the ADD function code. The steps for adding information are as follows:

1. Type the function code (in this case ADD).
2. Type the entry sequence number (a unique code assigned by the computer; see section 2.3.1.2. below for a detailed description).
3. Type the data element tag immediately followed by the data to be added.
4. Type a "Q".

Several data elements can be added at one time. In the following example inventory and order information are being added to an entry. In the following example, PROFessor, CouRSE, TERM, NEED, and ORDeR information are being added.

```
ADD     002457
PROF    LUBITZ
CRSE    ECON  C1501X
TERM    693
NEED    05
ORDR    05
Q
```

In a similar fashion, information can be DELeted from an entry by using the SUBtract function.

```
SUB     002457
PROF    LUBITZ
CRSE    ECON  C1501X
TERM    693
NEED    05
ORDR    05
Q
```

In the above example PROFessor, CouRSE, TERM, NEED and ORDeR information will be deleted from the entry.

Using the MODify function, information within an entry is changed. In this example, the author field is modified.

```
MOD     023285
AUTH    ABERNATHY, THOMAS P.
Q
```

In this example both author and title are modified.

```
MOD     005438
AUTH    ABIR, MORDECAI
TITL    ETHIOPIA - THE AGE OF THE PRINCES
Q
```

Using the DELete function, an entry can be completely deleted from the file. In this example, the entire entry in the Master Reserve File will be erased.

```
DEL     023285
Q
```

2.3.2.5. File contents. The main reserve file is stored on an IBM 2311 Disc Pack in sequence number order. As new entries are input, they are added to the end of the file and assigned a unique sequence number.

As outlined above, four types of information are manually input into the system: bibliographic which remains permanently resident or until DELeted; inventory which remains relatively permanent but may be SUBtracted or ADDed to; course information which is retained for three semesters and then fed to an historical file; and order information which remains only as long as an order is outstanding.

Additional information is added automatically by the program to a record at different times to indicate status change and certain other conditions. These include:

1. Sequence number. As each new entry is added a unique 6 digit sequence number is added to identify a record.

2. Processing status. Plus (+) and minus (-) symbols are added to indicate whether an item is being processed onto or off of reserve status. (A machine readable inventory card is produced each time a status change occurs; see 2.4.1.3. below for a description of these products.)

3. Total need. Individual course needs for a semester are added together to give the total number of copies needed for a particular semester.

4. Total inventory. The total number of copies included in the inventory field is calculated and printed as the total number of copies available.

5. Copy shortage. All course needs for a title for a particular semester are added together then subtracted from available inventory to compute Copy Shortage.

2.4. Processing Functions

The reserve computer programs are designed and written to accept data and instructions at various points in the processing cycle and automatically initiate action in the form of worklists, inventory processing cards, and public reference lists. The array of processing functions included are few in number and relatively simple to understand and use. They can be used singly or in combination providing the librarian with an extremely sophisticated combination of processing controls.

In the following section, the computer processing functions included in the system are described and examples of how they are used are given.

2.4.1. ENTer. The enter function is used to insert a new entry into the computer file. The computer will take one of several actions depending on the amount of information entered.

2.4.1.1. Establishing a record. The minimum amounts of information that may be entered to create a new record is author.

2.4.1.2. Sequence number. Every new record entered is assigned a unique, six digit sequence number by the computer. This number reflects the record's location in the computer file and is printed out in the librarian's worklist. All subsequent actions affecting a record must include this sequence number for reference purposes.

2.4.1.3. ON Inventory Cards. If course information is entered for a current semester the computer will calculate the total number of copies needed and compare this figure with the available inventory. If no inventory exists, warning messages in the form of punched cards are produced. ON cards are produced equal to the number of copies needed. A warning message is produced if the number of available copies is less than the copies listed as needed.

2.4.2. ADD. The ADD function is used to add information to a record. The ADD function can be used at any time to add information to the following data fields.

2.4.2.1. Course Data Field. Adding course information will cause the computer to increase the total number of copies needed and to produce additional ON Inventory Cards and/or warning messages.

2.4.2.2. Inventory Data Field. As new copies are added, the computer will recalculate shortages and need figures.

2.4.3. SUBtract. The SUBtract function is used to delete information from a record. The SUBtract function can be used at any time to delete information from the following data fields:

2.4.3.1. Course Data Field. Deleting a course will cause the computer to recalculate the number of copies needed, adjusting the shortage figure if necessary.

2.4.3.2. Inventory Data Field. Deleting copies from the inventory field will cause the computer to recalculate the total number of copies available and adjust the shortage figure if necessary.

2.4.4. MODify. The MODify function is used to change information in the bibliographic data field. In order to modify any part of the bibliographic data field, the entire data element is input, replacing the information already in the record.

2.4.5. DELete. The DELete function is used to cancel an entire record from the computer file.

2.4.6. CHK. The CHecK function is used to correct a status symbol for any copy number in the inventory data field.

2.4.7. ON. The ON function is initiated by the annotated ON inventory card. As ON inventory cards are returned to the computer, the plus (+) status code is erased from the appropriate copy number in the inventory data field.

2.4.8. OFF. The OFF function is initiated by the manually annotated OFF inventory cards. As OFF inventory cards are returned to the computer, the minus (-) status code is erased from the appropriate copy number in the inventory data field.

(ON inventory cards are produced by the computer as course needs are entered into the file. This occurs at any time with processing peaks occuring immediately before or just after the beginning of a semester. OFF cards are produced as part of the Term End Program once a semester.)

2.5. Output.

The computer is programmed to produce a variety of lists and machine readable records on demand. The Master Worklist, for example, can be produced on a regular schedule (e.g., daily, weekly, monthly, or whenever it is needed). During the interval between Master Worklist runs, Cummulative Supplements can be produced, again when needed. Other lists, such as course lists, are produced on-demand. Machine readable ON cards are produced automatically as semester status changes, while machine readable OFF cards are produced on-demand. This flexibility has been incorporated into the system to allow the librarian to exert as much (or as little) control over processing cycles as is necessary.

2.5.1. Master Worklist. The Master Worklist is a complete listing of all entries in the master reserves file, and may be produced in its entirety or as a cumulative supplement each time the master file is updated. Figure 9 is a sample page of this list and should be consulted when reading the following discussion of these elements. Figure 10 represents a typical page from a Master Worklist. The Master Worklist is the master guide to the reserve collection, and is referred to for many reasons. Its primary use is for staff reference and in processing new reserve requests from professors.

Bibliographic and inventory information appear on the left side of the page, with author and sequence number offset in a hanging indention to facilitate scanning of entries. Course information appears on the right side of the page. All data elements are included in full.

2.5.1.1. Bibliographic Information. Sequence number and author appear on the first line of the entry; title is printed on the second line; and edition, date of publication, and call number appear on the third.

2.5.1.2. Inventory and Order Information. Individual copy numbers appear immediately below bibliographic information. The maximum number of copies allowable is 99.

Status symbols, or processing flags, appear immediately below the copy numbers to which they apply. (If there are no flags for a line, the output is condensed and no blank line is left below a copy number line.)

The total number of copies in inventory and the number of copies on order is printed on the last line of the inventory field.

2.5.1.3. Course Information. Course information for the current and two future semesters can be included for any one entry. Semesters are identified as three digit numbers, the first two digits representing year and the third representing semester within that year. (i.e., 1 = Spring, 2 = Summer session, and 3 = Fall). A total of eight (8) different courses are allowed among these three semesters. Each course is printed on one line under the appropriate semester and includes course number, professor name, and number of copies needed. On a separate line for each semester, the total need and copy shortage is printed. The computer generates these summary figures each time the course field is updated. If there is no course listed for a semester, all data for that term are suppressed.

2.5.2. Supplementary Worklist. As mentioned above, the Worklist can be produced in two forms, either as a Master List or as a Supplement. Which of the two lists is produced is decided before a computer run is submitted. The Supplementary List is cumulative, containing entries that have been entered or referenced since the last Master Worklist run. At any one time, no more than two lists need be consulted to ascertain the status of an entry in the file. All entries in the Supplementary List are incorporated in the Master Worklist each time a Master run is done.

During peak processing periods, Master Worklist runs can be submitted as often as needed. Experience has indicated that weekly runs with Supplementary runs on each of the intervening weekdays is adequate. During slack periods Master and Supplementary runs may be varied as wanted. Experience has indicated that monthly master runs with weekly Supplementary runs is adequate.

2.5.3. Public Reference List. (Figure 11). The Public Reference List is produced by the main processing program on the same

schedule as a Master or Supplement Work List. The Public Reference List is an extract of the Worklist and contains a three-line entry (author, title, edition and date) for those entries on active reserve. No other entries in the reserve file appear in the Public List Reference.

The Public Reference List is alphabetically arranged by author, and subarranged by title. It can be printed in the form of a Master and Cumulative Supplement on the same basis as the Worklist. The Public List is produced in multiple copies and is used for circulation and reference purposes.

2.5.4. Error List (Figure 12). An error list is produced for both Master and Supplementary runs. The Error list includes input typing errors (i.e., format errors, tagging errors), sequence number errors (the automatically generated sequence number contains a check digit), and inventory card matching errors (i.e., an ON card is submitted for a non-esistent copy number). In addition, warning messages are included.

Processing statistics for a complete run are printed at the end of the error list. These include the number of records referenced, the number of ON cards produced, the number of Warning cards produced, and the number of transactions for each of the different processing functions submitted.

2.5.5 Sequence List and Supplement.(Figure 13). A master Sequence List in numerical order is produced once or twice a year, and contains, for each entry in the master reserve file, the sequence number, a portion of the author field (32 characters), a portion of the title (5 characters). The list serves as a numerical index to the Master File and is used for error correction.

A Sequence List supplement, in the same basic format as the Master Sequence List, is produced with each processing run and contains all new entries entered into the file. Supplements are bound with the Master Sequence List.

2.5.6. Professor List. (Figure 14). The Professor List is produced on demand by a special program several times a semester and consists of a series of separate lists by professor's name and course number listing all titles placed

on reserve for the current semester. Each entry contains all bibliographic data included in the Master File (except location). Entries in each list are divided into two categories, those which are actually on active reserve and those which are "in process".

Copies of the Professor List are put out for reference and are used by library staff and public to identify titles on reserve for a particular course. In addition, individual course lists are sent to the respective professors.

2.5.7. Inventory Check List. During the same run which produces the Professor List, an Inventory Check List is produced. It is arranged alphabetically and contains complete bibliographic information for entries which have an active course need (that is, titles which have been requested by a professor for reserve for the current semester) but for which no copies are on active reserve or on order. The list is used as a reminder to the librarian of entries that may need follow-up action.

2.5.8. "ON" Processing Cards (Figure 15). "ON" processing cards in the form of machine readable punched cards are produced by the main processing program during both master and supplementary runs whenever a new course need is ENTered or ADDed for an entry. As ON processing cards are produced a plus (+) status symbol is added to each copy number of the entry in the Reserve File. Data on these cards include sequence number, partial author and call number (or title, if the call number is not used). Space is provided for manually keying a two-digit copy number. ON cards are produced for as many copies as the need indicates, up to the total number of copies in the inventory for that entry.

ON cards are used to collect physical volumes from various locations and as a unit searching record for copies that cannot be located. When a copy is found, the copy number is written on the face of the card, and returned to the input staff where copy number is keypunched into the card. The ON card is then returned to the computer, causing the ON processing flag to be deleted from that copy number in the file, thus indicating that that copy is now on active reserve.

2.5.9. Warning Message Cards (See Figure 16). Certain warning messages relating to the processing of copies onto reserve are produced as punched cards instead of being printed on the error list. These messages are produced when a possible

```
LAST RUN 0006  9/12/69 693  MASTER  DIN=1 OUT=4 WIN=2 EXT=2 145748  9/12/69
FIRST CARD READ: RUN=0007 SUPPL, PUB     COURES 9-15-69
PUBLIC LIST INITIATED
THIS RUN 0007  9/15/69 693 .SUPPL.  DIN=2 OUT=1 WIN=4 EXT=3 145748  9/12/69
THE FOLLOWING IS NOT A VALID FORMAT, AND HAS BEEN REJECTED
  ADD 071528 (AUTH=
  AUTHORAKE, ST. CLAIR
  TITLBLACK METROPOLIS.  V2
  DATE1945
  CALLC 326.       D781
  COPY 01 0  3
  PROFBURFL
  CRSEANTH V3100X
  TERM693
  NEED 05
CANNOT LOCATE COURSE:
COURSE INFORMATION NOT PROCESSED.
  SUB 072969 (AUTH=INTERNATIONAL SYMPOSIUM ON ANTHROPOLOGY.  1952
  BROKEAD
  CRSEANTH GR271XTERM
  TERM693
INVALID SEQUENCE NUMBER
  ADD ADD 0300..
  PROFEOX-PUCHALA
  CRSEGOVT 36801X
  TERM693
  NEED 03
  0
INVALID SEQUENCE NUMBER:
  ADD 024856 (AUTH=
  PROFEOX-PUCHALA
  CRSEGOVT 56801X
  TERM693
  NEED 06
INVALID SEQUENCE NUMBER:
  ADD 060008 (AUTH=
  PROFEOX-PUCHAL
  CRSEGOVT 56801
  TERM693
  NEED 02
INVALID SEQUENCE NUMBER:
  ADD 133341 (AUTH=
  PROF
  CRSE
  TERM693
  NEED 01
ADDED DUPLICATE COPY  01 009999 BARBER, BERNARD                                    WARNING ONL
ADDED DUPLICATE COPY  03 003892 BAILEY, HARRY A . JR                               WARNING ONL
ADDED DUPLICATE COPY  04 003892 BAILEY, HARRY A . JR                               WARNING ONL
ADDED DUPLICATE COPY  09 062293 HANSEN, ALVIN H                                    WARNING ONL
ADDED DUPLICATE COPY  10 107997 PALMER, R.R.                                       WARNING ONL
ADDED DUPLICATE COPY  05 139550 BLOCH, MARC                                        WARNING ONL
NOT A VALID HEADER: DISCARD OLD ON/OFF CARDS. 007507 C 332     <523                KEYNES, JOHN M07
NOT FLAGGED PLUS:   ON  009954 SAMUELSON, PAUL A.                C H834     S448 1967          05
NOT FLAGGED PLUS:   ON  009954 SAMUELSON, PAUL A.                C H834     S448 1967          05
```

FIGURE 12

SAMPLE PAGE FROM THE ERROR LIST.

RESERVES SEQUENCE LIST AS OF RUN 0016 ON JUNE 16, 1969

135268	WARNER, WILLIAM L.	YANKE	135855	MEREDITH, GEORGE	ORDEA
135279	WARNER, WILLIAM L.	YANKE	135866	TROLLOPE, ANTHONY	BARCH
135280	WARNER, WILLIAM L.	YANKE	135877	TROTSKY, LEON	NEW C
135291	WADDELL, HELEN J.	MEDIE	135888	THACKERAY, WILLIAM M.	HISTO
135305	TROTSKY, LEV	TERRO	135903	I CITICS AND EXPERIENCE	EDITE
135316	TORRENTE BALLESTER, GONZALO	TEATR	135914	U.S. TASK FORCE ON THE ADMINISTR	TASK
135327	STALIN, JOSEPH	LENIN	135925	MARTIN, LAWRENCE A., ED.	NEWTR
135338	SCHWARZ, SOLOMON M.	LABOR	135947	MANPOWER STRATEGY FOR THE METROP	EDITE
135348	PARRINDER, EDWARD G.	RELIG	135958	BEN ORIN SKY, AARON	TOLED
135350	LENIN, VLADIMIR I.	SELEC	135969	HALKIN, SIMON	MODER
135361	LENIN, VLADIMIR I.	COLLE	135970	VALLE-INCLAN, RAMON	CUERN
135372	ASHBY, WILLIAM R.	DESIG	135981	BEN ORINOVSKY, AARON	TOLED
135383	KHRUSHCHEV, NIKITA S.	CRIME	135992	ALBERTI, RAPHAEL	HOMBR
135394	KOLLONTAI, ALEKSANDRA M.	WORKE	136007	ELIOT, GEORGE	MILL
135408	KOCHAN, LIONEL	RUSSI	136018	FORD, GEORGE H.	DICKE
135419	KENNEDY, CHARLES W.	ANTHO	136029	ELIOT, GEORGE	MIDDL
135420	HEMPEL, CARL	ASPEC	136030	ELIOT, GEORGE	ESSAY
135431	HAYWARD, MAX ED.	LITER	136041	DICKENS, CHARLES	BLEAK
135442	GARCIA LORCA, FEDERICO	OBRAS	136052	BRADBROOK, MURIEL C.	ANDRE
135453	GARCIA LORCA, FEDERICO	OBRAS	136063	FORD, BORIS	FROM
135464	FIELD, MARGARET J.	SEARC	136074	CRUITWELL, PATRICK	SHAKE
135475	JEROME, SAINT	SELEC	136085	BRADLEY, A.C.	SHAKE
135486	ESCHENBACH, WOLFRAM VON	PARZI	136096	ENSOR, ROBERT	ENGLA
135497	EPSTEIN, ARNOLD L.	POLIT	136108	DOUGLASS, ELISHA P.	REBEL
135512	ROMANCE OF THE ROSE	TRANS	136111	HUFF, DARRELL	HOW T
135523	ROMANCE OF THE ROSE	TRANS	136122	HAZAZ, HAYYIM	KOL K
135534	ROMANCE OF THE ROSE	TRANS	136133	HAZAZ, HAYYIM	KOL K
135545	VAN DEN BERGHE, PIONE L. ED.	AFRIC	136144	HAZAZ, HAYYIM	KOL K
135556	DEUTSCHER, ISAAC	RUSST	136155	HAZAZ, HAYYIM	KOL K
135567	BERGER, MORROE	ARAB	136166	HAZAZ, HAYYIM	KOL K
135578	SOVIET LEGAL PHILOSOPHY	TRANS	136177	HAZAZ, HAYYIM	KOL K
135589	BANTON, MICHAEL	WEST	136188	HAZAZ, HAYYIM	KOL K
135590	PRUDENTIUS. V1	OEB C	136199	IMAGE AND REALITY IN WORLD POLIT	EDITE
135604	PRUDENTIUS. V2	LOEB	136203	JOHNSTON, HUGH A.S.	FULAN
135615	AUGUSTINE, SAINT	CONFE	136214	JUMP, JOHN D.	TENNY
135626	BENEDICTUS	RULE	136225	DIAZ, JANET W.	TWENT
135637	BERLINER, JOSEPH S.	FACTO	136236	AGNON, SAMUEL Y.	BRIDA
135648	CARR, EDWARD H.	SOCIA	136247	AGNON, SAMUEL Y.	KITVE
135659	DICKENS, CHARLES	GREAT	136258	AGNON, SAMUEL Y.	KITVE
135660	DICKENS, CHARLES	MARTI	136269	AGNON, SAMUEL Y.	KITVE
135671	DICKENS, CHARLES	MARTI	136270	AGNON, SAMUEL Y.	KITVE
135682	SPECTATOR	ED. B	136281	AGNON, SAMUEL Y.	KITVE
135693	SPECTATOR	ED. B	136292	AGNON, SAMUEL Y.	KITVE
135707	SPECTATOR	ED. B	136306	AGNON, SAMUEL Y.	KITVE
135718	SPECTATOR	ED. B	136317	AGNON, SAMUEL Y.	KITVE
135729	SPECTATOR	ED. B	136328	AGNON, SAMUEL Y.	BETRO
135730	VALLE-INCLAN, RAMON	OBRAS	136339	AGNON, SAMUEL Y.	GUEST
135741	WILLIAMS, HAROLD	MACRO:	136340	AKINJOGBIN, J.	DAHOM
135752	ZSCHOCK, E.K. ED.	ECONO	136351	ALVAREZ, ALFRED	SCHOO
135763	U.S. CONGRESS JOINT ECONOMIC CO	REVEN	136362	BARNET, RICHARD	INTER

FIGURE 13

SAMPLE PAGE FROM THE SEQUENCE NUMBER LIST.

COLLEGE LIBRARY 4/09/69 503

PROFESSOR DIAMOND RESERVE LIST FOR: SOC 664995Y SPRING 1969

BARZUN, JACQUES AND GRAFF, HENRY
MODERN RESEARCH
1957 C 829.69 B269

BECKER, CARL L
HEAVENLY CITY
1946 B 8802 .B4

CAHNMAN, WERNER JACOB
SOCIOLOGY AND HISTORY, THEORY AND RESEARCH
1964 B 301 C119

CAMBRIDGE MEDIEVAL HISTORY
ESTATES BY C.H. MCILWAINE
1932 C 940.1 C14

CAMBRIDGE MEDIEVAL HISTORY
ESTATES, BY MCILWAINE, C. H.
1932 C 940.1 C14

COBBAN, ALFRED
SOCIAL INTERPRETATION OF THE FRENCH REVOLUTION
1964 B 944.04 C6343

DIAMOND, SIGMUND
CREATION OF SOCIETY IN THE NEW WORLD
1963 C 300.73 D563

MERTON, ROBERT K.
SOCIAL THEORY AND SOCIAL STRUCTURE
1957 C 301 M5581

RICHARDSON, H.G.
THE ORIGINS OF PARLIAMENT, TRANSACTIONS OF THE ROYAL HISTORICAL SOCIETY
XEROX ED.

RUDE, GEORGE F
THE CROWD IN THE FRENCH REVOLUTION
1959 B 944.04 R831

SAYLES, GEORGE OSBORN
THE MEDIEVAL FOUNDATIONS OF ENGLAND
1950 C 942 SA99

TEMPLEMAN, GEOFFREY
HISTORY OF PARLIAMENT TO 1400 IN THE LIGHT OF MODERN RECORDS
XEROX ED.

**** THE FOLLOWING TITLES ARE BEING OBTAINED FOR RESERVE ****

GOTTSCHALK, LOUIS
FRENCH REVOLUTION
1931 B 904 P43

HALEVY, ELIE
HISTORY OF THE ENGLISH PEOPLE
1961 C 942.08 H13311

SAVELLE, EDWARD N.
AMERICAN HISTORY AND THE SOCIAL SCIENCES
1964 C E175 .S36

STUBBS, WILLIAM
CONSTITUTIONAL HISTORY OF ENGLAND-VOLUME II, CHAPTER XV
1891 B 942.400 S781

FIGURE 14

SAMPLE PROFESSOR LISTS
TITLES ON RESERVE FOR
ONE COURSE.

copy shortage may exist, when there are outstanding OFF cards for an entry which has an additional need, or when the same course is ADDed twice. These cards are used for manual processing only and are not resubmitted to the computer.

2.5.10. "OFF" Processing Cards (Figure 17). OFF cards, produced by a special "End of Term Program", are produced once a semester. The OFF card has the same general format as the ON inventory card described above differing only in that the message reads OFF instead of ON and the inclusion of an actual copy number. As OFF cards are produced a minus (-) status symbol is added to the respective copy number in the file.

OFF cards are used to deprocess volumes from the reserve shelves, and as searching records for copies that cannot be located. Once a copy is deprocessed (i.e., taken from the reserve shelf and returned to its original location), its OFF card is returned to the computer, and the minus sign (-) is deleted from the appropriate copy number.

OFF cards are only produced for entries which have no current or future course NEED. For example, if three copies of a title are on active reserve for the Spring semester, and there is no NEED for that entry for the succeeding two semesters, an OFF card is produced. If a NEED does exist for either of the two succeeding semesters no OFF cards would be produced.

2.5.11. Cross-Reference List (Figure 18). Cross references are ENTered into the file as separate entries and appear in the Public Reference list and Master Worklist. A separate listing of all cross reference in the Master Reserve File is produced by a special program once a semester. The list is arranged alphabetically by author, and contains only that information needed for identification and verification of cross references (i.e., author, title, sequence number, and the body of the cross reference entry and its sequence number).

The list is referred to by the input typist when it is necessary to activate cross references. For example, when adding a course NEED to an entry which has the notation "X-REF" in the LOCation field, the typist looks up the entry in the Cross Reference list to find the sequence numbers of the cross references themselves. Once known, a dummy course NEED is prepared and submitted to the computer.

2.5.12. Historical Summaries. Various historical summaries are included in the reserve system design, and programs for these are being developed. The objective of these summaries is to supply the library with statistics:

1. relating to frequency and volume of reserve requests for specific titles and for broad classes of material

2. pinpointing reserve book needs (or excesses) of individual departments and professors.

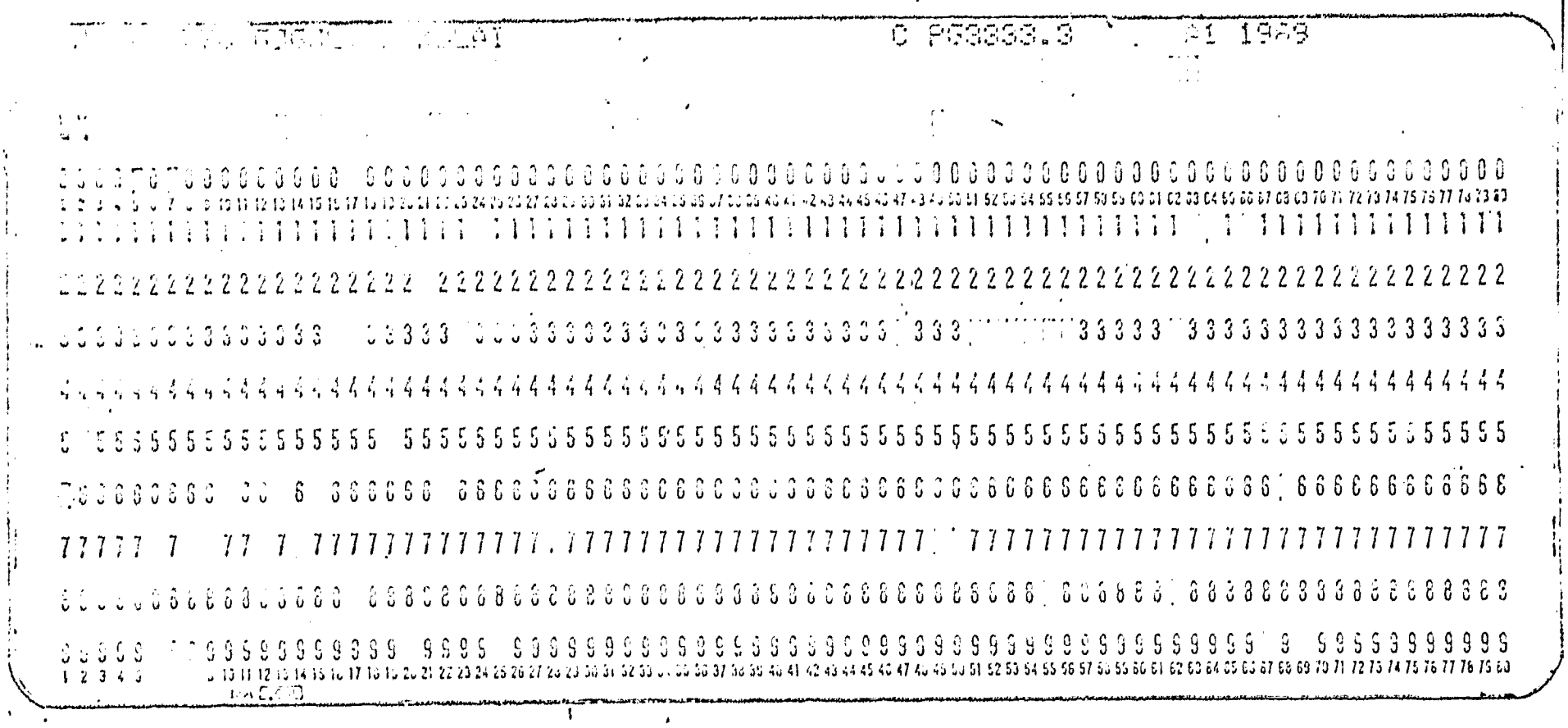


FIGURE 15A

ON CARD AS RECEIVED FROM THE COMPUTER WITHOUT COPY NUMBER.

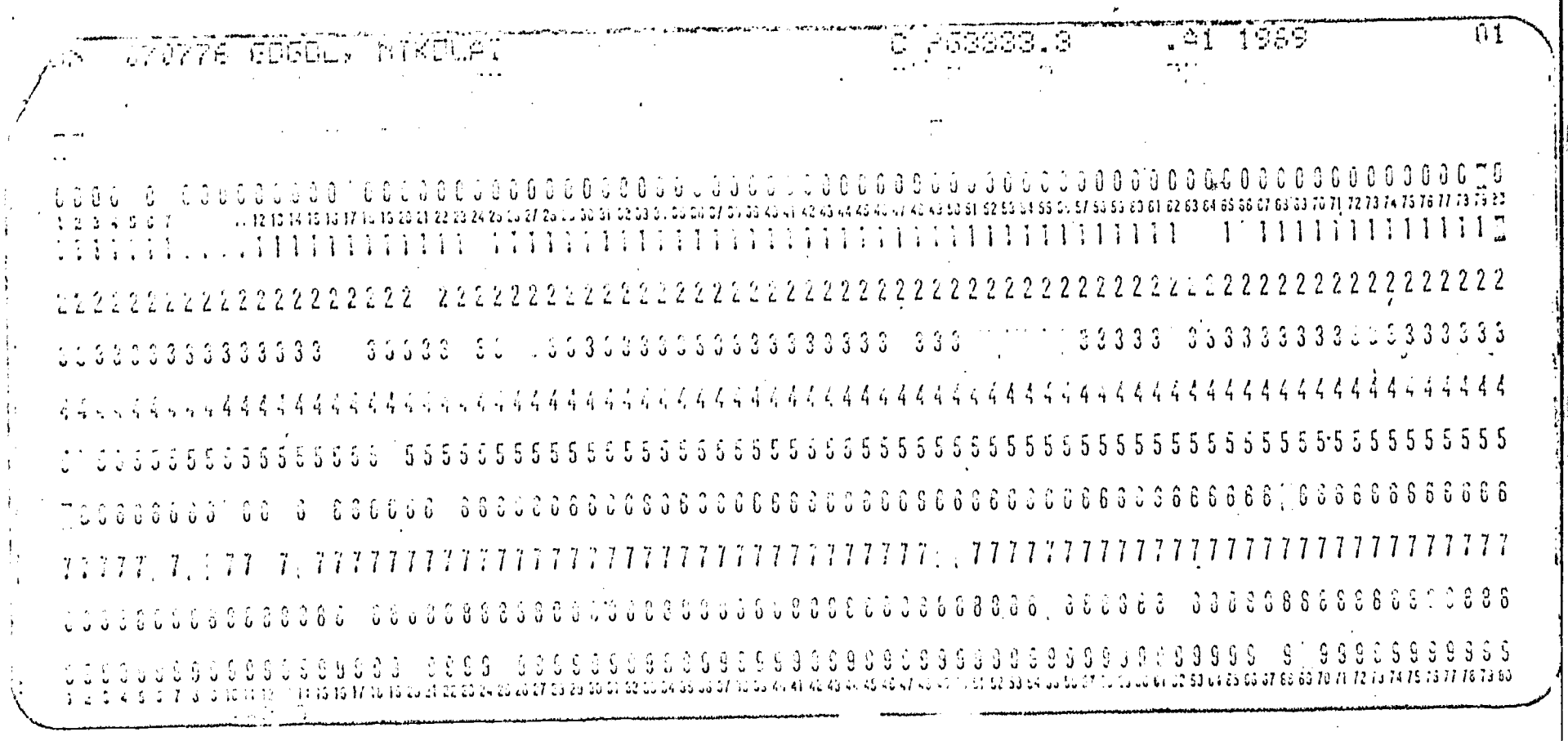


FIGURE 15B.

ON CARD AS RETURNED TO THE COMPUTER WITH THE COPY NUMBER ADDED.

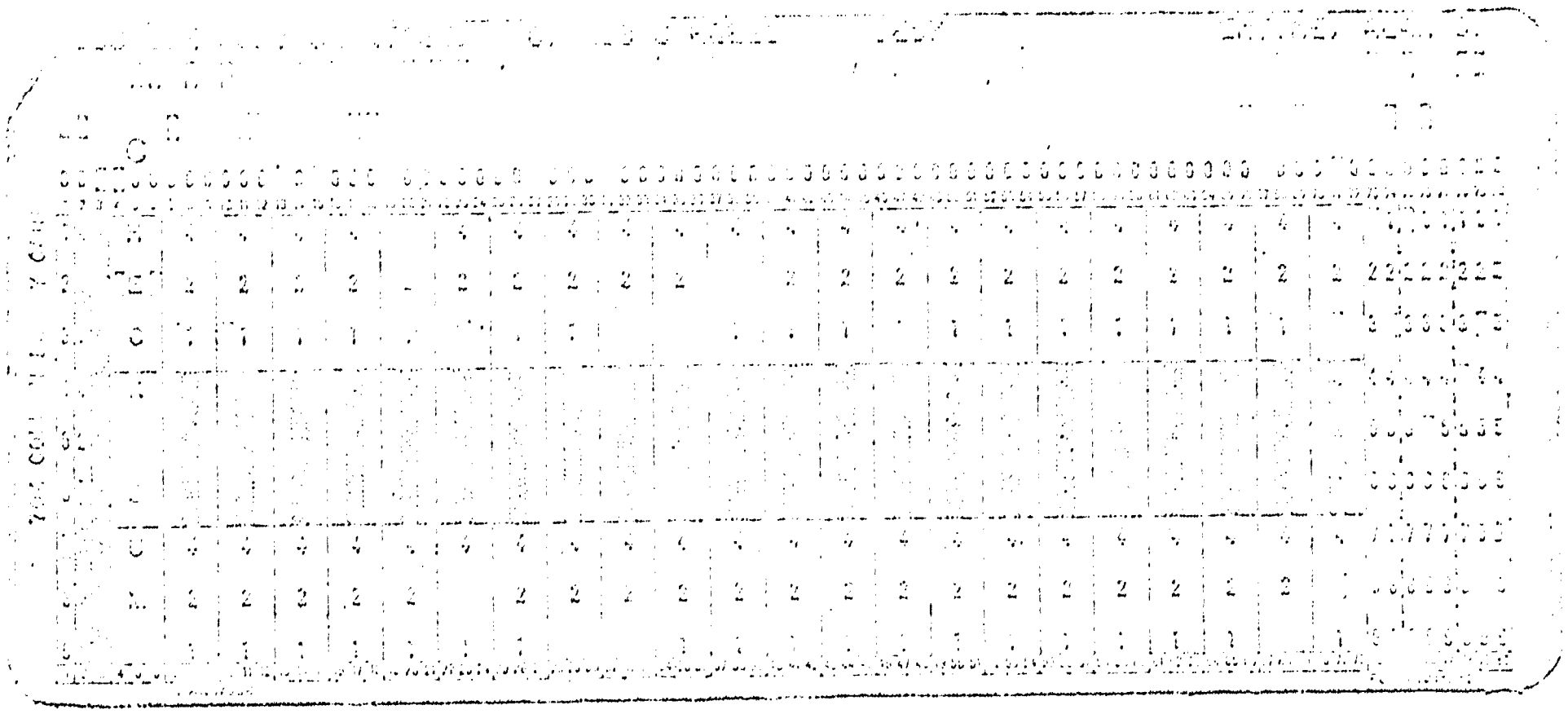


FIGURE 16

WARNING MESSAGE CARD
PRODUCED BY COMPUTER

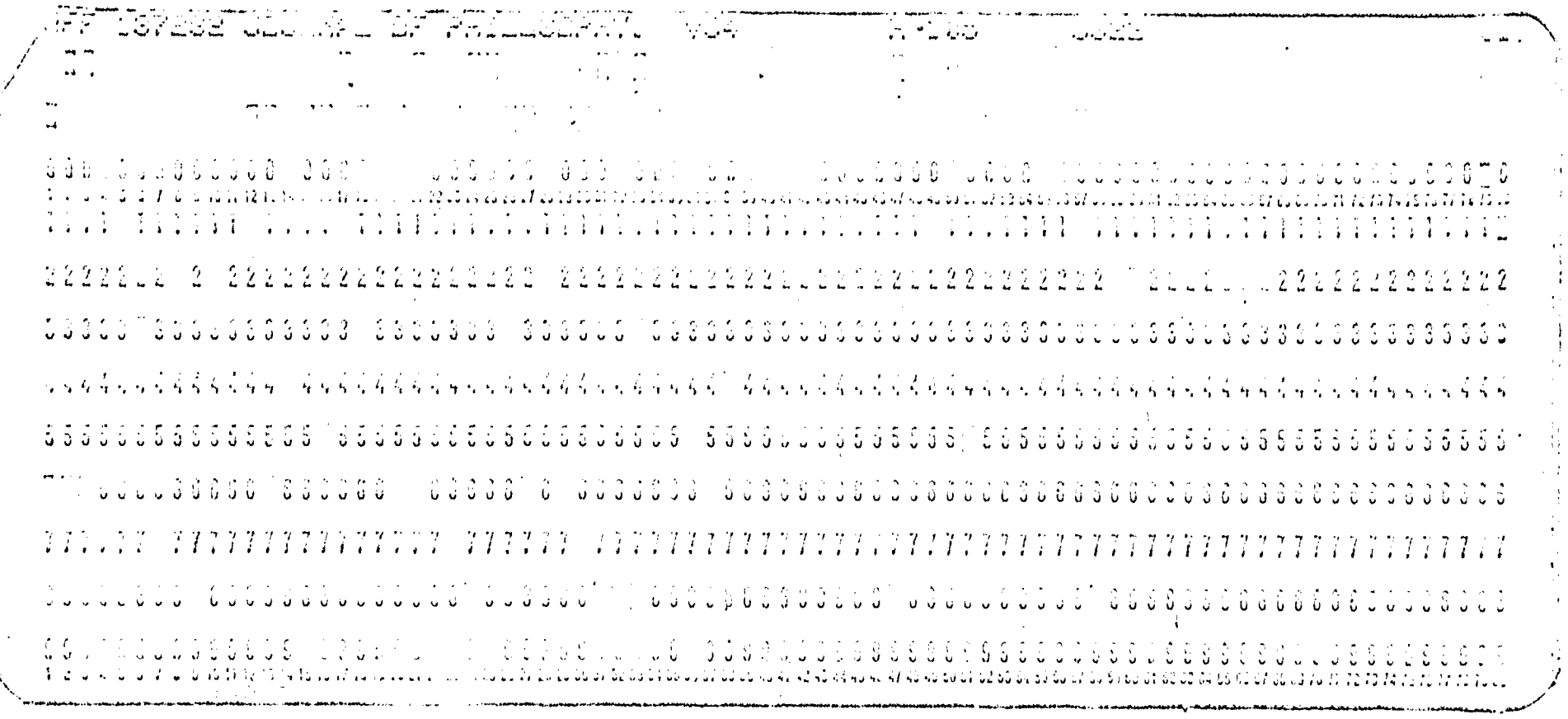


FIGURE 17

LAF CARD

RUSSELL'S CROSS REFERENCES BY MAIN ENTRY AS OF 6/23/69 PAGE

ARLEGGE, ANDREW; GOSPEL OF WEALTH
X KIRKLAND, EDWARD C. ED.; GOSPEL OF WEALTH... 11[illegible]

CHALLENGE OF DEVELOPMENT
X CARD, R. - CHALLENGE OF DEVELOPMENT. 097074

CHERKOV, ANTON; SOME IMPACTS OF OFFICE AUTOMATION UPON STATUS
X OFFICE AUTOMATION 1[illegible]

CHEKOV, ANTON; LADY WITH THE DOG AND OTHER STORIES
X CHEKHOV, ANTON; IONYCH 11[illegible]

CHEKHOV, ANTON; PORTABLE CHEKHOV
X CHEKHOV, ANTON; ABOUT LOVE 13[illegible]
X CHEKHOV, ANTON; ATTACK OF NERVES 13[illegible]
X CHEKHOV, ANTON; GOOSEBERRIES 13[illegible]
X CHEKHOV, ANTON; MAN IN THE SHELL 1[illegible]

CHESTER MYSTERY PLAYS
X HUSSEY, MAURICE TR.; CHESTER MYSTERY PLAYS 1[illegible]

CHURCH, S.C.; A LITERARY HISTORY OF ENGLAND
X NINETEENTH CENTURY AND AFTER 105928

CHINA QUARTERLY; CHINA UNDER MAO
X MACFARQUHAR, R. - CHINA UNDER MAO 10[illegible]

CHRETIEN DE TROYES
X TROYES, CHRETIEN DE; ARTHURIAN ROMANCES 130[illegible]

CICERO, MARCUS TULLIUS, M. TULL CICERONIS SCRIPTA QUAE MANSERUNT OMNIA
X M. TULLI CICERONIS SCRIPTA QUAE MANSERUNT OMNIA 057[illegible]

CICERO, R. HIRZEL. UNTERSUCHUNGEN ZU CICEROS PHILOSOPHISCHEN SCHR
X HIRZEL, R.; UNTERSUCHUNGEN ZU CICEROS PHILOSOPHISCHEN SCHRIFTEN 3 VOLS 056[illegible]

CITIZENS RESEARCH FOUNDATION; POLITICS OF NATIONAL CONVENTION FINANCES
X MCKEOUGH, KEVIN; COSTS OF POLITICAL PARTICIPATION... 1[illegible]

CITIZENS RESEARCH FOUNDATION; POLITICS OF NATIONAL CONVENTION...
X BIBBY, JOHN F.; POLITICS OF NATIONAL CONVENTION FINANCES AND ARRANGEMENTS 132[illegible]

CLAUDEL, PAUL; THEATRE
X CLAUDEL, P. - LANNCURCE FAITE A MARIE 05[illegible]

CLIFFORD, JAMES L. ED.; EIGHTEENTH-CENTURY ENGLISH LITERATURE
X EIGHTEENTH-CENTURY ENGLISH LITERATURE 133928

COHEN, STANLEY; AMERICAN ECONOMIC HISTORY
X VER STEEG, CLARENCE L.; AMERICAN REVOLUTION CONSIDERED AS AN ECONOMIC NOVEL 132[illegible]

3. PROGRAM DESCRIPTION

The Reserves System consists of a Master Processing Program and a number of auxiliary programs. The main computer program processes bibliographic, inventory and course data and produces worklists and public lists; auxiliary programs provide additional facilities and maintenance functions. (See descriptions of the individual programs below.) All programs are written in OS/360 COBOL F. The Columbia implementation includes LASP/MVT, but this is not necessary. With minor changes in the JCL (Job Control Language), programs will operate in a conventional OS/360 environment.

3.1. The Main Program.

3.1.1. Purpose - The objectives of the reserve program are:

3.1.1.1. Inventory control. To continually maintain an inventory record of the number of copies of a particular title in stock, and to balance this inventory against anticipated course requirements for the current and coming academic terms.

To preserve historical records of previous terms' requirements, in order to help the librarian properly anticipate needs.

3.1.1.2. Processing and deprocessing. To aid in the manual task of processing volumes onto the active reserve shelf at the beginning of a term (assembling the reserve collection) and of deprocessing volumes off the active reserve shelf at the end of the semester (disbursing the reserve collection).

3.1.1.3. List production. To produce worklists for the librarian which give complete information about each title in the file.

To produce lists for public use, in both author and course (or professor) sequence which give only essential bibliographic information. (Public lists are made available as a book form catalog, and may be widely distributed.)

3.1.2. Input commands - Following is a listing and identification of computer processing functions:

3.1.2.1. ENT (enter). Used to establish initially a record on the file for a particular title. Once a record is established it remains on the file permanently, unless it is specifically deleted with the DEL (see below) command. Any and all data fields may be entered into the newly established record by means of this command. The computer assigns a new

sequence number to the record, placing it at the end of the file. The sequence number assigned implies the record's relative track location within the file, and includes a machine-generated check digit. Thus, records may be retrieved randomly using this number as key. All user commands refer to the record in this way.

3.1.2.2. DEL (delete). Used to delete a title from the file. No further reference to the title record will be allowed nor will it appear in any list. The actual space on the disc is not relinquished for a new title; this is done by using an auxiliary command, SAVE.

3.1.2.3. MOD (modify). Used to alter the contents of the bibliographic data field in an already existing record on the file. Any bibliographic data field not specified when the record was originally established by an ENT is considered to contain blanks, and so may be modified in the same way as a bibliographic data field with informative contents.

3.1.2.4. ADD. Used to alter the contents of the copy inventory, course requirement, and/or on order data fields on an existing record by adding additional data to existing data elements and to enter additional course requirements to the course field.

3.1.2.5. SUB (subtract). The corrollary of the ADD command above.

3.1.2.6. ON. A one-card command produced by the computer. When course information is first entered, the computer flags all copy numbers associated with that record with a "+" sign. The computer then issues an ON card for each copy which must be processed onto reserve (determined by the contents of the incoming NEED field). Each ON card contains the command code "ON", the sequence number of the record, and selected bibliographic information. Actual copy numbers are not punched by the computer. As the librarian locates copies and places them on active reserve, the number of each copy is punched into an ON card for that title; the card is then returned to the computer, causing the "+" sign to be deleted from the specified copy number.

Adding additional courses or increasing the NEED of existing courses will cause additional ON cards to be issued but will not affect the copy number flags. The number of ON cards issued will not exceed the number of "+" flags remaining. If the value of the incoming NEED field exceeds the number of remaining "+" flags (hence the number of available copies) a warning message is issued which accompanies the ON cards.

When copies are added to a title record which includes course information, the new copy numbers will appear in the list with "+" signs..

Reducing either the NEED or the number of copies causes no automatic action by the computer.

3.1.2.7. OFF. A one-card command produced by the end-of-term program, and similar in function to the ON card (see above).

The end-of-term program flags each copy number which is to be processed off reserve (as determined by the program). An OFF card is produced for each copy and contains the command code "OFF", the sequence number of the title, selected bibliographic information, and a single copy number. These cards inform the librarian that specific copies are to be processed OFF reserve. As the copies are processed, OFF cards are returned to the computer causing the "-" sign to be deleted from the specified copy number.

3.1.2.8. CHK (check). Used to remove + and/or - flags from copy numbers. This is normally done by the ON and OFF functions (see above); the CHK function is only used to correct error conditions arising from incorrect input information. Up to 25 copy numbers may be referenced by a single CHK function.

3.1.2.9. SAVE. An auxilliary command issued by the computer on a punched card. When the entire file is periodically dumped for backup safety, the computer looks for records flagged as having been deleted by the DEL command, and generates a SAVE punched card for the space on the disk occupied by each deleted record. The SAVE card, containing the old record's sequence number which refers to the space on the disk, is then substituted for an ENT command card by the librarian, and the new record is established on the space formerly occupied by the deleted record, instead of being added to the end of the file.

The librarian need not wait for the computer to issue the punched card, but may key the SAVE command together with all the data fields appropriate to the ENT command.

3.1.3. Process control. The RUN card (see section 3.4.1.1.) specifies whether the run is to produce a Master List or Supplements to the previous Master List. A Master List contains all titles in the file; a Supplement List contains only those titles which have been ENTered or addressed by user commands since the last Master List was printed. Supplements are, therefore, cumulative.

The RUN card also specifies whether a Public List is to be produced. The Public List contains only bibliographic information for titles in the Worklist which are on current and active reserve. (i.e., those titles which have both at least one course and at least one copy number without a plus or minus symbol.)

3.1.4. Inventory balancing and control. The program stores up to 99 two-digit copy numbers for each entry. These are entered either by the ENTer or ADD command, and may be deleted by the SUBtract command.

Each title record can also contain information for up to eight courses. This information includes the number of copies required for each course, and is entered either by the ENTer or ADD command. The number of copies required (NEED) may be modified by the ADD or SUBtract command. Courses may be deleted by the SUBtract command.

The program groups courses for each title by term (up to three terms) and adds the NEED data fields for all courses in each term, printing a total need for each term. The number of copies listed as inventory is totaled and printed as the total number of copies on hand. The total NEED and the total inventory on hand are compared and any difference is printed as the SHORTAGE for that term.

Additional inventory control is provided both by the main program and by the end-of-term program in the form of ON and OFF cards. (See sections 3.1.2.6. and 3.1.2.7.).

3.1.5. Hardware and software environment. The Main Reserves Program requires the following devices in its present implementation at Columbia:

A random access device for main file residence;
A card reader/punch for input and punched card output;
A printer for the various lists.

In addition, sequential file space is needed for the four alphabetical indices. (In the Columbia implementation, this is on the same direct access device as the main file (two 2311 disk drives) but could as well be four tape drives or any other sequential devices).

Printed and punched output is spooled onto direct access by OS/MVT/LASP and printed or punched under system control after the run is complete. This could also be done using tapes or a minimum of three online printers and a punch.

The main program requires at present approximately 170K bytes of main storage, which allows a maximum of 2000 transactions in a single run. (Each transaction causes an index record to be generated and saved in an array in main storage). By reducing the number of transactions permitted in a single run, the storage requirement could be reduced by as much as 80K bytes.

Running time is primarily dependent on how many titles are printed in the Worklist. Typical running time for a file of 12,000 titles is 6 minutes. This includes only CPU cycles utilized plus a 28 millisecond penalty for each I/O instruction which induces a WAIT state.

3.2. Auxiliary Programs

3.2.1. Professor/Course list program. Bibliographic and course information is extracted from the file, sorted, and edited to produce a series of alphabetical lists, each containing the titles on reserve for a single Professor/Course combination in the current term. These lists appear alphabetically by Professor and Course, and each begins a new page, allowing them to be separated and sent to respective professors notifying them of titles placed on reserve for their course. A title which has more than one current course field in the Master File will appear in more than one such list.

Within each list, there are two alphabetical subsections. The first includes all titles which have in fact been processed onto active reserve (as indicated by the presence in the Master File of at least one copy number having no plus flag). The second includes those titles which have no such unflagged copy numbers, indicating that they are being processed for reserve. Any items in this second section which have no copy numbers (indicating no inventory) and, in addition, have a zero value in the Order field, are also printed in a separate Inventory Check list as a reminder to the librarian that copies must be ordered.

The program requires a direct access divice for main file residence, an on- or offline printer in addition to the system logical output device, and sorting capability. The amount of main storage required is approximately 10K bytes plus space for a sort program.

3.2.2. End of term program. The three terms which the main program can accommodate are moved forward by one term. If this causes the total NEED to drop to zero, deprocessing OFF cards will be issued for all unflagged copy numbers. Courses being deleted from the file are written on an historical file for later reference and statistical summary. Each tape record of this file contains one course field and the sequence number of the title with which it was associated.

The program requires a direct access device for main file residence, and system logical input and output, including punch. Since the number of OFF cards may be large, it might be preferable for the punch to be off line, but this is not necessary. Main storage requirement is approximately 10K bytes.

3.2.3. Cross reference list program. An alphabetical list of all entries which are cross-referenced in the Master File is produced by this program. Following each entry is a list of all references to it.

Cross-references are distinguished in the Master File by the keyword SEE in the Title field, which contains both author and title of the referenced main entry.

The program requires a direct-access device for main file residence, an output printer in addition to system logical output, and sorting capability.

Main storage requirement is approximately 5K bytes plus space for the sort program.

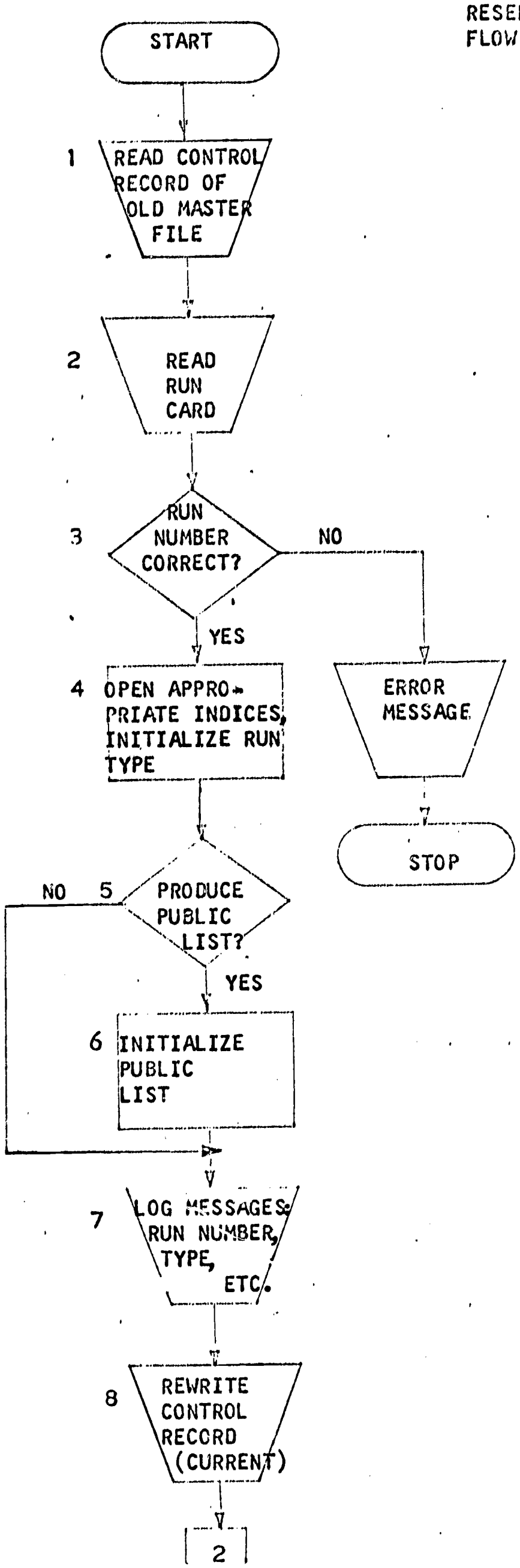
3.2.4. Historical summary program. [being developed]

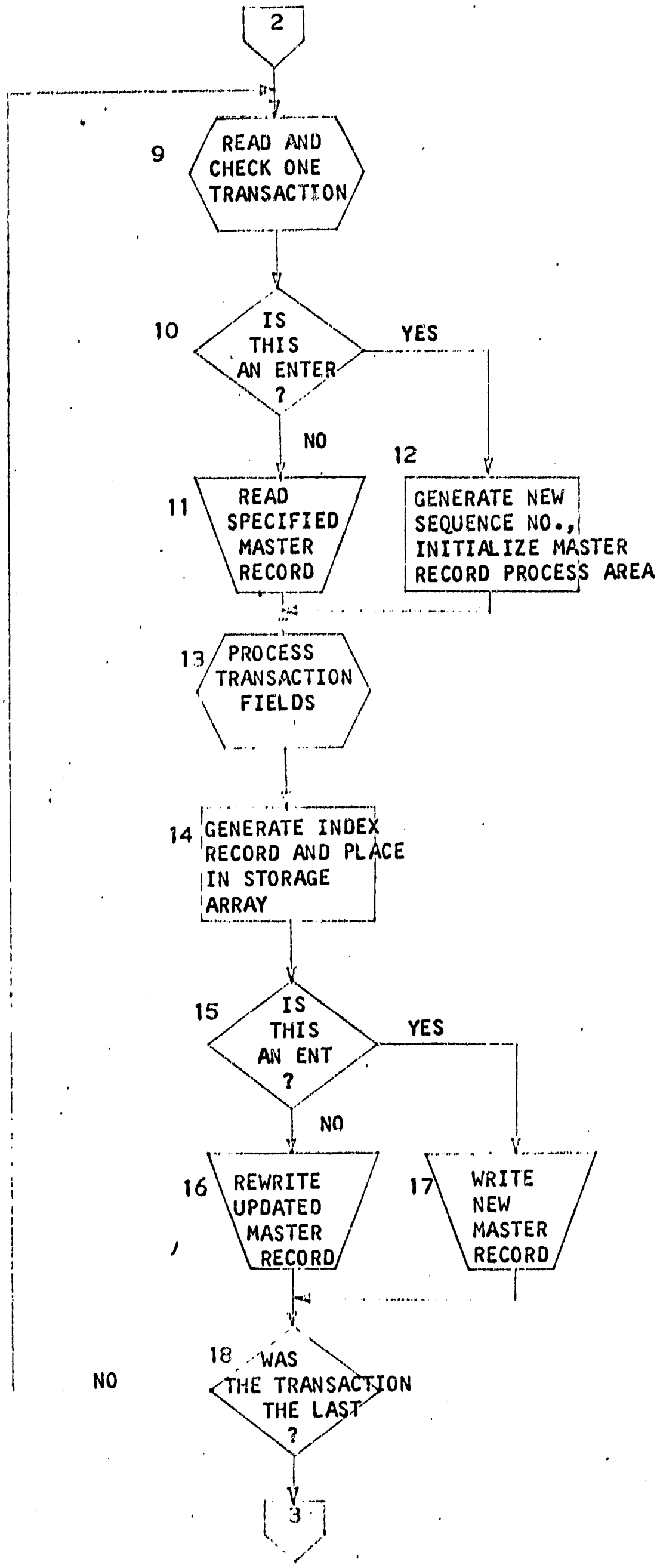
APPENDIX A

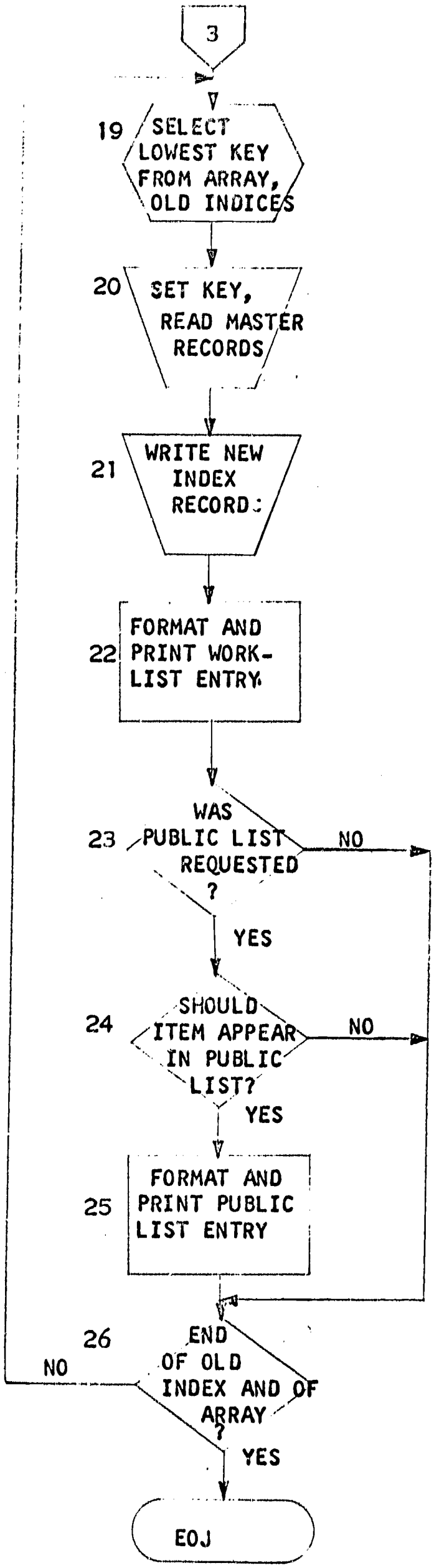
DETAIL FLOW DIAGRAM - EXPLANATORY NOTES

2

RESERVES PROGRAM
FLOW DIAGRAM




2
9
READ AND CHECK ONE TRANSACTION
10
IS THIS AN ENTER ?
YES
NO
11
READ SPECIFIED MASTER RECORD
12
GENERATE NEW SEQUENCE NO., INITIALIZE MASTER RECORD PROCESS AREA
13
PROCESS TRANSACTION FIELDS
14
GENERATE INDEX RECORD AND PLACE IN STORAGE ARRAY
15
IS THIS AN ENT ?
YES
NO
16
REWRITE UPDATED MASTER RECORD
17
WRITE NEW MASTER RECORD
18
WAS THE TRANSACTION THE LAST ?
NO
3


3
19
SELECT LOWEST KEY FROM ARRAY, OLD INDICES
20
SET KEY, READ MASTER RECORDS
21
WRITE NEW INDEX RECORD
22
FORMAT AND PRINT WORK-LIST ENTRY
23
WAS PUBLIC LIST REQUESTED ?
NO
YES
24
SHOULD ITEM APPEAR IN PUBLIC LIST?
NO
YES
25
FORMAT AND PRINT PUBLIC LIST ENTRY
26
END OF OLD INDEX AND OF ARRAY ?
NO
YES
EOJ

DETAIL FLOW DIAGRAM - EXPLANATORY NOTES

1. The control record contains the following information about the last (previous) run:
   Serial number and date.
   Whether MASTER or SUPPL. worklist was produced.
   Highest sequence number assigned.
   Index configuration.
   The date of the most recent MASTER run. (If the last run was a MASTER, this date will be the date of that run.)

2. The RUN card supplies the following information:
   Serial number of the current run.
   Whether MASTER or SUPPL. worklist is desired.
   Whether Public List is desired.

3. Check of RUN number prevents accidental re-run of data.

4. Four indices are maintained by the program, two for MASTER lists and two for SUPPL. lists. The correct configuration is automatically selected by the program. Flags are set indicating which lists are to be produced.

5. Determined from RUN card.

6. Appropriate headings are generated and the output file for the Public list is opened.

7. The updated control record reflecting information for the current run is printed, along with the previous control record, the RUN card, and a message indicating whether the Public list has been initiated.

8. The current control record is held in storage throughout the run, and is also written into the master file at this time to assure the correct RUN number being saved in case of subsequent system failure or abnormal termination.

9. As each transaction is read, the header is first checked for validity. Subsequent fields must then conform to the format for that type of transaction. Any error will cause the transaction to be rejected and error messages to be printed. The input cards will be printed following the message; this continues until a valid header card is read.

10. Determined from the transaction header card.

11. The access key is the sequence number punched on the transaction header card.

12. The sequence number stored in the control record is incremented by one and a check digit computed. The record processing area is initialized with all alphanumeric fields blank and all numeric fields set to zero.

13. Further error checking takes place here. Certain errors will cause warning messages only to be printed; others will cause the erroneous field(s) to be discarded and error messages to be printed. In any case where fields are discarded, the error message includes a complete listing of the transaction cards as submitted. In transactions which permit multiple operations, only the affected operation is discarded. For example, if an ENTer transaction includes a Course whose TERM is unacceptable to the program, only the course information will be rejected. The bibliographic information, and inventory information, if any, will be processed normally. The error messages are specific.

14. The index record contains portions of the AUTHor and TITLe fields of the master record, and its sequence number. All index records generated during the process phase are held in storage in an array, and then merged alphabetically with the old index file during the output or printing phase. These indices provide for selection of master records in alphabetical order for printing in the Worklist and Public list.

15. As determined from the transaction header card.

16. The updated master record is rewritten in place in the master file, replacing the old record.

17. A new master record is written, using as key the new sequence number generated by the program.

18. Processing of transactions continues until all input has been exhausted.

19. The lowest (i.e. earliest in alphabetical order) index record is selected from the storage array (see Box 14) and compared to the incoming old index record. The lowest of these is placed in an intermediate area. If the record is taken from the storage array, its position is set to blanks. If the incoming index record is chosen, another record is read from the appropriate index. Duplicate index records are deleted.

20. The record key is found in the index record. The master record is compared with the alphabetic portion of the index record. Failure to match indicates that the AUTHor and/or TITLe fields of the master record have been changed by the MODify function, and therefore the current index record no longer represents the correct position in the alphabetical lists. Since the MODify function generates a new index record, the outdated index record is deleted.

21. If correct, the current index record is written into the new index.

22. The fields of the master record are properly formatted and printed in the Worklist.

23. As determined by the RUN card.

24. Two criteria determine an entry's appearance in the public list; The presence of at least one course field <u>and</u> presence of at least one copy number without flags.

25. The fields of the master record are properly formatted and printed in the Public list.

26. Processing continues until both the old index files and the storage array of new index records are exhausted.

APPENDIX B

INPUT CARD FORMATS

Input card formats:

1. RUN card.

Columns	Contents
1 - 4	RUN=
5 - 8	Serial number of the current run, with leading zeros.
9	blank
10-15	MASTER if a Master Worklist is desired, SUPPL. if a Supplementary Worklist is desired.
16	blank
17-19	PUB if a Public List is desired; otherwise blank.
20-80	Unused (may contain comments)

2. ON and OFF cards.

Columns	Contents
1 - 4	ON or OFF
5 -10	Sequence number of record to be referenced.
11	unused
12-45	Author of referenced title (optional, does not affect processing)
46	unused
47-76	Call number of referenced title (optional, does not affect processing)
77-78	unused
79-80	Copy number to be tested, with leading zero if any.

3. Transaction Header cards.

Columns	Contents
1 - 4	Transaction code (ENT, ADD, SUB, MOD, CHK, SAVE)
5 -10	Sequence number of the record to be referenced.
11-80	unused

4. Data field cards.

Each data field is identified by its name in columns 1 - 4. Data begins in column 5 for all fields, but formats differ and are shown below. Unused areas of the card should be left blank.

In the table below, an X opposite a field name indicates that the field is optional in the transaction(s) at the top of the column in which the X appears.

Symbols used in the table: Ø = blank d = decimal digit x = alphanumeric

Field name	Transaction codes ENT SAVE	ADD SUB	MOD	CHK	Data format (begin in cc5)
AUTH	X[1]		X		xxx...up to 76 characters
TITL	X		X		xxx...up to 76 characters
EDTN	X		X		xxx...up to 10 characters
DATE	X		X		xxx...up to 10 characters
CALL	X		X		xxx...up to 30 characters
LOCN	X		X		xxx...up to 10 characters
COPY	X	X		X	ØddØddØdd...up to 25 occurrences
ORDR	X	X			Ødd
CRSE	X[2]	X[2]			xxx...up to 15 characters
PROF	X	X			xxx...up to 15 characters
TERM	X	X			ddd
NEED	X	X[3]			Ødd

1. AUTH field is required in ENT and SAVE transactions.

2. CRSE, PROF, TERM and NEED fields must appear in combination.

3. Need field may be omitted when Course information is included in a SUB transaction, in which case it will be considered to be equal to the existing NEED.

The DEL transaction does not include any data fields, but must be followed by a trailer ("Q") card. (See below)

5. Transaction Trailer cards.

The field cards for a single transaction must be followed by a trailer card having a "Q" in column 1, and the remainder of the card blank.

APPENDIX C

ERROR MESSAGES AND ACTION TAKEN

Error Messages and Action Taken.

Errors arising from the RUN card.

RUN CARD MISSING OR INVALID.

a) The RUN card was not the first data card.
b) It was not properly identified by the characters RUN= in columns 1-4.
c) The run specification (MASTER or SUPPL.) was not recognizable.

Action: The program terminates immediately.

RUN NUMBER INCORRECT. MUST BE nnnn

The run number specified on the RUN card is not the number of the current run as determined by the computer. nnnn specifies the correct number.

Action: The program terminates immediately.

Transaction headers and data formats.

NOT A VALID HEADER: xxx...

The first card following the RUN card or a previous transaction does not have one of the transaction codes in columns 1-4. The card-image is included in the message.

Action: The card is discarded and the next card read. This may be repeated until a valid transaction code is read.

THE FOLLOWING IS NOT A VALID FORMAT, AND HAS BEEN REJECTED.

a) A complete transaction has been read, but the fields included are not a permissible combination for that transaction.

Action: The transaction is discarded and the cards listed following the message.

b) While reading a transaction, a duplicate or unrecognizable field identifier has been encountered.

Action: The transaction is discarded and the cards listed following the message. Cards will continue to be discarded and listed until a transaction trailer card ("Q") is encountered.

INVALID SEQUENCE NUMBER:

In any transaction except ON, OFF, or SAVE, (see below) the sequence number field is incorrectly punched, or no record exists for that number.

Action: The transaction is discarded and the cards listed following the message.

INVALID SEQUENCE NUMBER: xxx...
SUBSTITUTING "ENT"

In a SAVE transaction, the sequence number field is incorrectly punched, or does not represent an available record area. The text of the SAVE header is shown.

Action: The transaction is changed by the program to an ENT transaction, and a new sequence number is generated.

INVALID SEQUENCE NUMBER: xxx...

The sequence number field on an ON or OFF card is incorrectly punched or no record exists for that number. The card-image is shown.

Action: The card is discarded.

SEQUENCE NUMBER IN USE: xxx...
SUBSTITUTI "ENT"

A SAVE transaction specifies a sequence number which represents a record in the file which has not been deleted.

Action: The SAVE transaction is changed by the program to an ENT transaction, for which a new sequence number is generated.

DELETING RECORD nnnnn xxx...

The sequence number shown was specified on a DEL transaction. The contents of the Author field of the record are also shown.

Action: The record is deleted from the file. This message is provided for verification purposes.

ON and OFF cards.

Each message includes the text of the card which caused the error.

Action: In each case, the error card is ignored.

COPY NUMBER INCORRECTLY PUNCHED: xxx...

The contents of the copy number field are non-numeric.

ZERO COPY ILLEGAL: xxx...

The copy-number field contains zeros, not valid as a copy number.

CANNOT LOCATE COPY: xxx...

The specified copy number is not represented in the record.

NOT FLAGGED PLUS: xxx... (ON card)
NOT FLAGGED MINUS: xxx... (OFF card)

The specified copy number is not flagged as assumed by the ON or OFF card.

Bibliographic data fields. (Identifiers AUTH, TITL, EDTN, DATE, CALL, LOCN)

nn BIB FIELD(S) TRUNCATED. aaaa nnnnnn AUTH=xxx...

In an ENT or MOD transaction, the indicated number of bibliographic data fields were longer than the permissible length and were truncated. The transaction code and sequence number, and the contents of the Author field (after processing) are shown.

Action: Processing continues.

Knowledge of certain aspects of transaction processing is helpful in interpreting the following messages. Briefly, these are the important points:

a) ENT, ADD and SUB transactions may each include any combination of inventory and course information.
b) When both inventory and course information are included, the inventory information is processed first. Error in inventory processing will not prevent processing of course information, but may affect the result.
c) Course information in the file consists of the input fields CRSE, PROF, TERM and NEED. The first three identify the course field and must always appear in combination.
d) To avoid confusion when multiple error and warning messages are produced the card input is listed only once on the error list. Thus all messages for a single transaction appear together, followed by the text of the input cards. The contents of the Author field are added to the text of the transaction header card.

The COPY field.

COPY xnn NOT FOUND.
A copy number specified in a SUB or CHK transaction is already in the specified record.
Action: The copy number is not processed. The error count for the COPY field is incremented. (see below)

ADDED DUPLICATE COPY xnn, WARNING ONLY.
A copy number specified in an ADD or ENT transaction is already in the specified record.
Action: The Last Copy indicator will reflect the current input. The error count for the COPY field is incremented. (see below)

nn ERRORS IN COPY FIELD. CHECK RESULT.
Indicates the total number of errors encountered in processing the COPY field, including unrecognizable information and incorrectly positioned numbers. The librarian should check the final result in the Worklist, and make necessary corrections.

The ORDR field.

ORDR FIELD IS INCORRECTLY PUNCHED OR VALUE IS UNACCEPTABLE.

a) In an ENT, ADD or SUB transaction, the contents of the ORDR field are invalid.
b) In an ADD transaction, the ORDR field contains a value which if added to the current On Order field will exceed the maximum permissible value (99).
c) In a SUB transaction, the ORDR field contains a value greater than the current On Order.
Action: The ORDR field is not processed.

Course information fields.

CRSE FIELD TRUNCATED. (and/or) PROF FIELD TRUNCATED.
The contents of the specified field(s) exceed the maximum permissible length.
Action: The field is truncated before processing.

ADDED SAME COURSE, CHECK NEW NEED.
In an ADD transaction, the course identification fields match an existing course in the specified record.
Action: The specified NEED is added to the existing Need for that course.

DELETING COURSE.
In a SUB transaction, the NEED field has been omitted, or contains a value equal to the current Need for the specified course.
Action: The course field is deleted from the file.

COURSE INFORMATION NOT PROCESSED.
This message will always be preceded by one of the five messages shown below.
Action: The course information fields have not been processed for the reason given.

TERM NOT ACCEPTABLE, OR INCORRECTLY PUNCHED:
The contents of the TERM field do not match any of the three terms recognized by the program.
Action: The course information cannot be processed. See above.

NEED FIELD IS INCORRECTLY PUNCHED:
The contents of the NEED field are invalid.
Action: The course information cannot be processed. See above

NEED IS TOO LARGE:

a) In an ADD transaction, specify an existing course, the NEED field contains a value which if added to the existing Need for that course would exceed the maximum permissible value.
b) In an ADD transaction, the NEED field contains a value which if added to the Total Need for the specified term will exceed the maximum permissible value.
c) In a SUB transaction, the NEED field contains a value larger than the existing Need for the course specified.

Action: The course information cannot be processed. See above

CANNOT LOCATE COURSE:
In a SUB transaction, the CRSE, PROF and TERM fields do not match an existing course field in the specified record.
Action: The course information cannot be processed. See above.

CANNOT ADD ANOTHER COURSE:

An ADD transaction specifies course information for a record which already contains the maximum number of courses, and the specified fields do not match one of the existing courses.
Action: The course information cannot be processed. See above.

Output phase.

MOD AUTH/TITL nnnnnn WAS: xxx... NOW: xxx...

The current index record has selected a master file record whose Author and/or Title fields have been MODified in such a way that the position of the record in the alphabetical lists has changed. The sequence number is shown along with the alphanumeric portion of the current index record (WAS: xxx...) and a construct of the same portion of the index record generated at the time the MOD transaction was processed (NOW: xxx...).
Action: The current index record is deleted.

Errors arising internally.

These messages are generated by routines which are included in the program for logical consistency, but will normally be executed only in cases of undetected machine error or program error.

OPEN ROUTINE FAILED.

In the initialization phase, the program has failed to select the correct indices for the current run. All relevent program flags and assignment indicators are listed following the message.
Action: The program terminates immediately.

FILE SELECT #nn FAILED.

In the output phase, the program has failed to select the proper index in a read or write operation. nn specifies the point in the program at which the error was detected. All relevent program flags and assignment indicators are listed following the message.
Action: The program closes all active files and terminates.

APPENDIX D

PROGRAM LISTINGS

1. The Main Program (COLLRESV)
2. The End-of-Term Program (COLLTERM)
3. The Professors' Lists Program (RESVPROF)
4. The Cross Reference Program (XREFRESV)

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00001   000100 IDENTIFICATION DIVISION.                                  COLLRESV
00002   000200 PROGRAM-ID. 'COLLRESV'.                                   COLLRESV
00003   000300 AUTHOR. H. J. HETLAND.                                    COLLRESV
00004   000400 DATE-COMPILED. SEP 18,1969                                COLLRESV
00005   000500 ENVIRONMENT DIVISION.                                     COLLRESV
00006   000600 INPUT-OUTPUT SECTION.                                     COLLRESV
00007   000700 FILE-CONTROL.                                             COLLRESV
00008   000800     SELECT MASTER-FILE ASSIGN 'COLMAS' DIRECT-ACCESS      COLLRESV
00009   000900     ORGANIZATION DIRECT ACCESS RANDOM                     COLLRESV
00010   001000     SYMBOLIC SEQNBR  ACTUAL TRKEY.                        COLLRESV
00011   001100     SELECT TAPE1 ASSIGN 'COLX1' UTILITY.                  COLLRESV
00012   001200     SELECT TAPE2 ASSIGN 'COLX2' UTILITY.                  COLLRESV
00013   001300     SELECT TAPE3 ASSIGN 'COLX3' UTILITY.                  COLLRESV
00014   001400     SELECT TAPE4 ASSIGN 'COLX4' UTILITY.                  COLLRESV
00015   001500     SELECT CDIN ASSIGN 'SYSIN' UTILITY RESERVE 7.         COLLRESV
00016   001600     SELECT PRINT-FILE ASSIGN 'WORKLIST' UTILITY RESERVE 1. COLLRESV
00017   001700     SELECT PNOUT ASSIGN 'ONCARDS' UTILITY.                COLLRESV
00018   001800     SELECT PUBLIC-LIST ASSIGN 'PUBLIST' UTILITY.          COLLRESV
00019   001900     SELECT SEQNLIST ASSIGN 'SEQNLIST' UTILITY RESERVE 1.  COLLRESV
00020   002000 I-O-CONTROL.                                              COLLRESV
00021   002100     SAME AREA CDIN SEQNLIST PRINT-FILE.                   COLLRESV
00022   002200     APPLY RESTRICTED SEARCH 1 ON MASTER-FILE.             COLLRESV
00023   002300 DATA DIVISION.                                            COLLRESV
00024   002400 FILE SECTION.                                             COLLRESV
00025   002500 FD  MASTER-FILE                                           COLLRESV
00026   002600     RECORDING F LABEL RECORD STANDARD DATA RECORD MASTER-RECORD. COLLRESV
00027   002700 01  MASTER-RECORD.                                        COLLRESV
00028   002800  02     PR        PICTURE 9    COMPUTATIONAL-3.           COLLRESV
00029   002900  02     BIB.                                              COLLRESV
00030   003000  03       AUTH    PICTURE X(76).                          COLLRESV
00031   003100  03       TITL    PICTURE X(76).                          COLLRESV
00032   003200  03       EDTN    PICTURE X(10).                          COLLRESV
00033   003300  03       DATN    PICTURE X(10).                          COLLRESV
00034   003400  03       CALN    PICTURE X(30).                          COLLRESV
00035   003500  03       DOCN    PICTURE X(10).                          COLLRESV
00036   003600  02     INVENT.                                           COLLRESV
00037   003700  03       ORDR    PICTURE 99.                             COLLRESV
00038   003800  03       NCP     PICTURE 99.                             COLLRESV
00039   003900  02     CPEF.                                             COLLRESV
00040   004000  03       CPF     PICTURE 9    COMPUTATIONAL-3  OCCURS 99. COLLRESV
00041   004100  02     CPSES.                                            COLLRESV
00042   004200  03       NCPSE   PICTURE 99   COMPUTATIONAL-3.           COLLRESV
00043   004300  03       TNEED   PICTURE 99   OCCURS 3.                  COLLRESV
00044   004400  03       SHORT   PICTURE S99  OCCURS 3.                  COLLRESV
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00045   004500   03        CRSE                OCCURS 8.                          COLLRESV
00046   004600   04       NEED  PICTURE 99.                                      COLLRESV
00047   004700   04       CID.                                                    COLLRESV
00048   004800   05        TERM PICTURE 999.                                     COLLRESV
00049   004900   05       CRID.                                                   COLLRESV
00050   005000   04        CRSE PICTURE X(15).                                   COLLRESV
00051   005100   04        PROF PICTURE X(15).                                   COLLRESV
00052   005200 FD  CRDIN RECORDING F LABEL RECORD OMITTED DATA RECORD CARDIN.    COLLRESV
00053   005300 01  CARDIN.                                                       COLLRESV
00054   005400 02  CRDF        PICTURE XXXX.                                     COLLRESV
00055   005500 02  IB.                                                           COLLRESV
00056   005600 03  IC          PICTURE X      OCCURS 76.                         COLLRESV
00057   005700 02  IBBF        REDEFINES IB.                                     COLLRESV
00058   005800 03  IBR         PICTURE 9(6).                                     COLLRESV
00059   005900 03  FILLER      PICTURE X(67).                                    COLLRESV
00060   006000 03  IBCF.                                                         COLLRESV
00061   006100   04  FILLER    PICTURE X.                                        COLLRESV
00062   006200   04  IBCN      PICTURE 99.                                       COLLRESV
00063   006300 02  IRTF        REDEFINES IB.                                     COLLRESV
00064   006400 03  INRUN       PICTURE XXXX.                                     COLLRESV
00065   006500 03  IRT         PICTURE X(7).                                     COLLRESV
00066   006600 03  IASSF.                                                        COLLRESV
00067   006700   04  IDIN      PICTURE 9.                                        COLLRESV
00068   006800   04  IOUT      PICTURE 9.                                        COLLRESV
00069   006900   04  IWIN      PICTURE 9.                                        COLLRESV
00070   007000   04  IEXT      PICTURE 9.                                        COLLRESV
00071   007100 03  IASSN  REDEFINES IASSF  PICTURE 9999.                         COLLRESV
00072   007200 03  FILLER      PICTURE X(61).                                    COLLRESV
00073   007300 FD  PRINT-FILE                                                    COLLRESV
00074   007400     RECORDING F BLOCK 5 RECORDS LABEL RECORD OMITTED              COLLRESV
00075   007500     DATA RECORD PRTLN.                                            COLLRESV
00076   007600 01  PRTLN.                                                        COLLRESV
00077   007700 02  FILLER  PICTURE X.                                            COLLRESV
00078   007800 02  PRTDTA  PICTURE X(132).                                       COLLRESV
00079   007900 FD  SEONLIST                                                      COLLRESV
00080   008000     RECORDING V BLOCK 10 RECORDS LABEL RECORD OMITTED             COLLRESV
00081   008100     DATA RECORD SLREC.                                            COLLRESV
00082   008200 01  SLREC         PICTURE X(66).                                  COLLRESV
00083   008300 FD  PNOUT                                                         COLLRESV
00084   008400     BLOCK 5 RECORDS                                               COLLRESV
00085   008500     RECORDING F LABEL RECORD OMITTED DATA RECORD CARDOUT.         COLLRESV
00086   008600 01  CARDOUT.                                                      COLLRESV
00087   008700 02  PNDTA PICTURE X(80).                                          COLLRESV
00088   008800 FD  PUBLIC-LIST                                                   COLLRESV
00089   008900     RECORDING F BLOCK 5 RECORDS LABEL RECORD OMITTED              COLLRESV
00090   009000     DATA RECORD PUBLN.                                            COLLRESV
00091   009100 01  PUBLN.                                                        COLLRESV
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00092   009300  02  FILLER PICTURE X.                                          COLLRESV
00093   009400  02  PURDTA  PICTURE X(132).                                    COLLRESV
00094   009500 FD  TAPE1 RECORDING F BLOCK 40 RECORDS LABEL RECORD STANDARD    COLLRESV
00095   009600     DATA RECORD TREC1.                                           COLLRESV
00096   009700 01  TREC1  PICTURE X(43).                                       COLLRESV
00097   009800 FD  TAPE2 RECORDING F BLOCK 40 RECORDS LABEL RECORD STANDARD    COLLRESV
00098   009900     DATA RECORD TREC2.                                           COLLRESV
00099   010000 01  TREC2  PICTURE X(43).                                       COLLRESV
00100   010100 FD  TAPE3 RECORDING F BLOCK 40 RECORDS LABEL RECORD STANDARD    COLLRESV
00101   010200     DATA RECORD TREC3.                                           COLLRESV
00102   010300 01  TREC3  PICTURE X(43).                                       COLLRESV
00103   010400 FD  TAPE4 RECORDING F BLOCK 40 RECORDS LABEL RECORD STANDARD    COLLRESV
00104   010500     DATA RECORD TREC4.                                           COLLRESV
00105   010600 01  TREC4  PICTURE X(43).                                       COLLRESV
00106   010700 WORKING-STORAGE SECTION.                                         COLLRESV
00107   010800 77  AA          PICTURE 999.                                     COLLRESV
00108   010810 77  A       PICTURE 9 COMPUTATIONAL-3.                           COLLRESV
00109   010820 77  B       PICTURE 9 COMPUTATIONAL-3.                           COLLRESV
00110   010900 77  CD          PICTURE S99 COMPUTATIONAL VALUE 0.               COLLRESV
00111   011000 77  CRE         PICTURE X.                                       COLLRESV
00112   011100 77  CX          PICTURE S9999 COMPUTATIONAL VALUE 0.             COLLRESV
00113   011200 77  ECNT        PICTURE S9999 COMPUTATIONAL VALUE 0.             COLLRESV
00114   011250 77  ERE PICTURE X.                                              COLLRESV
00115   011300 77  E           PICTURE X.                                       COLLRESV
00116   011400 77  ES  PICTURE S99 COMPUTATIONAL.                              COLLRESV
00117   011500 77  HPR         PICTURE 9 COMPUTATIONAL-3.                       COLLRESV
00118   011600 77  K   PICTURE S999          COMPUTATIONAL.                     COLLRESV
00119   011700 77  LN  PICTURE S999  COMPUTATIONAL  VALUE 60.                   COLLRESV
00120   011800 77  LN2 PICTURE S999  COMPUTATIONAL  VALUE 56.                   COLLRESV
00121   011900 77  M   PICTURE S999          COMPUTATIONAL.                     COLLRESV
00122   012000 77  N   PICTURE S999          COMPUTATIONAL.                     COLLRESV
00123   012100 77  ONCT    PICTURE S9999 COMPUTATIONAL VALUE 0.                 COLLRESV
00124   012200 77  ONE         PICTURE X.                                       COLLRESV
00125   012300 77  P   PICTURE S999          COMPUTATIONAL.                     COLLRESV
00126   012400 77  Q   PICTURE S9999         COMPUTATIONAL.                     COLLRESV
00127   012500 77  R   PICTURE S999          COMPUTATIONAL.                     COLLRESV
00128   012600 77  RTP     PICTURE S9  COMPUTATIONAL.                           COLLRESV
00129   012700     88  DAILY   VALUE 1.                                         COLLRESV
00130   012800     88  WEEKLY  VALUE 2.                                         COLLRESV
00131   012900 77  S   PICTURE S999          COMPUTATIONAL.                     COLLRESV
00132   013000 77  SAVE    PICTURE X.                                           COLLRESV
00133   013100 77  SVCDIN PICTURE X(80).                                       COLLRESV
00134   013200 77  NSHV  PICTURE XXX  VALUE HIGH-VALUE.                        COLLRESV
00135   013300 77  T   PICTURE S999          COMPUTATIONAL.                     COLLRESV
00136   013400 77  TRKEY       PICTURE S9(5) COMPUTATIONAL.                     COLLRESV
00137   013500 77  W   PICTURE S999          COMPUTATIONAL.                     COLLRESV
00138   013550 77  WACNT       PICTURE S9999 COMPUTATIONAL VALUE 0.             COLLRESV
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00139   013600 77  X    PICTURE S999          COMPUTATIONAL.                    COLLRESV
00140   013700 77  Y    PICTURE S999          COMPUTATIONAL.                    COLLRESV
00141   013800 77  Z    PICTURE S999          COMPUTATIONAL.                    COLLRESV
00142   013900 01  ASSN.                                                         COLLRESV
00143   014000   02  DIN        PICTURE S9 COMPUTATIONAL.                        COLLRESV
00144   014100   02  OUT        PICTURE S9 COMPUTATIONAL.                        COLLRESV
00145   014200   02  WIN        PICTURE S9 COMPUTATIONAL.                        COLLRESV
00146   014300   02  EXT        PICTURE S9 COMPUTATIONAL.                        COLLRESV
00147   014400 01      CAA.                                                      COLLRESV
00148   014500   02      CAAE     OCCURS 2000.                                   COLLRESV
00149   014600     03      CAUTH  PICTURE X(32).                                 COLLRESV
00150   014700     03      CTITL  PICTURE X(5).                                  COLLRESV
00151   014800     03      CSEQN  PICTURE 9(6).                                  COLLRESV
00152   014810 01  CHD.                                                          COLLRESV
00153   014820   02  FILLER     PICTURE X(23) VALUE 'PUNCHED OUTPUT FOR RUN '.   COLLRESV
00154   014830   02  CRUN       PICTURE 9999.                                    COLLRESV
00155   014840   02  FILLER     PICTURE XXXX VALUE ' ON '.                       COLLRESV
00156   014850   02  CDAT       PICTURE X(8).                                    COLLRESV
00157   014900 01      CHKDATA.                                                  COLLRESV
00158   015100   02      CHKEN    PICTURE XXXX VALUE 'ON  '.                     COLLRESV
00159   015200   02      CHKSEQN PICTURE 9(6).                                   COLLRESV
00160   015300   02      FILLER   PICTURE X     VALUE SPACE.                     COLLRESV
00161   015400   02      CHKAUTH PICTURE X(34).                                  COLLRESV
00162   015500   02      FILLER   PICTURE X     VALUE SPACE.                     COLLRESV
00163   015600   02      CHKCAIN  PICTURE X(30).                                 COLLRESV
00164   015700   02      FILLER   PICTURE XXXX VALUE SPACE.                      COLLRESV
00165   016000 01  FILLER.                                                       COLLRESV
00166   016100   02  CTR    PICTURE S9999 COMPUTATIONAL OCCURS 8.                COLLRESV
00167   016200 01  DCRSE.                                                        COLLRESV
00168   016300   02  DNEED      PICTURE 99.                                      COLLRESV
00169   016400   02  DCID.                                                       COLLRESV
00170   016500     03  DTERM      PICTURE 999.                                   COLLRESV
00171   016600     03  DCRID.                                                    COLLRESV
00172   016700       04  DCRSE     PICTURE X(15).                                COLLRESV
00173   016800       04  DRROR     PICTURE X(15).                                COLLRESV
00174   016900 01  DINREC  PICTURE X(43).                                        COLLRESV
00175   017000 01  DUMCREE.                                                      COLLRESV
00176   017100   02      DCRE     PICTURE 9     COMPUTATIONAL-3  OCCURS 99.      COLLRESV
00177   017200 01  DUMICEE.                                                      COLLRESV
00178   017300   02      DIC      PICTURE S99   COMPUTATIONAL    OCCURS 13.     COLLRESV
00179   017400 01      ECODED   PICTURE X(48)                                   COLLRESV
00180   017500         VALUE 'AUTHTITLEDTNDATECALLLCCNCRSETERMNEEDPRDECDRYDRDR1'.COLLRESV
00181   017600 01      ECODEE   REDEFINES ECODED.                               COLLRESV
00182   017700   02      ECODE    PICTURE XXXX OCCURS 12.                        COLLRESV
00183   017800 01      ECODED   PICTURE X(32)                                   COLLRESV
00184   017900         VALUE 'ENT DT DEF ADD SUB MOD CHK DEL '.                  COLLRESV
00185   018000 01      ECODEE   REDEFINES ECODED.                               COLLRESV
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00186   018100  02      ECODE  PICTURE X(4) OCCURS 8.                    COLLRESV
00187   018200 01      EEEE.                                             COLLRESV
00188   018300  02      EEE.                                              COLLRESV
00189   018400  03       MEE    PICTURE X.                               COLLRESV
00190   018500  03       CDE    PICTURE X.                               COLLRESV
00191   018600  03       PRE    PICTURE X.                               COLLRESV
00192   018700  03       PNE    PICTURE X.                               COLLRESV
00193   018800  03       PUE    PICTURE X.                               COLLRESV
00194   018900  03       T1E    PICTURE X.                               COLLRESV
00195   019000  03       T2E    PICTURE X.                               COLLRESV
00196   019100  03       T3E    PICTURE X.                               COLLRESV
00197   019200  03       T4E    PICTURE X.                               COLLRESV
00198   019300  02      ESTE.                                             COLLRESV
00199   019400  03       DIE    PICTURE X.                               COLLRESV
00200   019500      88   DINOPEN VALUE 'O'.                              COLLRESV
00201   019600  03       WIE    PICTURE X.                               COLLRESV
00202   019700      88   WINOPEN VALUE 'O'.                              COLLRESV
00203   019800 01      FUNC.                                             COLLRESV
00204   019900  02      ICEE.                                             COLLRESV
00205   020000  03       ICE    PICTURE S99  COMPUTATIONAL.              COLLRESV
00206   020100  03       ICE    PICTURE S99  COMPUTATIONAL     OCCURS 12. COLLRESV
00207   020200  02      INEOE.                                            COLLRESV
00208   020300  03       INELO  OCCURS 15.                               COLLRESV
00209   020400    04      INEL  PICTURE S99  COMPUTATIONAL.              COLLRESV
00210   020500    04      INEO  PICTURE X(76).                           COLLRESV
00211   020600  02      ICPNC.                                            COLLRESV
00212   020700  03       ICEN   OCCURS 25.                               COLLRESV
00213   020800    04      ICPE  PICTURE X.                               COLLRESV
00214   020900    04      ICPN  PICTURE 99.                              COLLRESV
00215   021000  02      ITPB.                                             COLLRESV
00216   021100  03       ITPC   PICTURE XXX.                             COLLRESV
00217   021200  03       ITPM REDEFINES ITPC   PICTURE 999.              COLLRESV
00218   021300  03       FILLER PICTURE 9     VALUE 0.                   COLLRESV
00219   021400  02      FILLER                REDEFINES ITPB.            COLLRESV
00220   021500  03       INBLK  PICTURE X.                               COLLRESV
00221   021600  03       INVALTST PICTURE 999.                           COLLRESV
00222   021700  03       FILLER                REDEFINES INVALTST.        COLLRESV
00223   021800    04      INNUM PICTURE 99.                              COLLRESV
00224   021900    04      FILLER PICTURE 9.                              COLLRESV
00225   022000 01      FUNWORDDUMMY.                                     COLLRESV
00226   022100  02      FUNWORD.                                          COLLRESV
00227   022200  03       FUN    PICTURE 9.                               COLLRESV
00228   022300  03       FUNS   PICTURE 9     OCCURS 12.                 COLLRESV
00229   022400  02      FUNWORD2              REDEFINES FUNWORD.         COLLRESV
00230   022500  03       FUNBIP.                                         COLLRESV
00231   022600    04      FUN1-2.                                        COLLRESV
00232   022700      05     FUN1                 PICTURE 9.               COLLRESV
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00233   022800      05      FUN2                    PICTURE 9.                          COLLRESV
00234   022900      04      FUN3-7                  PICTURE 9(5).                       COLLRESV
00235   023000      03      FUN9-13.                                                    COLLRESV
00236   023100      04      FUN8-11                 PICTURE 9999.                       COLLRESV
00237   023200      04      FUN12-13                PICTURE 99.                         COLLRESV
00238   023300 01   HDLDTN   PICTURE X(43).                                            COLLRESV
00239   023400 01   MODBIB.                                                            COLLRESV
00240   023500      02      MAUTH   PICTURE X(32).                                      COLLRESV
00241   023600      02      MTITL   PICTURE X(5).                                       COLLRESV
00242   023700 01   OUTREC.                                                            COLLRESV
00243   023800      02      OBIB    PICTURE X(37).                                      COLLRESV
00244   023900      02      OSFON   PICTURE 9(6).                                       COLLRESV
00245   024000 01   PCOPYS.                                                            COLLRESV
00246   024100      02      PCPEA.                                                      COLLRESV
00247   024200      03      PCOPIES PICTURE X(7).                                       COLLRESV
00248   024300      03      PCPA    OCCURS 20.                                          COLLRESV
00249   024400      04      PCPEA   PICTURE X.                                          COLLRESV
00250   024500      04      PCPN    PICTURE 99.                                         COLLRESV
00251   024600      02      PCPB.                                                       COLLRESV
00252   024700      03      FILLER  PICTURE X(7).                                       COLLRESV
00253   024800      03      PCPB    OCCURS 20.                                          COLLRESV
00254   024900      04      FILLER  PICTURE X.                                          COLLRESV
00255   025000      04      PCPEB   PICTURE X.                                          COLLRESV
00256   025100      04      FILLER  PICTURE X.                                          COLLRESV
00257   025200 01   PHEAD.                                                             COLLRESV
00258   025300      02      FILLER  PICTURE X   VALUE '1'.                              COLLRESV
00259   025400      02      FILLER  PICTURE X(23)  VALUE SPACE.                         COLLRESV
00260   025500      02      PHTP PICTURE X(6) VALUE SPACE.                              COLLRESV
00261   025600      02      FILLER PICTURE X(22) VALUE ' RESERVES WORKLIST OF ',        COLLRESV
00262   025700      02      HDATE PICTURE X(8).                                         COLLRESV
00263   025800      02      FILLER PICTURE X(10) VALUE SPACE.                           COLLRESV
00264   025900      02      HRTYP.                                                      COLLRESV
00265   026000      03      HSUP PICTURE X(24).                                         COLLRESV
00266   026100      03      HLDATE PICTURE X(8).                                        COLLRESV
00267   026200      02      FILLER PICTURE X(21) VALUE SPACE.                           COLLRESV
00268   026300      02      FILLER PICTURE X(5) VALUE 'PAGE ',                          COLLRESV
00269   026400      02      PAGN PICTURE Z,777.                                         COLLRESV
00270   026500 01   PRINTAR.                                                           COLLRESV
00271   026600      02      PRINTS.                                                     COLLRESV
00272   026700      05      PLINE   OCCURS 16.                                          COLLRESV
00273   026800      10      CCH     PICTURE X.                                          COLLRESV
00274   026900      10      PRIBF.                                                      COLLRESV
00275   027000      15      FILLER  PICTURE X(17).                                      COLLRESV
00276   027100      15      PCPAP.                                                      COLLRESV
00277   027200      20      PCOPYE  PICTURE X(67).                                      COLLRESV
00278   027300      15      FILLER  PICTURE X(17).                                      COLLRESV
00279   027400      10      PCRSEE  PICTURE X(38).                                      COLLRESV
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00280   027500  02  BIBSTUF  REDEFINES PRINTS.                          COLLRESV
00281   027600    05  LIN1.                                             COLLRESV
00282   027700      10  CCH1  PICTURE X.                                COLLRESV
00283   027800      10  PSEQN  PICTURE 9(6).                            COLLRESV
00284   027900      10  FILLER  PICTURE X(5).                           COLLRESV
00285   028000      10  PAUTH  PICTURE X(76).                           COLLRESV
00286   028100      10  FILLER  PICTURE X(45).                          COLLRESV
00287   028200    05  LIN2.                                             COLLRESV
00288   028300      10  CCH2  PICTURE X.                                COLLRESV
00289   028400      10  FILLER  PICTURE X(15).                          COLLRESV
00290   028500      10  PTITL  PICTURE X(76).                           COLLRESV
00291   028600      10  FILLER  PICTURE X(41).                          COLLRESV
00292   028700    05  LIN3.                                             COLLRESV
00293   028800      10  CCH3  PICTURE X.                                COLLRESV
00294   028900      10  FILLER  PICTURE X(15).                          COLLRESV
00295   029000      10  PEDTN  PICTURE X(10).                           COLLRESV
00296   029100      10  FILLER  PICTURE X.                              COLLRESV
00297   029200      10  PDATE  PICTURE X(10).                           COLLRESV
00298   029300      10  FILLER  PICTURE X.                              COLLRESV
00299   029400      10  PCALL  PICTURE X(30).                           COLLRESV
00300   029500      10  FILLER  PICTURE X.                              COLLRESV
00301   029600      10  PLOCN  PICTURE X(10).                           COLLRESV
00302   029700 01  PSTUF.                                               COLLRESV
00303   029800    05  PCPTOTL.                                          COLLRESV
00304   029900      10  PTOTCOP  PICTURE X(13) VALUE 'TOTAL COPIES '.   COLLRESV
00305   030000      10  PTOTL  PICTURE 99.                              COLLRESV
00306   030100      10  PORD  PICTURE X(7) VALUE '  ORDR '.             COLLRESV
00307   030200      10  PORDR  PICTURE 99.                              COLLRESV
00308   030300 01  PTERMHD.                                             COLLRESV
00309   030400    02  PTERHD  PICTURE X(5) VALUE 'TERM '.               COLLRESV
00310   030500    02  PTERM  PICTURE 999.                               COLLRESV
00311   030600 01  PCRSES.                                              COLLRESV
00312   030700    05  FILLER  PICTURE XXX  VALUE SPACE.                 COLLRESV
00313   030800    05  PCRSE  PICTURE X(15).                             COLLRESV
00314   030900    05  FILLER  PICTURE X    VALUE SPACE.                 COLLRESV
00315   031000    05  PRRDE  PICTURE X(15).                             COLLRESV
00316   031100    05  FILLER  PICTURE XX   VALUE SPACE.                 COLLRESV
00317   031200    05  PNEED  PICTURE 99.                                COLLRESV
00318   031300 01  PTTOTLS.                                             COLLRESV
00319   031400    05  FILLER  PICTURE X(12)  VALUE SPACE.               COLLRESV
00320   031500    05  PSHORHD PICTURE X(9)  VALUE 'SHORTAGE '.          COLLRESV
00321   031600    05  PSHORT  PICTURE 99.                               COLLRESV
00322   031700    05  PTNEEHD PICTURE X(13)  VALUE '  TOTAL NEED '.     COLLRESV
00323   031800    05  PTNEED  PICTURE 99.                               COLLRESV
00324   031900 01  PURHEAD.                                             COLLRESV
00325   032000    02  FILLER  PICTURE X  VALUE '1'.                     COLLRESV
00326   032100    02  FILLER  PICTURE X(20)  VALUE SPACE.               COLLRESV
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00327   032200  02  FILLER   PICTURE X(27)  VALUE                          COLLRESV
00328   032300      'PUBLIC RESERVES LIST AS OF '.                          COLLRESV
00329   032400  02  PUDATE   PICTURE X(8).                                 COLLRESV
00330   032500  02  PUSUPP   PICTURE X(27)  VALUE SPACE.                   COLLRESV
00331   032600  02  FILLER   PICTURE X(5)  VALUE 'PAGE '.                  COLLRESV
00332   032700  02  PUBPAGE  PICTURE ZZZ.                                  COLLRESV
00333   032800  02  FILLER   PICTURE X(42) VALUE SPACE.                    COLLRESV
00334   032900 01  PUBLINES.                                               COLLRESV
00335   033000  02  PULIN1.                                                COLLRESV
00336   033100  03  PCI       PICTURE X  VALUE '='.                        COLLRESV
00337   033200  03  FILLER   PICTURE X(10)  VALUE SPACE.                   COLLRESV
00338   033300  03  PUAUTH   PICTURE X(76).                                COLLRESV
00339   033400  02  PULIN2.                                                COLLRESV
00340   033500  03  FILLER   PICTURE X  VALUE SPACE.                       COLLRESV
00341   033600  03  FILLER   PICTURE X(14)  VALUE SPACE.                   COLLRESV
00342   033700  03  PUTITL   PICTURE X(76).                                COLLRESV
00343   033800  02  PULIN3.                                                COLLRESV
00344   033900  03  FILLER   PICTURE X  VALUE SPACE.                       COLLRESV
00345   034000  03  FILLER   PICTURE X(14)  VALUE SPACE.                   COLLRESV
00346   034100  03  PUEDTN   PICTURE X(10).                                COLLRESV
00347   034200  03  FILLER   PICTURE X(5)  VALUE SPACE.                    COLLRESV
00348   034300  03  PUDATN   PICTURE X(10).                                COLLRESV
00349   034400 01  RDTA.                                                   COLLRESV
00350   034500  02  RUNSER       PICTURE 9999.                             COLLRESV
00351   034600  02  FILLER       PICTURE X.                                COLLRESV
00352   034700  02  DATE         PICTURE X(8).                             COLLRESV
00353   034800  02  FILLER       PICTURE X.                                COLLRESV
00354   034900  02  TERMA        PICTURE 999.                              COLLRESV
00355   035000  02  FILLER       PICTURE X.                                COLLRESV
00356   035100  02  LRTP         PICTURE X(7).                             COLLRESV
00357   035200  02  FILLER       PICTURE X.                                COLLRESV
00358   035300  02  FILLER       PICTURE X(5).                             COLLRESV
00359   035400  02  HDIN         PICTURE 9.                                COLLRESV
00360   035500  02  FILLER       PICTURE X(5).                             COLLRESV
00361   035600  02  HOUT         PICTURE 9.                                COLLRESV
00362   035700  02  FILLER       PICTURE X(5).                             COLLRESV
00363   035800  02  HWIN         PICTURE 9.                                COLLRESV
00364   035900  02  FILLER       PICTURE X(5).                             COLLRESV
00365   036000  02  HEXT         PICTURE 9.                                COLLRESV
00366   036100  02  FILLER       PICTURE X.                                COLLRESV
00367   036200  02  FUNSEQ       PICTURE 9(5).                             COLLRESV
00368   036300  02  FUNSEQF   REDEFINES FUNSEQ.                            COLLRESV
00369   036400  03  ASEQN       PICTURE 9   OCCURS 5.                     COLLRESV
00370   036500  02  ESEQNE      PICTURE 9.                                COLLRESV
00371   036600  02  FILLER       PICTURE X.                                COLLRESV
00372   036700  02  LDATE       PICTURE X(8).                             COLLRESV
00373   036800 01      SEQNEF.                                             COLLRESV
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00374   036900  02      SEQN                    PICTURE 9(6).                   COLLRESV
00375   037000  02      ASEQNE  REDEFINES SEQN.                                COLLRESV
00376   037100  03      ASEQND                  PICTURE 9(5).                   COLLRESV
00377   037200  03      ASEQNE                  PICTURE 9.                      COLLRESV
00378   037300 01  SLDATA.                                                      COLLRESV
00379   037400  02  FILLER      PICTURE X(17) VALUE SPACE.                     COLLRESV
00380   037500  02  SLSEQN.                                                     COLLRESV
00381   037600  03  SLSEQUNSEQ  PICTURE 9(5).                                  COLLRESV
00382   037700  03  SLSEQONE  PICTURE 9.                                       COLLRESV
00383   037800  02  FILLER      PICTURE X(3) VALUE SPACE.                      COLLRESV
00384   037900  02  SLBIB.                                                      COLLRESV
00385   038000  03  FILLER      PICTURE X(21)                                  COLLRESV
00386   038100      VALUE '  NEW ENTRIES IN RUN '.                             COLLRESV
00387   038200  03  SLRUNSER  PICTURE 9(4).                                    COLLRESV
00388   038300  03  FILLER     PICTURE X(4) VALUE ' ON '.                       COLLRESV
00389   038400  03  SLDATE     PICTURE X(8).                                   COLLRESV
00390   038500  03  FILLER     PICTURE X(3) VALUE SPACE.                       COLLRESV
00391   038600  02  FILLER  REDEFINES SLBIB.                                   COLLRESV
00392   038700  03  SLAUTH     PICTURE X(32).                                  COLLRESV
00393   038800  03  SLATEIL    PICTURE X(3).                                   COLLRESV
00394   038900  03  SLTITL     PICTURE X(5).                                   COLLRESV
00395   039000 01  TERME PICTURE 999.                                          COLLRESV
00396   039100 01  TERME REDEFINES TERME.                                       COLLRESV
00397   039200  02  TERMG  PICTURE 99.                                         COLLRESV
00398   039300  02  TERMH  PICTURE 9.                                          COLLRESV
00399   039400 01  TRMS.                                                        COLLRESV
00400   039500  02  TRM OCCURS 3.                                              COLLRESV
00401   039600  03  TRA PICTURE 99.                                            COLLRESV
00402   039700  03  TRB PICTURE 9.                                             COLLRESV
00403   039710 01  WARDATA.                                                     COLLRESV
00404   039730  02  WATXT.                                                      COLLRESV
00405   039731  03  WATA      PICTURE X(7).                                    COLLRESV
00406   039732  03  WANEED    PICTURE 99.                                      COLLRESV
00407   039733  03  WATB      PICTURE X(16).                                   COLLRESV
00408   039740  02  FILLER     PICTURE X VALUE SPACE.                          COLLRESV
00409   039750  02  WASEQN    PICTURE 9(6).                                    COLLRESV
00410   039760  02  FILLER     PICTURE X VALUE SPACE.                          COLLRESV
00411   039770  02  WACALN    PICTURE X(30).                                   COLLRESV
00412   039780  02  FILLER     PICTURE X VALUE SPACE.                          COLLRESV
00413   039790  02  WAAUTH    PICTURE X(16).                                   COLLRESV
00414   039800 01  WINREC  PICTURE X(43).                                      COLLRESV
00415   039900 PROCEDURE DIVISION.                                              COLLRESV
00416   040000 INITIALIZATION SECTION.                                          COLLRESV
00417   040100 SETUP.                                                           COLLRESV
00418   040200     MOVE ALL 'C' TO FFFF.                                        COLLRESV
00419   040300     OPEN INPUT CDIN I-O MASTER-FILE. MOVE 'O' TO CDF-NEF.        COLLRESV
00420   040400     MOVE 0 TO TRKEY SEQN.                                        COLLRESV
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00421   040500      READ MASTER-FILE INTO RDTA INVALID GO TO ABORT1.                COLLRESV
00422   040600      DISPLAY 'LAST RUN ' RDTA. ADD 1 TO RUNSER.                      COLLRESV
00423   040700      ENTER LINKAGE. CALL 'DATE' USING DATE. ENTER COBOL.             COLLRESV
00424   040800      MOVE TERMA TO TRM (1) TRM (2) TRM (3) GO TO T123 T231 T312      COLLRESV
00425   040900      DEPENDING TRB (1).                                              COLLRESV
00426   041000 T123. MOVE 2 TO TRB (2) MOVE 3 TO TRB (3) GO TO TEX.                 COLLRESV
00427   041100 T231. MOVE 3 TO TRB (2) MOVE 1 TO TRB (3) ADD 1 TO TRA (3) GO TO     COLLRESV
00428   041200      TEX.                                                            COLLRESV
00429   041300 T312. MOVE 1 TO TRB (2) MOVE 2 TO TRB (3) ADD 1 TO TRA (2) ADD 1     COLLRESV
00430   041400      TO TRA (3).                                                     COLLRESV
00431   041500 TEX. MOVE DATE TO HDATE. READ CDIN END GO TO ABORT2.                 COLLRESV
00432   041600      DISPLAY 'FIRST CARD READ:' CARDIN.                              COLLRESV
00433   041700      IF CRDE NOT = 'RUN=' GO TO ABORT2.                              COLLRESV
00434   041800      IF INRUN NOT = RUNSER DISPLAY                                   COLLRESV
00435   041900      'RUN NUMBER INCORRECT, MUST BE ' RUNSER THEN GO TO CLOSEM.      COLLRESV
00436   042000      IF IRT = ' SUPPL.' MOVE 1 TO RTP GO TO DS.                      COLLRESV
00437   042100      IF IRT = ' MASTER' MOVE 2 TO RTP GO TO WS.                      COLLRESV
00438   042200      IF IRT NOT = ' SETUP ' GO TO ABORT2.                            COLLRESV
00439   042300      MOVE 2 TO RTP. IF IASSN NUMERIC AND IWIN + IOUT = 7 AND         COLLRESV
00440   042400          IDIN + IEXT = 3 NEXT SENTENCE, ELSE GO TO ABORT2.           COLLRESV
00441   042500      MOVE IDIN TO DIN  MOVE IOUT TO OUT                              COLLRESV
00442   042600      MOVE IWIN TO WIN  MOVE IEXT TO EXT  GO TO WOPEN.                COLLRESV
00443   042700 WS.  IF LRTP NOT = ' SUPPL.' AND 'DAILY  ' GO TO WAW.                COLLRESV
00444   042800      MOVE HDIN TO EXT  MOVE HOUT TO DIN                              COLLRESV
00445   042900      MOVE HWIN TO WIN  MOVE HEXT TO OUT  GO TO WOPEN.                COLLRESV
00446   043000 WAW.     MOVE HDIN TO EXT  MOVE HOUT TO WIN                          COLLRESV
00447   043100          MOVE HWIN TO OUT  MOVE HEXT TO DIN.                         COLLRESV
00448   043200 WOPEN.   IF WIN + OUT NOT = 7 OR DIN + EXT NOT = 3 GO TO ABORT3.     COLLRESV
00449   043300      SUBTRACT 2 FROM WIN. GO TO WOPEN34 WOPEN43 DEPENDING WIN.       COLLRESV
00450   043400      GO TO ABORT3.                                                   COLLRESV
00451   043500 WOPEN34.     OPEN INPUT TAPE3 OUTPUT TAPE4. GO TO WOPEND.            COLLRESV
00452   043600 WOPEN43.     OPEN INPUT TAPE4 OUTPUT TAPE3.                          COLLRESV
00453   043700 WOPEND. MOVE '0' TO T3F T4F WIF.                                     COLLRESV
00454   043800      GO TO DOPEN12 DOPEN21 DEPENDING DIN. GO TO ABORT3.              COLLRESV
00455   043900 DS.  IF LRTP NOT = ' SUPPL.' AND 'DAILY  ' GO TO DAW.                COLLRESV
00456   044000      MOVE HDIN TO OUT  MOVE HOUT TO DIN                              COLLRESV
00457   044100      MOVE HWIN TO WIN  MOVE HEXT TO EXT.  GO TO DOPEN.               COLLRESV
00458   044200 DAW.     MOVE HDIN TO OUT  MOVE HOUT TO WIN                          COLLRESV
00459   044300          MOVE HWIN TO EXT  MOVE HEXT TO DIN.                         COLLRESV
00460   044400 DOPEN.   IF DIN + OUT NOT = 3 OR WIN + EXT NOT = 7 GO TO ABORT3.     COLLRESV
00461   044500      SUBTRACT 2 FROM WIN GO TO DOPEN12 DOPEN21 DEPENDING DIN.        COLLRESV
00462   044600      GO TO ABORT3.                                                   COLLRESV
00463   044700 DOPEN12.     OPEN INPUT TAPE1 OUTPUT TAPE2. GO TO DOPEND.            COLLRESV
00464   044800 DOPEN21.     OPEN INPUT TAPE2 OUTPUT TAPE1.                          COLLRESV
00465   044900 DOPEND. MOVE '0' TO T1F T2F DIF.  MOVE IRT TO LRTP.                  COLLRESV
00466   045000      IF DAILY  MOVE LDATE TO HLDATE                                  COLLRESV
00467   045100          MOVE 'SUPPLEMENTS WORKLIST OF ' TO HSUP                     COLLRESV
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00468   045200          MOVE ' (SUPPLEMENT)' TO PUSUPP                          COLLRESV
00469   045300      ELSE MOVE 'MASTER' TO PHTP MOVE DATE TO LDATE               COLLRESV
00470   045400          MOVE 'REPLACES ALL PREVIOUS WORKLISTS ' TO HRTYP.       COLLRESV
00471   045500      IF IASSE = ' PUB'                                           COLLRESV
00472   045600          MOVE C TO Z  MOVE 1 TO Y, PUBPAGE  MOVE DATE TO PUDATE  COLLRESV
00473   045700          OPEN OUTPUT PUBLIC-LIST  MOVE 'O' TO PUE                COLLRESV
00474   045800          WRITE PUBLN FROM PUBHEAD DISPLAY 'PUBLIC LIST INITIATED'.COLLRESV
00475   045900      MOVE DIN TO HDIN MOVE OUT TO HOUT ADD 2 WIN GIVING HWIN     COLLRESV
00476   046000      MOVE EXT TO HEXT DISPLAY 'THIS RUN ' RDTA.                  COLLRESV
00477   046100      REWRITE MASTER-RECORD FROM RDTA  INVALID GO TO ABORTI.      COLLRESV
00478   046200      MOVE FUNSEQ TO SLFUNSEQ. MOVE FSEONE TO SLFSEONE.           COLLRESV
00479   046300      MOVE RUNSER TO SLRUNSER. MOVE DATE TO SLDATE.               COLLRESV
00480   046400      MOVE 1 TO Q.                                                COLLRESV
00481   046500 ZCTRS.  MOVE C TO CTR (Q). IF Q < 8 ADD 1 TO Q GO TO ZCTRS.      COLLRESV
00482   046600      MOVE 1 TO Q.                                                COLLRESV
00483   046700 ZDCPE.  MOVE C TO DCPE (Q). IF Q < 99 ADD 1 TO Q GO TO ZDCPE.    COLLRESV
00484   046800      MOVE 1 TO Q.                                                COLLRESV
00485   046900 ZDIC.   MOVE C TO DIC (Q). IF Q < 13 ADD 1 TO Q GO TO ZDIC.      COLLRESV
00486   047000      MOVE DUMICEE TO ICEE. MOVE SPACE TO SAVE. GO TO NEWCD.      COLLRESV
00487   047100 ABORTI. DISPLAY 'RDTA R/RR/RW FAILED ' TRKEY SEQN. GO TO CLOSEM. COLLRESV
00488   047200 ABORT2. DISPLAY 'RUN CARD INVALID OR MISSING'. GO TO CLOSEM.     COLLRESV
00489   047300 ABORT3. DISPLAY 'OPEN ROUTINE FAILED' MOVE IRT TO LRTP GO TO AB4.COLLRESV
00490   047400 ABORT4. DISPLAY 'FILE SELECT #' FS ' FAILED'.                    COLLRESV
00491   047500 AB4.  EXHIBIT NAMED DIN OUT WIN EXT MEE CDE PRE PNE T1E T2E T3E  COLLRESV
00492   047600      T4E DIE WIE.  DISPLAY 'NEXT RUN MUST BE SETUP'.             COLLRESV
00493   047700      MOVE 0 TO TRKEY SEQN READ MASTER-FILE INVALID GO TO ABORTI. COLLRESV
00494   047800      MOVE DIN TO HDIN MOVE OUT TO HOUT ADD 2 TO WIN              COLLRESV
00495   047900      MOVE WIN TO HWIN MOVE EXT TO HEXT.                          COLLRESV
00496   048000      DISPLAY 'ABORTED RUN ' RDTA. MOVE C TO HDIN HOUT HWIN HEXT. COLLRESV
00497   048100      REWRITE MASTER-RECORD FROM RDTA  INVALID GO TO ABORTI.      COLLRESV
00498   048200      GO TO CLOSEM.                                               COLLRESV
00499   048300 CARD-READ SECTION.                                               COLLRESV
00500   048400 FETCH-FUNCTION. IF CX NOT < 2000 GO TO TOOMANY.                  COLLRESV
00501   048500      MOVE DUMICEE TO ICEE. MOVE SPACE TO AUTH, SAVE.             COLLRESV
00502   048600 EE. GO TO NC. NOTE ALTER TO QT.                                  COLLRESV
00503   048700 TOOMANY. DISPLAY                                                 COLLRESV
00504   048800      '**A+ DAY LIMIT EXCEEDED. ANY FOLLOWING NOT PROCESSED ***'. COLLRESV
00505   048900      ALTER NC TO PROCEED TO RUNOUT. GO TO EE.                    COLLRESV
00506   049000 RUNOUT. DISPLAY CARDIN. READ CDIN END GO TO QT. GO TO RUNOUT.    COLLRESV
00507   049100 NEWCD.  ADD 1 TO CD. READ CDIN END                               COLLRESV
00508   049200                ALTER EE TO PROCEED TO QT GO TO BADFORM.          COLLRESV
00509   049300 NC. GO TO ND. NOTE MAY ALTER TO RUNOUT.                          COLLRESV
00510   049400 ND. PERFORM BLNKSCAN VARYING M FROM 76 BY -1 UNTIL M = C.        COLLRESV
00511   049500      IF CPDE = 'Q' GO TO BITFUN.                                 COLLRESV
00512   049600      IF CPDE = 'A' GO TO KILLFUN.                                COLLRESV
00513   049700      IF CPDE = ' ' SUBTRACT 1 FROM CD GO TO NEWCD.               COLLRESV
00514   049800      GO TO QQQ.                                                  COLLRESV
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00515   049900 BLNKSCAN.   IF IC (M) NOT = ' ' GO TO LFIELD.                    COLLRESV
00516   050000 LFIELD. IF IC (M) = ' '                                          COLLRESV
00517   050100                DISPLAY 'FIELD DISCARDED: ' CARDIN                COLLRESV
00518   050200                SUBTRACT 1 FROM CD GO TO NEWCD.                   COLLRESV
00519   050300 000. IF CD = '  PERFORM ETEST VARYING N FROM 1 BY 1 UNTIL N = 9  COLLRESV
00520   050400                THEN IF CODE = 'SAVE' GO TO SAVIN                 COLLRESV
00521   050500                     ELSE DISPLAY 'NOT A VALID HEADER: ', CARDIN  COLLRESV
00522   050600                          MOVE 0 TO CD GO TO NEWCD                COLLRESV
00523   050700       ELSE   PERFORM ETEST VARYING N FROM 1 BY 1 UNTIL N = 13    COLLRESV
00524   050800                GO TO ENDFUN.                                     COLLRESV
00525   050900 ETEST.  IF CODE = ECODE (N)                                      COLLRESV
00526   051000       MOVE N TO ICE, GO TO ENTIN CHKIN CHKIN DEPENDING N THEN    COLLRESV
00527   051100       IF IBB NOT NUMERIC DISPLAY 'INVALID SEQUENCE NUMBER' GO TO COLLRESV
00528   051200       DISPRD-1 ELSE MOVE IBB TO SEQN GO TO NEWCD.                COLLRESV
00529   051300 ETEST.  IF CODE = ECODE (N) AND ICE (N) = 0                      COLLRESV
00530   051400       MOVE IB TO INFO (CD), MOVE M TO INFL (CD),                 COLLRESV
00531   051500       MOVE CD TO ICE (N), GO TO NEWCD.                           COLLRESV
00532   051600 ENTIN. ADD 1 TO FUNSEQ MOVE FUNSEQ TO ASEQND. COMPUTE AA =       COLLRESV
00533   051700       ASEQN (2) * ASEQN (4) + ASEQN (1) + ASEQN (3) + ASEQN (5).COLLRESV
00534   051800       MOVE AA TO ASEQNF ESEQNF.                                  COLLRESV
00535   051900 ENT2. MOVE SPACE TO BIB MOVE ZERO TO PR INVENT CRSES NCRSE       COLLRESV
00536   052000       MOVE DUMCREF TO CREF.                                      COLLRESV
00537   052100 ENTEX. GO TO NEWCD.                                              COLLRESV
00538   052200 CHKIN.  IF IBB NUMERIC MOVE IBB TO SEQN                          COLLRESV
00539   052300       ELSE DISPLAY 'INVALID SEQUENCE NUMBER: ' CARDIN            COLLRESV
00540   052400                MOVE 0 TO CD GO TO NEWCD.                         COLLRESV
00541   052500       MOVE IBCF TO ITRC. IF INVALTST NUMERIC MOVE IBCN TO N      COLLRESV
00542   052600       ELSE DISPLAY 'COPY NUMBER INCORRECTLY PUNCHED: ' CARDIN    COLLRESV
00543   052700            MOVE 0 TO CD GO TO NEWCD.                             COLLRESV
00544   052800       MOVE CARDIN TO SVCDIN.                                     COLLRESV
00545   052900       READ CDIN END ALTER EE TO PROCEED TO OT. GO TO FUNGOOD.    COLLRESV
00546   053000 SAVIN. MOVE 1 TO ICE. MOVE 'A' TO SAVE.                          COLLRESV
00547   053100       IF IBB NOT NUMERIC GO TO BADSAVESEQN.                      COLLRESV
00548   053200       MOVE IBB TO SEQN. COMPUTE TRKEY = ASEQND / 5.              COLLRESV
00549   053300       READ MASTER-FILE INVALID GO TO BADSAVESEQN.                COLLRESV
00550   053400       IF PR = 0 GO TO ENT2.                                      COLLRESV
00551   053500       DISPLAY 'SEQUENCE NUMBER IN USE: ' CARDIN. GO TO SAVE-ENT. COLLRESV
00552   053600 BADSAVESEQN.     DISPLAY 'INVALID SEQUENCE NUMBER: ' CARDIN.     COLLRESV
00553   053700 SAVE-ENT.   DISPLAY '     SUBSTITUTING "ENT"'.                   COLLRESV
00554   053800       MOVE SPACE TO SAVE.     GO TO ENTIN.                       COLLRESV
00555   053900 FUNMOVE.    IF ICE (N) > 0 MOVE 1 TO FUNS (N)                    COLLRESV
00556   054000                          ELSE MOVE 0 TO FUNS (N).               COLLRESV
00557   054100 RITEUN. READ CDIN END ALTER EE TO PROCEED TO OT GO TO FUNCHECK.  COLLRESV
00558   054200       IF CODE = '0' GO TO RITEUN. IF CODE = '*' GO TO KILLFUN.   COLLRESV
00559   054300 FUNCHECK.   MOVE ICE TO FUN1.                                    COLLRESV
00560   054400       PERFORM FUNMOVE VARYING N FROM 1 BY 1 UNTIL N = 13.        COLLRESV
00561   054500       IF  (FUN1-2 = '11' AND (FUN8-11 = '1111' OR '0000')) OR    COLLRESV
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00562   054600          (FUNWORD = '8000000000000') OR                          COLLRESV
00563   054700          (FUNBIP = '4000000' AND (FUN8-11 = '1111' OR '0000')) OR COLLRESV
00564   054800          (FUNBIP = '5000000' AND (FUN8-11 = '1111' OR '0000'     COLLRESV
00565   054900              OR '1101')) OR                                      COLLRESV
00566   055000          (FUNWORD = '7000000000010') OR                          COLLRESV
00567   055100          (FUN1 = '6' AND (FUN2 > '0' OR FUN3-7 > '00000')        COLLRESV
00568   055200              AND FUN8-13 = '000000')                             COLLRESV
00569   055300      GO TO FUNGOOD.                                              COLLRESV
00570   055400 BADFORM. IF CD > 1 PERFORM ENDFUN THRU PER-DIS. GO TO NO-DIS-RD. COLLRESV
00571   055500 ENDFUN. DISPLAY                                                  COLLRESV
00572   055600      'THE FOLLOWING IS NOT A VALID FORMAT, AND HAS BEEN REJECTED'.COLLRESV
00573   055700 FENT.    IF ICF = 1 AND SAVE = SPACE SUBTRACT 1 FROM FUNSEQ.     COLLRESV
00574   055800 PER-DIS.     IF ICF = 1  IF SAVE = SPACE DISPLAY '  ' FCODE (I) COLLRESV
00575   055900                          ELSE DISPLAY '  SAVE' SEQN.             COLLRESV
00576   056000      IF ICF > 1 DISPLAY '  ' FCODE (ICF) SEQN '    ' AUTH.       COLLRESV
00577   056100      PERFORM DISPLAY-CARDS VARYING M FROM 2 BY 1 UNTIL M = 16    COLLRESV
00578   056200                                AFTER N FROM 1 BY 1 UNTIL N = 13. COLLRESV
00579   056300 DIS-RD-1. DISPLAY '  ' CARDIN. READ CDIN END GO TO QT.          COLLRESV
00580   056400      IF NOT (CODE = '0' OR '*') GO TO DIS-RD-1. GO TO DIS-RD-2.  COLLRESV
00581   056500 KILLFUN. DISPLAY 'FUNCTION DISCARDED' PERFORM FENT THRU PER-DIS. COLLRESV
00582   056600 DIS-RD-2. DISPLAY '  ' CARDIN. READ CDIN END GO TO QT.          COLLRESV
00583   056700      IF CODE = '0' OR '*' GO TO DIS-RD-2.                        COLLRESV
00584   056800 NO-DIS-RD. MOVE 1 TO CD GO TO FETCH-FUNCTION.                    COLLRESV
00585   056900 DISPLAY-CARDS. IF ICE (N) = M DISPLAY '  ' FCODE (N) INFO (M).   COLLRESV
00586   057000 FUNGOOD.     MOVE 1 TO CD.                                       COLLRESV
00587   057100 PERFORM-FUNCTION SECTION.                                        COLLRESV
00588   057200      IF ICF = 1 GO TO MODIFY. COMPUTE TRKEY = ASEQND / 5.        COLLRESV
00589   057300      READ MASTER-FILE INVALID GO TO INV. IF PR > 0 GO TO MODIFY. COLLRESV
00590   057400 INV.     IF ICF = 2 OR 3                                         COLLRESV
00591   057500              DISPLAY 'INVALID SEQUENCE NUMBER: ' SVCDIN          COLLRESV
00592   057600      ELSE DISPLAY 'INVALID SEQUENCE NUMBER: ' PERFORM PER-DIS.   COLLRESV
00593   057700      GO TO FETCH-FUNCTION.                                       COLLRESV
00594   057800 MODIFY. ADD 1 TO CTR (ICF).                                      COLLRESV
00595   057900      IF ICF = 2 GO TO CHKPLUS. IF ICF = 3 GO TO CHKMINUS.        COLLRESV
00596   058000      IF ICF = 8 DISPLAY 'DELETING RECORD ' SEQN ' ' AUTH         COLLRESV
00597   058500              MOVE 0 TO PR MOVE SPACE TO AUTH GO TO RWMR.         COLLRESV
00598   058600      MOVE 0 TO FS. MOVE SPACE TO ERF.                            COLLRESV
00599   058610      IF ICF = 1 OR 6 PERFORM FINDFIELD THRU BB                   COLLRESV
00600   058620              VARYING N FROM 1 BY 1 UNTIL N > 6                   COLLRESV
00601   058630              IF FS > 0 MOVE 'X' TO ERF                           COLLRESV
00602   058640                  DISPLAY FS ' BIBLIOGRAPHIC FIELD(S) TRUNCATED.'.COLLRESV
00603   058700      IF ICF (11) > 0 PERFORM COPYIN THRU COPYEX.                 COLLRESV
00604   058800      IF ICF (12) > 0 PERFORM ORDRIN THRU ORDREX.                 COLLRESV
00605   058900      IF ICF (7) > 0 PERFORM CRSEIN THRU BD.                      COLLRESV
00606   059000      IF ERF NOT = SPACE PERFORM PER-DIS.                         COLLRESV
00607   059100      PERFORM NEWSHORT VARYING W FROM 1 BY 1 UNTIL W = 4.         COLLRESV
00608   059200 PRFLAG. IF PR NOT = 2 MOVE 1 TO PR. ADD 1 TO CX.                 COLLRESV
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00609   059300      MOVE AUTH TO CAUTH (CX)   MOVE TITL TO CTITL (CX)          COLLRESV
00610   059400      MOVE SEQN TO CSEQN (CX).                                   COLLRESV
00611   059500 WRTO.   IF ICF = 1 AND SAVE = SPACE GO TO ENTR.                 COLLRESV
00612   059600 RWWR.  REWRITE MASTER-RECORD INVALID DISPLAY 'REWRITE FAILED '  COLLRESV
00613   059700      TRKEY SEQN PERFORM PER-DIS. GO TO FETCH-FUNCTION.          COLLRESV
00614   059800 ENTR.  COMPUTE TRKEY = ASEQNO / 5.                              COLLRESV
00615   059900      MOVE AUTH TO SVCDIN. WRITE MASTER-RECORD INVALID DISPLAY   COLLRESV
00616   060000      'FILE LIMIT EXCEEDED ' TRKEY SEQN PERFORM ENT THRU PER-DIS COLLRESV
00617   060100      GO TO FETCH-FUNCTION. READ MASTER-FILE INVALID GO TO MRNW. COLLRESV
00618   060200      IF AUTH = SVCDIN GO TO FETCH-FUNCTION.                     COLLRESV
00619   060300 MRNW. DISPLAY 'PROBABLE FUNSEQ ERROR, WILL ATTEMPT CORRECTION.  COLLRESV
00620   060400      'FUNSEQ=' FUNSEQ.                                          COLLRESV
00621   060500 SES.  PERFORM ENTIN. COMPUTE TRKEY = ASEQNO / 5.                COLLRESV
00622   060600      READ MASTER-FILE INVALID GO TO RTWMR.                      COLLRESV
00623   060700      PERFORM PRELAG. GO TO SES.                                 COLLRESV
00624   060800 RTWMR. DISPLAY 'NEW FUNSEQ=' FUNSEQ '. WILL ATTEMPT REPROCESS'. COLLRESV
00625   060900      PERFORM ENT2 GO TO PERFORM-FUNCTION.                       COLLRESV
00626   061000 NEWSHORT.   SUBTRACT NGP FROM TNEED (W) GIVING SHORT (W).       COLLRESV
00627   061100      IF SHORT (W) NEGATIVE MOVE 0 TO SHORT (W).                 COLLRESV
00628   061200 FINDFIELD. IF ICF (N) > 0 MOVE ICF (N) TO P ELSE GO TO BB.      COLLRESV
00629   061300      GO TO AUTHS TITLS EDTNS DATES CALNS LOCNS DEPENDING N.     COLLRESV
00630   061400 AUTHS.  MOVE INFO (P) TO AUTH. GO TO BB.                        COLLRESV
00631   061500 TITLS.  MOVE INFO (P) TO TITL. GO TO BB.                        COLLRESV
00632   061600 EDTNS.  MOVE INFO (P) TO EDTN. IF INFL (P) > 10 ADD 1 TO FS.    COLLRESV
00633   061700      GO TO BB.                                                  COLLRESV
00634   061800 DATES.  MOVE INFO (P) TO DATN. IF INFL (P) > 10 ADD 1 TO FS.    COLLRESV
00635   061900      GO TO BB.                                                  COLLRESV
00636   062000 CALNS.  MOVE INFO (P) TO CALN. IF INFL (P) > 30 ADD 1 TO FS.    COLLRESV
00637   062100      GO TO BB.                                                  COLLRESV
00638   062200 LOCNS.  MOVE INFO (P) TO LOCN. IF INFL (P) > 10 ADD 1 TO FS.    COLLRESV
00639   062300 BB.  EXIT.                                                      COLLRESV
00640   062400 COPYIN. MOVE ICF (11) TO P MOVE INFO (P) TO ICPNC MOVE 0 TO M FS.COLLRESV
00641   062410      IF NCPSF > 0 MOVE 3 TO A MOVE 4 TO B                       COLLRESV
00642   062420      ELSE MOVE 1 TO A MOVE 2 TO B.                              COLLRESV
00643   062500 NEXTICPN.   ADD 1 TO M. IF M > 25 GO TO COPYEX.                 COLLRESV
00644   062600      MOVE ICPN (M) TO ITRC. IF ITRC = ' ' GO TO NEXTICPN.       COLLRESV
00645   062700      IF INBLK NUMERIC OR INVALTST NOT NUMERIC OR INNUM = '00'   COLLRESV
00646   062800          ADD 1 TO FS GO TO NEXTICPN ELSE MOVE INNUM TO N.       COLLRESV
00647   062900      IF CPF (N) NOT > 0                                         COLLRESV
00648   063000          IF ICF = 1 OR 4 GO TO NEWCPN                           COLLRESV
00649   063100          ELSE DISPLAY 'COPY ' ITRC ' NOT FOUND.'                COLLRESV
00650   063200          ADD 1 TO FS GO TO NEXTICPN.                            COLLRESV
00651   063300      IF ICF = 5 GO TO SAMESUB. IF ICF = 7 GO TO SAMECHK.        COLLRESV
00652   063400 SAMECPN.                                                        COLLRESV
00653   063500      IF INBLK NOT = SPACE  IF (CPF (N) = 1 OR 3 OR 5) ADD 1 TO  COLLRESV
00654   063600      CPF (N) ELSE NEXT SENTENCE ELSE IF (CPF (N) = 2 OR 4 OR 6) COLLRESV
00655   063700      SUBTRACT 1 FROM CPF (N).                                   COLLRESV
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00656   063800        DISPLAY 'ADDED DUPLICATE COPY ' ITRC ', WARNING ONLY.'      COLLRESV
00657   063900        ADD 1 TO FS GO TO NEXTICPN.                                 COLLRESV
00658   064000 NEWCPN. ADD 1 TO NCP. IF INBLK NOT = SPACE MOVE B TO CPF (N)       COLLRESV
00659   064100        ELSE, MOVE A TO CPF (N). GO TO NEXTICPN.                    COLLRESV
00660   064200 SAMECHK.     IF CPF (N) > 2 SUBTRACT 2 FROM CPF (N) GO TO SAMECHK. COLLRESV
00661   064300        GO TO NEXTICPN.                                             COLLRESV
00662   064400 SAMESUB.     SUBTRACT 1 FROM NCP MOVE 0 TO CPF (N) GO TO NEXTICPN. COLLRESV
00663   064500 COPYFX. IF FS > 0 MOVE 'X' TO ERF.                                COLLRESV
00664   064600              DISPLAY FS ' ERRORS IN COPY FIELD. CHECK RESULT.'.  COLLRESV
00665   064700 CHKPLUS.     IF N = 0 DISPLAY 'ZERO COPY ILLEGAL:  ' SVCDIN      COLLRESV
00666   064800        ELSE  IF CPF (N) = 3 OR 4 SUBTRACT 2 FROM CPF (N)         COLLRESV
00667   064900        ELSE  IF CPF (N) > 0 DISPLAY 'NOT FLAGGED PLUS:  ' SVCDIN COLLRESV
00668   065000              ELSE DISPLAY 'CANNOT LOCATE COPY: ' SVCDIN.         COLLRESV
00669   065100 CHP.     IF CPDE NOT = 'ON  ' OR IBB NOT = SEONEF GO TO PRELAG.  COLLRESV
00670   065200        MOVE IBCF TO ITRC. IF INVALTST NOT NUMERIC GO TO PRELAG.  COLLRESV
00671   065300        MOVE IBCN TO N MOVE CARDIN TO SVCDIN. ADD 1 TO CTR (2).   COLLRESV
00672   065400        READ CDIN END ALTER EF TO PROCEED TO OT PERFORM CHKPLUS   COLLRESV
00673   065500              GO TO PRELAG.                GO TO CHKPLUS.         COLLRESV
00674   065600 CHKMINUS.    IF N = 0 DISPLAY 'ZERO COPY ILLEGAL:  ' SVCDIN      COLLRESV
00675   065700        ELSE  IF CPF (N) > 4 SUBTRACT 4 FROM CPF (N)              COLLRESV
00676   065800        ELSE  IF CPF (N) > 0 DISPLAY 'NOT FLAGGED MINUS:  ' SVCDIN COLLRESV
00677   065900              ELSE DISPLAY 'CANNOT LOCATE COPY: ' SVCDIN.         COLLRESV
00678   066000 CHM.     IF CPDE NOT = 'OFF ' OR IBB NOT = SEONEF GO TO PRELAG.  COLLRESV
00679   066100        MOVE IBCF TO ITRC. IF INVALTST NOT NUMERIC GO TO PRELAG.  COLLRESV
00680   066200        MOVE IBCN TO N MOVE CARDIN TO SVCDIN. ADD 1 TO CTR (3).   COLLRESV
00681   066300        READ CDIN END ALTER EF TO PROCEED TO OT PERFORM CHKMINUS  COLLRESV
00682   066400              GO TO PRELAG.                GO TO CHKMINUS.        COLLRESV
00683   066500 CRSEIN.  MOVE ICE (8) TO P MOVE INFO (P) TO ITRC.                COLLRESV
00684   066600        IF ITRM = TRM (1) OR TRM (2) OR TRM (3) MOVE ITRM TO TERME COLLRESV
00685   066700        ELSE DISPLAY 'TERM NOT ACCEPTABLE, OR INCORRECTLY PUNCHED:' COLLRESV
00686   066800              GO TO FAIL-BD.                                      COLLRESV
00687   066900        IF ICE (9) = 0 MOVE 0 TO INNUM ELSE MOVE ICE (9) TO P MOVE COLLRESV
00688   067000        INFO (P) TO ITRC THEN IF INBLK NOT = SPACE OR INVALTST NOT COLLRESV
00689   067100        NUMERIC DISPLAY 'NEED FIELD IS INCORRECTLY PUNCHED:'      COLLRESV
00690   067200              GO TO FAIL-BD.                                      COLLRESV
00691   067300        MOVE ICE (7) TO P MOVE INFO (P) TO DCRSE.                 COLLRESV
00692   067350        IF INFL (P) > 15 MOVE 'X' TO ERF                          COLLRESV
00693   067360              DISPLAY 'CRSE FIELD TRUNCATED.'.                    COLLRESV
00694   067400        MOVE ICE (10) TO P MOVE INFO (P) TO DPROF.                COLLRESV
00695   067450        IF INFL (P) > 15 MOVE 'X' TO ERF                          COLLRESV
00696   067460              DISPLAY 'PROF FIELD TRUNCATED.'.                    COLLRESV
00697   067500        MOVE TERME TO DTERM. MOVE NCRSE TO O. MOVE NCP TO X.      COLLRESV
00698   067550        MOVE 0 TO M, N, W. MOVE SPACE TO F.                       COLLRESV
00699   067600 TFS.         IF N < 0 ADD 1 TO N                                 COLLRESV
00700   067700              THEN IF DCID = CID (N) GO TO SAMECRSE               COLLRESV
00701   067800                   ELSE GO TO TFS.                                COLLRESV
00702   067900        IF ICE = 5 DISPLAY 'CANNOT LOCATE COURSE:' GO TO FAIL-BD. COLLRESV
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00703   068000      IF N < 8, ADD 1 TO N                                    COLLRE
00704   068100          ELSE DISPLAY 'CANNOT ADD ANOTHER COURSE;' GO TO FAIL-BD.  COLLRE
00705   068200      MOVE TERMH TO T. COMPUTE Q = TNEED (T) + INNUM.         COLLRE
00706   068300      IF Q > 99 GO TO BIGNEED.     MOVE Q TO TNEED (T).       COLLRE
00707   068400      MOVE INNUM TO QNEED. MOVE QCRSE TO CRSE (N). MOVE N TO NCRSE.COLLRE
00708   068700      IF N > 1 GO TO PLCNT.  MOVE 2 TO PR.                    COLLRE
00709   068750 QNS.     IF M NOT < X GO TO PLEX.  ADD 1 TO W.               COLLRE
00710   068800      IF W > 99 DISPLAY 'NCR ERR' 'SEQN' THEN GO TO PLEX.     COLLRE
00711   068850      MOVE CPE (W) TO Q. IF Q = C GO TO QNS. ADD 1 TO M.      COLLRE
00712   068900      IF Q < 3 ADD 2 TO Q GO TO CPESET.   MOVE 'X' TO E.      COLLRE
00713   068950      IF Q > 4 SUBTRACT 2 FROM Q.                             COLLRE
00714   069000 CPESET.  MOVE Q TO CPE (W).   GO TO QNS.                     COLLRE
00715   069050 PLCNT.   IF M NOT < X GO TO PLCNEX.  ADD 1 TO W.             COLLRE
00716   069100      IF W > 99 DISPLAY 'NCR ERR' 'SEQN' THEN GO TO PLCNEX.   COLLRE
00717   069150      MOVE CPE (W) TO Q. IF Q > 0                             COLLRE
00718   069200          IF Q < 3 SUBTRACT 1 FROM X ELSE ADD 1 TO M.         COLLRE
00719   069250      GO TO PLCNT.                                            COLLRE
00720   069300 WAPUN.   IF PNF = 'C' OPEN OUTPUT PNOUT MOVE 'D' TO PNF THEN COLLRE
00721   069310      MOVE RUNSER TO CRUN MOVE DATE TO CDAT WRITE CARDOUT FROM CHD.COLLRE
00722   069350      MOVE SEQN TO WASEQN MOVE CALN TO WACALN MOVE AUTH TO WAAUTH.COLLRE
00723   069400      WRITE CARDOUT FROM WARDATA ADD 1 TO WACNT.              COLLRES
00724   069450 WAEX.    GO TO.   NOTE SET BEFORE EACH BRANCH TO WAPUN.      COLLRES
00725   069500 PLEX.    IF E NOT = SPACE                                    COLLRES
00726   069550          MOVE 'DISCARD OLD ON/OFF CARDS;' TO WATXT           COLLRES
00727   069600          ALTER WAEX TO PROCEED TO PLCNEX GO TO WAPUN.        COLLRES
00728   069650 PLCNEX.  IF INNUM NOT > X MOVE INNUM TO X                    COLLRES
00729   069700          ELSE MOVE 'NEED = ' TO WATA MOVE INNUM TO WANEED    COLLRES
00730   069710              MOVE '.  POSS. SHORTAGE' TO WATB                COLLRES
00731   069750              ALTER WAEX TO PROCEED TO ONPUN GO TO WAPUN.     COLLRES
00732   069800 ONPUN.   IF PNF = 'C' OPEN OUTPUT PNOUT MOVE 'D' TO PNF THEN COLLRES
00733   069810      MOVE RUNSER TO CRUN MOVE DATE TO CDAT WRITE CARDOUT FROM CHD.COLLRES
00734   069850      MOVE SEQN TO CHKSEQN MOVE AUTH TO CHKAUTH               COLLRES
00735   069900      MOVE CALN TO CHKCALN.                                   COLLRES
00736   070000 PUNLP.   IF X NOT > 0 GO TO BD.   WRITE CARDOUT FROM CHKDATA.COLLRES
00737   070050      ADD 1 TO ONCT.   SUBTRACT 1 FROM X.   GO TO PUNLP.      COLLRES
00738   070100 SAMECRSE.    MOVE TERMH TO T. IF ICE = 5 GO TO SUBCRSE.      COLLRES
00739   070200      IF 99 < (INNUM + NEED (N)) OR (INNUM + TNEED (T))       COLLRES
00740   070400          GO TO BIGNEED.                                      COLLRES
00741   070500      ADD INNUM TO NEED (N), ADD INNUM TO TNEED (T).          COLLRES
00742   070600      DISPLAY 'ADDED SAME COURSE. CHECK NEW NEED.' MOVE 'X' TO ERR.COLLRES
00743   070610      MOVE 'WARNING ADDED SAME COURSE' TO WATXT.              COLLRES
00744   070620      ALTER WAEX TO PROCEED TO PLCNT GO TO WAPUN.             COLLRES
00745   070700 SUBCRSE.     IF INNUM < 1 GO TO DELCRS.                      COLLRES
00746   070800      IF INNUM = NEED (N) GO TO DELCRS.                       COLLRES
00747   070900      IF INNUM > NEED (N) GO TO BIGNEED.                      COLLRES
00748   071000      SUBTRACT INNUM FROM NEED (N) SUBTRACT INNUM FROM TNEED (T).COLLRES
00749   071100      GO TO BD.                                               COLLRES
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00750   071200 DELCRS. SUBTRACT NEED (N) FROM TNEED (T).   IF N < NCRSE          COLLRESV
00751   071300      PERFORM CRSDOWNSHUF VARYING W FROM N BY 1 UNTIL X = NCRSE.   COLLRESV
00752   071400      MOVE ZEROS TO CID (NCRSE).                                   COLLRESV
00753   071500      SUBTRACT 1 FROM NCRSE DISPLAY 'DELETING COURSE' GO TO DIS-BD.COLLRESV
00754   071600 CRSDOWNSHUF.    ADD 1 W GIVING X. MOVE CRSE (X) TO CRSE (W).      COLLRESV
00755   071700 BIGNEED.    DISPLAY 'NEED IS TOO LARGE:'.                         COLLRESV
00756   071800 FAIL-BD.    DISPLAY 'COURSE INFORMATION NOT PROCESSED.'.          COLLRESV
00757   071900 DIS-BD. MOVE 'X' TO ERF.                                          COLLRESV
00758   072000 BD. EXIT.                                                         COLLRESV
00759   072100 ORDRIN. MOVE ICE (12) TO P MOVE INED (P) TO ITRC.                 COLLRESV
00760   072200      IF INBLK NUMERIC OR INVALTST NOT NUMERIC GO TO ORDRER.       COLLRESV
00761   072300      IF ICE = 5 IF INNUM NOT > ORDR SUBTRACT INNUM FROM ORDR      COLLRESV
00762   072400      ELSE GO TO ORDRER ELSE IF INNUM + ORDR < 100 ADD INNUM TO    COLLRESV
00763   072500      ORDR ELSE GO TO ORDRER.                                      COLLRESV
00764   072600 ORDREX. EXIT.                                                     COLLRESV
00765   072700 ORDRER. DISPLAY 'ORDR FIELD IS INCORRECTLY PUNCHED OR VALUE IS UNCOLLRESV
00766   072800-     'ACCEPTABLE.'. MOVE 'X' TO ERF GO TO ORDREX.                 COLLRESV
00767   072900 DAYWEEK SECTION.                                                  COLLRESV
00768   073000 OT. CLOSE CDIN MOVE 'C' TO CDF.                                   COLLRESV
00769   073100      DISPLAY '*** END OF INPUT PHASE ' RDTA.                      COLLRESV
00770   073200      DISPLAY CX ' RECORDS REFERENCED.'                            COLLRESV
00771   073300      IF PNF = 'O' CLOSE PNOUT DISPLAY                             COLLRESV
00772   073350          ONCT ' "ON" CARDS. ' WACNT ' WARNINGS PRODUCED.'         COLLRESV
00773   073400      ELSE DISPLAY 'NO PUNCHED OUTPUT.'.                           COLLRESV
00774   073500      DISPLAY 'TRANSACTION COUNT:'.  MOVE 1 TO Q.                  COLLRESV
00775   073600 DCTRS.  DISPLAY '  ', ECODE (Q), ' = ', CTR (Q).                 COLLRESV
00776   073700      IF Q < 8 ADD 1 TO Q GO TO DCTRS.                             COLLRESV
00777   073800      COMPUTE Q = CTR (1) + CTR (2) + CTR (3) + CTR (4) + CTR (5)  COLLRESV
00778   073900      + CTR (6) + CTR (7) + CTR (8).  DISPLAY ' TOTAL = ' Q.       COLLRESV
00779   074000      MOVE 0 TO TRKEY SEQN READ MASTER-FILE INVALID GO TO ABORT1.  COLLRESV
00780   074100      REWRITE MASTER-RECORD FROM RDTA INVALID GO TO ABORT1.        COLLRESV
00781   074200      OPEN OUTPUT SEQNLIST.                                        COLLRESV
00782   074300      WRITE SLREC FROM SLDATA.   MOVE SPACE TO SLATFIL.            COLLRESV
00783   074400      MOVE SPACE TO SLREC.  WRITE SLREC.                           COLLRESV
00784   074500      MOVE 0 TO W.   GO TO SLC.                                    COLLRESV
00785   074600 SLLP.    IF CSEQN (W) > SLSEQN                                    COLLRESV
00786   074700                 MOVE CAUTH (W) TO SLAUTH MOVE CTITL (W) TO SLTITL COLLRESV
00787   074800                 MOVE CSEQN (W) TO SLSEQN  WRITE SLREC FROM SLDATA.COLLRESV
00788   074900 SLC.     IF W < CX ADD 1 TO W GO TO SLLP.                         COLLRESV
00789   075000      MOVE 'END OF NEW ENTRIES' TO SLBIB.                          COLLRESV
00790   075100      MOVE SPACE TO SLSEQN.  WRITE SLREC FROM SLDATA.              COLLRESV
00791   075200      CLOSE SEQNLIST.                                              COLLRESV
00792   075300      OPEN OUTPUT PRINT-FILE MOVE 'O' TO PRF. MOVE 0 TO W T.       COLLRESV
00793   075400      MOVE 1 TO K.                                                 COLLRESV
00794   075500      MOVE SPACE TO PRINTS PERFORM HEAD.                           COLLRESV
00795   075600      IF DAILY ALTER WEEK TO PROCEED TO MVH GO TO NOWIN.           COLLRESV
00796   075700      ALTER WEEK TO PROCEED TO MERGE. GO TO 2WIN3 2WIN4 DEPENDING  COLLRESV
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00797   075800      WIN. MOVE 2 TO ES GO TO ABORT4.                          COLLRESV
00798   075900 2WIN3. READ TAPE3 INTO WINREC END CLOSE TAPE3 MOVE 'C'        COLLRESV
00799   076000      TO T3F GO TO 2WINE. GO TO 2WINR.                         COLLRESV
00800   076100 2WIN4. READ TAPE4 INTO WINREC END CLOSE TAPE4 MOVE 'C'        COLLRESV
00801   076200      TO T4F GO TO 2WINE. GO TO 2WINR.                         COLLRESV
00802   076300 2WINE. MOVE 'C' TO WIF. ALTER WEEK TO PROCEED TO MVH.         COLLRESV
00803   076400 2WINR. EXIT.                                                  COLLRESV
00804   076500 NOWIN. GO TO 3DIN1 3DIN2 DEPENDING DIN MOVE 3 TO ES GO TO ABORT4. COLLRESV
00805   076600 3DIN1. READ TAPE1 INTO DINREC END CLOSE TAPE1 MOVE 'C' TO T1F  COLLRESV
00806   076700      GO TO 3DINE. GO TO 3DINR.                                COLLRESV
00807   076800 3DIN2. READ TAPE2 INTO DINREC END CLOSE TAPE2 MOVE 'C' TO T2F  COLLRESV
00808   076900      GO TO 3DINE. GO TO 3DINR.                                COLLRESV
00809   077000 3DINE. MOVE NSHV TO DINREC MOVE 'C' TO DIF.                   COLLRESV
00810   077100 3DINR. EXIT.                                                  COLLRESV
00811   077200 DSCAN. MOVE DINREC TO HOLDIN. PERFORM CSCAN THRU CSEXIT       COLLRESV
00812   077300      VARYING O FROM I BY I UNTIL O > CX.                      COLLRESV
00813   077400      IF ECNT > 0 MOVE CAAF (CX) TO CAAF (ECNT)                COLLRESV
00814   077500          SUBTRACT I FROM CX MOVE O TO ECNT GO TO WEEK.        COLLRESV
00815   077600      IF DINOPEN GO TO 4DIN1 4DIN2 DEPENDING DIN MOVE 4 TO ES  COLLRESV
00816   077700      GO TO ABORT4. GO TO WEEK.                                COLLRESV
00817   077800 4DIN1. READ TAPE1 INTO DINREC END CLOSE TAPE1 MOVE 'C' TO T1F COLLRESV
00818   077900      GO TO 4DINE. GO TO 4DINR.                                COLLRESV
00819   078000 4DIN2. READ TAPE2 INTO DINREC END CLOSE TAPE2 MOVE 'C' TO T2F COLLRESV
00820   078100      GO TO 4DINE. GO TO 4DINR.                                COLLRESV
00821   078200 4DINE. MOVE NSHV TO DINREC. MOVE 'C' TO DIF.                  COLLRESV
00822   078300 4DINR. EXIT.                                                  COLLRESV
00823   078400 WEEK.    GO TO. NOTE MERGE OR MVH.                            COLLRESV
00824   078500 WKRD. IF WINOPEN GO TO 5WIN3 5WIN4 DEPENDING WIN              COLLRESV
00825   078600      MOVE 5 TO ES GO TO ABORT4. GO TO MVH.                    COLLRESV
00826   078700 5WIN3. READ TAPE3 INTO WINREC END CLOSE TAPE3 MOVE 'C' TO T3F COLLRESV
00827   078800      GO TO 5WINE. GO TO 5WINR.                                COLLRESV
00828   078900 5WIN4. READ TAPE4 INTO WINREC END CLOSE TAPE4 MOVE 'C' TO T4F COLLRESV
00829   079000      GO TO 5WINE. GO TO 5WINR.                                COLLRESV
00830   079100 5WINE. MOVE 'C' TO WIF. ALTER WEEK TO PROCEED TO MVH. GO TO MVH. COLLRESV
00831   079200 5WINR. EXIT.                                                  COLLRESV
00832   079300 MERGE.   IF WINREC < HOLDIN GO TO MVW.                        COLLRESV
00833   079400          IF WINREC > HOLDIN GO TO MVH.                        COLLRESV
00834   079500      NOTE WINREC = HOLDIN. GO TO WKRD.                        COLLRESV
00835   079600 MVW. MOVE WINREC TO OUTREC. MOVE 2 TO S. GO TO PRINTOUT.      COLLRESV
00836   079700 MVH. IF HOLDIN = NSHV GO TO ALLDONE. MOVE HOLDIN TO OUTREC.   COLLRESV
00837   079800      MOVE 1 TO S.                                             COLLRESV
00838   079900 PRINTOUT. MOVE DSEQN TO SEQN COMPUTE TRKSY = ASEQND / 5.      COLLRESV
00839   080000      READ MASTER-FILE INVALID ADD 1 TO W DISPLAY OUTREC       COLLRESV
00840   080100      ' READ FAILURE 4' W GO TO PRINTEXIT.                     COLLRESV
00841   080200      IF PR = 0 GO TO PRINTEXIT.                               COLLRESV
00842   080300      MOVE AUTH TO MAUTH   MOVE TITL TO MTITL.                 COLLRESV
00843   080400      IF MODBIB NOT = OBIB DISPLAY                             COLLRESV
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00844   080500          'MOD AUTH/TITL ' SEQN '  WAS: ' OBIB '  NOW: ' MODBIB     COLLRESV
00845   080600          GO TO PRINTEXIT.                                          COLLRESV
00846   080700      MOVE PR TO HPR. IF DAILY GO TO NPRC.                          COLLRESV
00847   080800      IF PR = 2 PERFORM COPOUT VARYING Q FROM 1 BY 1 UNTIL Q = 100  COLLRESV
00848   080900        MOVE 1 TO PR. IF PR = 1 MOVE 3 TO PR. IF PR = 3 AND NCRSE   COLLRESV
00849   081000        = 0 MOVE 4 TO PR.                                           COLLRESV
00850   081100      NOTE IF PR IS CHANGED TO 4, SHOULD GO TO PRINTIT.             COLLRESV
00851   081200 NPRC. GO TO 6OUT1 6OUT2 6OUT3 6OUT4 DEPENDING OUT. MOVE 6 TO FS    COLLRESV
00852   081300      GO TO ABORT4.                                                 COLLRESV
00853   081400 6OUT1. WRITE TREC1 FROM OUTREC. GO TO 6OUTW.                       COLLRESV
00854   081500 6OUT2. WRITE TREC2 FROM OUTREC. GO TO 6OUTW.                       COLLRESV
00855   081600 6OUT3. WRITE TREC3 FROM OUTREC. GO TO 6OUTW.                       COLLRESV
00856   081700 6OUT4. WRITE TREC4 FROM OUTREC.                                    COLLRESV
00857   081800 6OUTW. EXIT.                                                       COLLRESV
00858   081900 PRINTIT.                                                           COLLRESV
00859   082000      MOVE SEQN TO PSEQN MOVE AUTH TO PAUTH MOVE TITL TO PTITL      COLLRESV
00860   082100      MOVE EDTN TO PEDTN MOVE DATN TO PDATE MOVE CALN TO PCALL      COLLRESV
00861   082200      MOVE LOCN TO PLOCN MOVE '0' TO CCH1. MOVE 4 TO K MOVE 1 TO M. COLLRESV
00862   082300      MOVE SPACES TO PCOPYS, E, ONE.                                COLLRESV
00863   082400      MOVE NCP TO N   MOVE 0 TO M, P, R.                            COLLRESV
00864   082500 CPEIND. IF M NOT < N  IF M > 0 GO TO FLG ELSE GO TO CPTOTL.        COLLRESV
00865   082600      IF P > 98 DISPLAY 'NCP ERR ' OUTREC ' TELL JIM***' GO TO FLG. COLLRESV
00866   082700      ADD 1 TO P. MOVE CPE (P) TO Q.                                COLLRESV
00867   082800      IF Q > 0 ADD 1 TO M MOVE P TO PCPN (M)                        COLLRESV
00868   082900      ELSE GO TO CPEIND.                                            COLLRESV
00869   083000      IF Q = 1 OR 3 OR 5  NEXT SENTENCE                             COLLRESV
00870   083100      ELSE MOVE '#' TO PCPEA (M).                                   COLLRESV
00871   083200      IF Q > 2 MOVE 'X' TO E                                        COLLRESV
00872   083300      THEN IF Q < 5  MOVE '+' TO PCPEB (M)                          COLLRESV
00873   083400           ELSE      MOVE '-' TO PCPEB (M)                          COLLRESV
00874   083500      ELSE MOVE 'X' TO ONE.                                         COLLRESV
00875   083600      IF M < 20 GO TO CPEIND.                                       COLLRESV
00876   083700 FLG.     IF K = 4 MOVE 'COPIES' TO PCOPIES.                        COLLRESV
00877   083800      MOVE PCEA TO PCOPYE (K)  ADD 1 TO K.                          COLLRESV
00878   083900      IF E = 'X' MOVE SPACE TO E                                    COLLRESV
00879   084000          MOVE PCEB TO PCOPYE (K)  ADD 1 TO K.                      COLLRESV
00880   084100      MOVE 0 TO M.  SUBTRACT 20 FROM N.                             COLLRESV
00881   084200      MOVE SPACES TO PCOPYS  GO TO CPEIND.                          COLLRESV
00882   084300 CPTOTL. MOVE NCP TO PTOTL MOVE ORDR TO PORDR MOVE PCPTOTL TO       COLLRESV
00883   084400      PCPAR (K) MOVE 1 TO Q. MOVE 0 TO M. MOVE SPACE TO CPE.        COLLRESV
00884   084500 PCS. MOVE TRM (Q) TO TERME MOVE SPACE TO E MOVE TERME TO PTERM.    COLLRESV
00885   084600      ADD 1 TO M MOVE PTERMHD TO PCRSEE (M). MOVE NCRSE TO R.       COLLRESV
00886   084700      PERFORM PCRS VARYING P FROM 1 BY 1 UNTIL P > R.               COLLRESV
00887   084800      IF E = 'X'  MOVE 'X' TO CRE                                   COLLRESV
00888   084900          MOVE TNEED (TERMH) TO PTNEED                              COLLRESV
00889   085000          MOVE SHORT (TERMH) TO PSHORT                              COLLRESV
00890   085100          ADD 1 TO M MOVE PTTOTLS TO PCRSEE (M)                     COLLRESV
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00891   085200      ELSE MOVE SPACE TO PCRSEE (M) SUBTRACT 1 FROM M.                COLLRESV
00892   085300      ADD 1 TO Q IF Q < 4 GO TO PCS.                                  COLLRESV
00893   085400 BLKBIB. IF K < M ADD 1 TO K MOVE SPACE TO PBIBF (K) GO TO BLKBIB.    COLLRESV
00894   085500 BLKCR. IF M < K ADD 1 TO M MOVE SPACE TO PCRSEE (M) GO TO BLKCR.     COLLRESV
00895   085600      MOVE 1 TO K ADD 1 TO X. IF M NOT < (LN - X) PEREORM HEAD.       COLLRESV
00896   085700 PRINTEM. IF K > M GO TO PRINTED. WRITE PRTLN FROM PLINE (K).         COLLRESV
00897   085800      ADD 1 TO K ADD 1 TO X GO TO PRINTEM.                            COLLRESV
00898   085900 PRINTED. IF PUF = 'D' AND CRF = 'X' AND ONE = 'X'                    COLLRESV
00899   086000          NEXT SENTENCE      ELSE GO TO PRINTED2.                     COLLRESV
00900   086100                  MOVE AUTH TO PUBAUTH MOVE TITL TO PUTITL MOVE EDTN TO COLLRESV
00901   086200      PUEDTN MOVE DATN TO PUDATN. IF Z > LN2 ADD 1 TO Y MOVE Y TO     COLLRESV
00902   086300      PUBPAGE WRITE PUBLN FROM PUBHEAD MOVE 0 TO Z MOVE '-' TO PC1.   COLLRESV
00903   086400      WRITE PUBLN FROM PULIN1 WRITE PUBLN FROM PULIN2 WRITE PUBLN     COLLRESV
00904   086500      FROM PULIN3. ADD 3 TO Z MOVE SPACE TO PC1.                      COLLRESV
00905   086600 PRINTED2. IF PR NOT = HPR REWRITE MASTER-RECORD INVALID DISPLAY      COLLRESV
00906   086700      'REWRITE FAILED' OUTREC.                                        COLLRESV
00907   086800 PRINTEXIT. GO TO DSCAN WKRD DEPENDING S.                             COLLRESV
00908   086900 HEAD. ADD 1 TO T MOVE T TO PAGN MOVE 0 TO X. WRITE PRTLN FROM        COLLRESV
00909   087000      PHEAD. MOVE '0' TO CCH (K).                                     COLLRESV
00910   087100 CORPUT. IF CPF (Q) > 2 GO TO HPRC.                                   COLLRESV
00911   087200 CSCAN. EXIT.                                                         COLLRESV
00912   087300 CS2. IF CAAF (Q) > HOLDIN GO TO CSEXIT.                              COLLRESV
00913   087400      IF CAAF (Q) < HOLDIN MOVE CAAF (Q) TO HOLDIN                    COLLRESV
00914   087500                  MOVE 0 TO ECNT GO TO CSEXIT.                        COLLRESV
00915   087600      IF CX NOT < 0 MOVE CAAF (CX) TO CAAF (Q)                        COLLRESV
00916   087700                  SUBTRACT 1 FROM CX GO TO CS2.                       COLLRESV
00917   087800 CSEXIT. EXIT.                                                        COLLRESV
00918   087900 PCRS. IF TERM (P) = TERME MOVE 'X' TO F MOVE CRSE (P) TO PCRSE       COLLRESV
00919   088000      MOVE PRDE (P) TO PPROF MOVE NEED (P) TO PNEED ADD 1 TO M        COLLRESV
00920   088100      MOVE PCRSES TO PCRSEE (M).                                      COLLRESV
00921   088200 ALLDONE. DISPLAY '** END OF OUTPUT PHASE.'.                          COLLRESV
00922   088300      IF W > 0 DISPLAY W ' READ FAILURES ON MASTER FILE.'.            COLLRESV
00923   088400 CLOSEM.                                                              COLLRESV
00924   088500      IF T1F = 'O' CLOSE TAPE1.                                       COLLRESV
00925   088600      IF T2F = 'O' CLOSE TAPE2.                                       COLLRESV
00926   088700      IF T3F = 'O' CLOSE TAPE3.                                       COLLRESV
00927   088800      IF T4F = 'O' CLOSE TAPE4.                                       COLLRESV
00928   088900      IF MFF = 'O' CLOSE MASTER-FILE.                                 COLLRESV
00929   089000      IF CDF = 'O' CLOSE CDIN.                                        COLLRESV
00930   089100      IF PRF = 'O' MOVE '-END OF WORKLIST.' TO PRTLN WRITE PRTLN      COLLRESV
00931   089200        CLOSE PRINT-FILE.                                             COLLRESV
00932   089300      IF PUF = 'O' MOVE '-                    END OF PUBLIC LIST.' TO PUBLN COLLRESV
00933   089400          WRITE PUBLN CLOSE PUBLIC-LIST                               COLLRESV
00934   089500                  DISPLAY 'PUBLIC LIST PRODUCED.'.                    COLLRESV
00935   089600      DISPLAY 'FILES CLOSED: END OF JOB.'.   STOP RUN.                COLLRESV
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000100 IDENTIFICATION DIVISION.
000200 PROGRAM-ID. 'COLLTERM'.
000300 AUTHOR. H.J.HETLAND.
000400 ENVIRONMENT DIVISION.
000500 INPUT-OUTPUT SECTION.
000600 FILE-CONTROL.
000700      SELECT MASTER ASSIGN 'MASTER' DIRECT-ACCESS
000800      ORGANIZATION DIRECT  ACCESS RANDOM
000900      SYMBOLIC SEQN  ACTUAL TRKEY.
001000      SELECT HYSTERICAL  ASSIGN 'HYSTERIC' UTILITY.
001100      SELECT MINUSFILE ASSIGN 'DEFCARDS' UTILITY.
001200 I-O-CONTROL.
001300      APPLY RESTRICTED SEARCH 1 ON MASTER.
001400 DATA DIVISION.
001500 FILE SECTION.
001600 FD  MASTER
001700      RECORDING F LABEL RECORD STANDARD DATA RECORD MASTREC.
001800 01  MASTREC.
001900   02  PR      PICTURE 9  COMPUTATIONAL-3.
002000   02  BIB.
002100     03  AUTH        PICTURE X(76).
002200     03  TITL        PICTURE X(76).
002300     03  EDTN        PICTURE X(10).
002400     03  DATN        PICTURE X(10).
002500     03  CALN        PICTURE X(30).
002600     03  LOCN        PICTURE X(10).
002700   02  INVENT.
002800     03  ORDR        PICTURE 99.
002900     03  NCP         PICTURE 99.
003000   02  CPFF.
003100     03  CPF         PICTURE 9  COMPUTATIONAL-3  OCCURS 99.
003200   02  CRSES.
003300     03  NCRSE       PICTURE 99  COMPUTATIONAL-3.
003400     03  TNEED       PICTURE 99  OCCURS 3.
003500     03  SHORT       PICTURE S99  OCCURS 3.
003600     03  CRSF        OCCURS 8.
003700       04  NEED      PICTURE 99.
003800       04  CID.
003900         05  TERM.
004000           06  FILLER PICTURE 99.
004100           06  TERMB  PICTURE 9.
004200         05  CRID.
004300           06  CRSE   PICTURE X(15).
004400           06  PROF   PICTURE X(15).
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00045   004500 FD  HYSTERICAL  RECORDING F  BLOCK CONTAINS 20 RECORDS
00046   004600     LABEL RECORD STANDARD  DATA RECORD HYSTREC.
00047   004700 01  HYSTREC.
00048   004800  02  HSEQN        PICTURE X(6).
00049   004900  02  HCRSF.
00050   005000  03  HNEED        PICTURE 99.
00051   005100  03  HTERM        PICTURE 999.
00052   005200  03  HCRID.
00053   005300  04  HCRSE        PICTURE X(15).
00054   005400  04  HPRCF        PICTURE X(15).
00055   005500 FD  MINUSFILE
00056   005600     BLOCK 100 RECORDS
00057   005700     RECORDING F LABEL RECORD STANDARD DATA RECORD CHKCD.
00058   005800 01  CHKCD  PICTURE X(80).
00059   005900 WORKING-STORAGE SECTION.
00060   006000 77  A        PICTURE S9999  COMPUTATIONAL.
00061   006100 77  B        PICTURE S9999  COMPUTATIONAL.
00062   006200 77  C        PICTURE S9999  COMPUTATIONAL.
00063   006300 77  D        PICTURE S9999  COMPUTATIONAL.
00064   006400 77  DELCNT   PICTURE S9(5)  COMPUTATIONAL  VALUE 0.
00065   006500 77  DELH     PICTURE S9(5)  COMPUTATIONAL.
00066   006600 77  DUM      PICTURE 999.
00067   006700 77  GENSEQN  PICTURE S9(5) COMPUTATIONAL.
00068   006800 77  MAXSEQN  PICTURE S9(5)  COMPUTATIONAL.
00069   006900 77  MINUSCNT PICTURE S9(7)  COMPUTATIONAL  VALUE 0.
00070   007000 77  NEWTERM  PICTURE XXX.
00071   007100 77  NUTERM  REDEFINES NEWTERM  PICTURE 999.
00072   007200 77  TIDELCNT PICTURE S9(5)  COMPUTATIONAL  VALUE 0.
00073   007300 77  TRKEY    PICTURE S9(5)  COMPUTATIONAL.
00074   007400 01  CHKDTA.
00075   007500  02  FILLER     PICTURE XXXX  VALUE 'OFF '.
00076   007600  02  CHKSEQN    PICTURE X(6).
00077   007700  02  FILLER     PICTURE X  VALUE SPACE.
00078   007800  02  CHKAUTH    PICTURE X(34).
00079   007900  02  FILLER     PICTURE X  VALUE SPACE.
00080   008000  02  CHKCALN    PICTURE X(30).
00081   008100  02  FILLER     PICTURE XX  VALUE SPACE.
00082   008200  02  CHKCPY     PICTURE 99.
00083   008300 01  RDTA.
00084   008400  02  RUNSER  PICTURE 9999.
00085   008500  02  FILLER  PICTURE X.
00086   008600  02  DATE  PICTURE X(8).
00087   008700  02  FILLER  PICTURE X.
00088   008800  02  TERMA  PICTURE 999.
00089   008900  02  FILLER  PICTURE X.
00090   009000  02  LRTP  PICTURE X(7).
00091   009100  02  FILLER  PICTURE X.
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00092   009200  02  FILLER  PICTURE X(5).
00093   009300  02  HDIN  PICTURE 9.
00094   009400  02  FILLER  PICTURE X(5).
00095   009500  02  HOUT  PICTURE 9.
00096   009600  02  FILLER  PICTURE X(5).
00097   009700  02  HWIN  PICTURE 9.
00098   009800  02  FILLER  PICTURE X(5).
00099   009900  02  HEXT  PICTURE 9.
00100   010000  02  FILLER  PICTURE X.
00101   010100  02  FUNSEQ  PICTURE 9(5).
00102   010200  02  FSEQNE  PICTURE 9.
00103   010300  02  FILLER  PICTURE X.
00104   010400  02  LDATE  PICTURE X(8).
00105   010500 01  SEQN.
00106   010600  02  FSEQN  PICTURE 9(5).
00107   010700  02  FILLER      REDEFINES FSEQN.
00108   010800  03  D1    PICTURE 9.
00109   010900  03  D2    PICTURE 9.
00110   011000  03  D3    PICTURE 9.
00111   011100  03  D4    PICTURE 9.
00112   011200  03  D5    PICTURE 9.
00113   011300  02  D6    PICTURE 9.
00114   011400 01  FILLER.
00115   011500  02  B1    PICTURE S9  COMPUTATIONAL.
00116   011600  02  B2    PICTURE S9  COMPUTATIONAL.
00117   011700  02  B3    PICTURE S9  COMPUTATIONAL.
00118   011800  02  B4    PICTURE S9  COMPUTATIONAL.
00119   011900  02  B5    PICTURE S9  COMPUTATIONAL.
00120   012000 01  FILLER.
00121   012100  02  NEWNEED    PICTURE S99  COMPUTATIONAL  OCCURS 3.
00122   012200 PROCEDURE DIVISION.
00123   012300      ACCEPT NEWTERM.  EXHIBIT NAMED NEWTERM.
00124   012400      IF NEWTERM NOT NUMERIC DISPLAY
00125   012500      'NEW TERM INCORRECTLY PUNCHED.' THEN GO TO ABORT2.
00126   012600      OPEN I-O MASTER.
00127   012700      MOVE ZERO TO SEQN, TRKEY.
00128   012800      READ MASTER INTO RDTA
00129   012900          INVALID EXHIBIT NAMED 'RDTA READ FAILED.' TRKEY SEQN
00130   013000              THEN GO TO ABORT1.
00131   013100      IF NEWTERM NOT > TERMA
00132   013200          DISPLAY 'CURRENT TERM IS ' TERMA.
00133   013300          '. NEW TERM MUST BE GREATER.'
00134   013400          THEN GO TO ABORT1.
00135   013500      DISPLAY 'PRESENT FILE STATUS: ' RDTA.
00136   013600      OPEN OUTPUT HYSTERICAL, MINUSFILE.
00137   013700      MOVE FUNSEQ TO MAXSEQN.
00138   013800      MOVE ZERO TO GENSEQN.
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00139   013900 LP1.
00140   014000        IF GENSEQN < MAXSEQN ADD 1 TO GENSEQN
00141   014100           ELSE GO TO ENDED.
00142   014200        MOVE GENSEQN TO FSEQN.  MOVE D1 TO B1 MOVE D2 TO B2
00143   014300           MOVE D3 TO B3 MOVE D4 TO B4 MOVE D5 TO B5.
00144   014400        COMPUTE DUM = B2 * B4 + B1 + B3 + B5.  MOVE DUM TO D6.
00145   014500        COMPUTE TRKEY = GENSEQN / 5.
00146   014600        READ MASTER  INVALID EXHIBIT NAMED
00147   014700           'READ FAILURE' TRKEY SEQN   THEN GO TO LP1.
00148   014800        IF PR = 0 GO TO LP1.
00149   014900        MOVE ZERO TO NEWNEED (1) NEWNEED (2) NEWNEED (3).
00150   015000        MOVE DELCNT TO DELH.
00151   015100        MOVE 1 TO A MOVE 0 TO B MOVE NCRSE TO C.
00152                 IF C = 0 GO TO LP1.  NOTE NO PROCESS IF NO COURSES.
00153   015200 LP2.      IF A > C OR B GO TO P2.
00154   015300        IF TERM (A) NOT < NEWTERM
00155   015400           ADD 1 TO B
00156   015500           MOVE CRSF (A) TO CRSF (B)
00157   015600           MOVE TERMB (B) TO D  ADD NEED (B) TO NEWNEED (D)
00158   015700        ELSE
00159   015800           MOVE CRSF (A) TO HCRSF
00160   015900           ADD 1 TO DELCNT
00161   016000           THEN IF HCRID NOT = SPACE
00162   016100                 MOVE SEQN TO HSEQN  WRITE HYSTREC.
00163   016200        ADD 1 TO A GO TO LP2.
00164   016300 P2.    MOVE B TO NCRSE.  MOVE NEWNEED (1) TO TNEED (1)
00165   016400        MOVE NEWNEED (2) TO TNEED (2)  MOVE NEWNEED (3) TO TNEED (3).
00166                 IF DELCNT > DELH ADD 1 TO TIDELCNT
00167                 ELSE GO TO LP1.  NOTE NO DELETIONS HENCE NO DEPROCESS.
00168   016600        MOVE NCP TO A  MOVE 1 TO D.
00169   016700 LP3.      IF D > 3 GO TO P3.
00170   016800        COMPUTE C = NEWNEED (D) - A.
00171   016900        IF C > 0 MOVE C TO SHORT (D)
00172   017000        ELSE MOVE 0 TO SHORT (D).
00173   017100        ADD 1 TO D GO TO LP3.
00174   017200 P3.    IF B > 0 GO TO P4.
00175   017300        MOVE 0 TO A MOVE NCP TO B  MOVE 0 TO C.
00176   017400        IF B > 0
00177   017500           MOVE SEQN TO CHKSEQN
00178   017600           MOVE CALN TO CHKCALN
00179   017700           MOVE AUTH TO CHKAUTH
00180   017800        ELSE GO TO P4.
00181   017900 LP4.      IF C < B AND A < 99  ADD 1 TO A
00182   018000           ELSE GO TO P4.
00183   018100        MOVE CPF (A) TO D.
00184   018200        IF D = 0 GO TO LP4.
00185   018300        ADD 1 TO C.
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00186   018400      IF D < 3 ADD 4 TO D
00187   018500          MOVE A TO CHKCPY  WRITE CHKCD FROM CHKDTA
00188   018600          ADD 1 TO MINUSCNT
00189   018700      ELSE IF D < 5 SUBTRACT 2 FROM D.
00190   018800      MOVE D TO CPF (A)  GO TO LP4.
00191   018900 P4.  REWRITE MASTREC
00192   019000          INVALID DISPLAY 'REWRITE FAILED' TRKEY SEQN.
00193   019100      GO TO LP1.
00194   019200 ABORT1.      CLOSE MASTER.
00195   019300 ABORT2.      DISPLAY 'RUN CANCELED'.  STOP RUN.
00196   019400 ENDED.  CLOSE MINUSFILE, HYSTERICAL.
00197   019500      MOVE ZERO TO TRKEY, SEQN.
00198   019600      READ MASTER INVALID EXHIBIT NAMED
00199   019700          'RDTA READ2 FAILED' TRKEY SEQN  GO TO BLECH.
00200   019800      MOVE NUTERM TO TERMA.
00201   019900      MOVE 0 TO RUNSER.
00202   020000      REWRITE MASTREC FROM RDTA  INVALID EXHIBIT NAMED
00203   020100          'RDTA REWRITE FAILED' TRKEY SEQN  GO TO BLECH.
00204   020200      CLOSE MASTER.
00205   020300      DISPLAY 'TERM END PROCESS COMPLETE. '.
00206   020400      DISPLAY 'NUMBER OF TITLES HAVING COURSES DELETED = ' TIDELCNT
00207   020500      DISPLAY 'TOTAL NUMBER OF COURSES DELETED = ' DELCNT
00208   020600      DISPLAY 'TOTAL NUMBER "CPF" CARDS PRODUCED = ' MINUSCNT.
00209   020700      DISPLAY 'UPDATED FILE STATUS: ' RDTA.
00210   020800      DISPLAY 'NEXT REGULAR RUN MUST BE RUN=0001.'.
00211   020900      STOP RUN.
00212   021000 BLECH.  DISPLAY 'PROCESS COMPLETE, BUT CANNOT UPDATE FILE STATUS'
00213   021100      DISPLAY 'FILE STATUS REMAINS AS SHOWN ABOVE.'.
00214   021200      CLOSE MASTER  STOP RUN.
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00001          IDENTIFICATION DIVISION.                                          00000100
00002          PROGRAM-ID. 'RESVPROF'.                                           00000200
00003          AUTHOR. H.J.HETLAND.                                              00000300
00004          ENVIRONMENT DIVISION.                                             00000400
00005          INPUT-OUTPUT SECTION.                                             00000500
00006          FILE-CONTROL.                                                     00000600
00007              SELECT MASTER-FILE ASSIGN 'MASTER' DIRECT-ACCESS              00000700
00008              ORGANIZATION DIRECT  ACCESS RANDOM                            00000800
00009              SYMBOLIC SEQNFF  ACTUAL TRKEY.                                00000900
00010              SELECT PROFLIST ASSIGN 'PROFLIST' UTILITY RESERVE 5.          00001000
00011          I-O-CONTROL.                                                      00001100
00012              APPLY RESTRICTED SEARCH 1 ON MASTER-FILE.                     00001200
00013          DATA DIVISION.                                                    00001300
00014          FILE SECTION.                                                     00001400
00015          FD  MASTER-FILE                                                   00001500
00016              RECORDING F LABEL RECORD STANDARD DATA RECORD MASTER-RECORD.  00001600
00017          01  MASTER-RECORD.                                                00001700
00018           02     PR        PICTURE 9    COMPUTATIONAL-3.                   00001800
00019           02     BIB.                                                      00001900
00020            03       AUTH    PICTURE X(76).                                00002000
00021            03       TITL    PICTURE X(76).                                00002100
00022            03       EDTN    PICTURE X(10).                                00002200
00023            03       DATN    PICTURE X(10).                                00002300
00024            03       CALN    PICTURE X(30).                                00002400
00025            03       LCCN    PICTURE X(10).                                00002500
00026           02     INVENT.                                                   00002600
00027            03       ORDR    PICTURE 99.                                   00002700
00028            03       NCP     PICTURE 99.                                   00002800
00029           02     CPFF.                                                     00002900
00030            03       CPF     PICTURE 9    COMPUTATIONAL-3  OCCURS 99.      00003000
00031           02     CRSES.                                                    00003100
00032            03       NCRSE   PICTURE 99   COMPUTATIONAL-3.                 00003200
00033            03       TNEED   PICTURE 99   OCCURS 3.                        00003300
00034            03       SHORT   PICTURE S99  OCCURS 3.                        00003400
00035            03       CRSF                 OCCURS 8.                        00003500
00036             04        NEED   PICTURE 99.                                  00003600
00037             04        CID.                                                00003700
00038              05        TERM PICTURE 999.                                  00003800
00039              05        CRID.                                              00003900
00040               06        CRSE PICTURE X(15).                               00004000
00041               06        PROF PICTURE X(15).                               00004100
00042          FD  PROFLIST  RECORDING F  LABEL RECORD OMITTED                  00004200
00043              BLOCK 5 RECORDS                                              00004300
00044              DATA RECORD PREC.
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00045          01  PREC.                                                    00004400
00046           02  FILLER  PICTURE X.                                      00004500
00047           02  FILLER  PICTURE X(132).                                 00004600
00048          SD  SFILE  RECORDING F  DATA RECORD SREC.                    00004700
00049          01  SREC.                                                    00004800
00050           02  SORF   PICTURE X.                                       00004900
00051           02  SCRID.                                                  00005000
00052            03  SPROF  PICTURE X(15).                                  00005100
00053            03  SCRSE  PICTURE X(15).                                  00005200
00054           02  SBIB.                                                   00005300
00055            03  SAUTH  PICTURE X(76).                                  00005400
00056            03  STITL  PICTURE X(76).                                  00005500
00057            03  SEDTN  PICTURE X(10).                                  00005600
00058            03  SDATN  PICTURE X(10).                                  00005700
00059            03  SCALN  PICTURE X(30).                                  00005800
00060          WORKING-STORAGE SECTION.                                     00005900
00061          77  AA  PICTURE 999.                                         00006000
00062          77  A  PICTURE S99 COMPUTATIONAL.                            00006100
00063          77  B  PICTURE S99 COMPUTATIONAL.                            00006200
00064          77  CRSCNT  PICTURE S99  COMPUTATIONAL.                      00006300
00065          77  CRSPG  PICTURE S99 COMPUTATIONAL  VALUE 16.              00006400
00066          77  CT1  PICTURE S9(6)  COMPUTATIONAL  VALUE 0.              00006500
00067          77  CT2  PICTURE S9(6)  COMPUTATIONAL  VALUE 0.              00006600
00068          77  CT3  PICTURE S9(6)  COMPUTATIONAL  VALUE 0.              00006700
00069          77  CT4  PICTURE S9(6)  COMPUTATIONAL  VALUE 0.              00006800
00070          77  CT5 PICTURE ZZ.9.                                        00006900
00071          77  CT6  PICTURE S9(6)  COMPUTATIONAL  VALUE 0.              00007000
00072          77  ORF  PICTURE X.                                          00007100
00073          77  PGCNT  PICTURE S9999  COMPUTATIONAL  VALUE 0.            00007200
00074          77  TRKEY  PICTURE S9(5) COMPUTATIONAL.                      00007300
00075          01  HCRID.                                                   00007400
00076           02  HPROF  PICTURE X(15).                                   00007500
00077           02  HCRSE  PICTURE X(15).                                   00007600
00078          01  PAREAS.                                                  00007700
00079           02  H1.                                                     00007800
00080            03  FILLER  PICTURE X(38)  VALUE SPACE.                    00007900
00081            03  HDTXT  PICTURE X(15)  VALUE 'COLLEGE LIBRARY'.         00008000
00082            03  FILLER  PICTURE X(19)  VALUE SPACE.                    00008100
00083            03  HDATE  PICTURE X(8).                                   00008200
00084            03 FILLER  PICTURE X(4) VALUE SPACE.                       00008300
00085            03  PAG  PICTURE X(5)  VALUE SPACE.                        00008400
00086            03  PGNO  PICTURE ZZZZ.                                    00008500
00087           02  H2.                                                     00008600
00088            03  FILLER  PICTURE X(7)  VALUE SPACE.                     00008700
00089            03  FILLER  PICTURE X(11)  VALUE 'PROFESSOR: '.            00008800
00090            03  PPROF  PICTURE X(15).                                  00008900
00091            03  FILLER  PICTURE X(22)  VALUE '   RESERVE LIST FOR: '.  00009000
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00092          03  PCRSE   PICTURE X(15).                                00009100
00093          03  FILLER  PICTURE X      VALUE SPACE.                  00009200
00094          03  HTERM   PICTURE X(6).                                00009300
00095          03  FILLER  PICTURE XXX    VALUE ' 19'.                  00009400
00096          03  HYEAR   PICTURE XX.                                  00009500
00097          03  FILLER  PICTURE X(7) VALUE SPACE.                    00009600
00098          03  PGN2  PICTURE ZZZZ.                                  00009700
00099        02  PLIN.                                                  00009800
00100          03  FILLER  PICTURE X(10)  VALUE SPACE.                  00009900
00101          03  PAUTL.                                               00010000
00102            04  TBLNK  PICTURE XXXX.                               00010100
00103            04  PTITL  PICTURE X(76).                              00010200
00104            04  PEDDACA  REDEFINES PTITL.                          00010300
00105              05  PEDTN  PICTURE X(10).                            00010400
00106              05  FILLER PICTURE XX.                               00010500
00107              05  PDATN  PICTURE X(10).                            00010600
00108              05  FILLER PICTURE XX.                               00010700
00109              05  PCALN  PICTURE X(30).                            00010800
00110        01  RUNTERM.                                               00010900
00111          02  RTA  PICTURE XX.                                     00011000
00112          02  RTB  PICTURE 9.                                      00011100
00113        01  TRMS.                                                  00011200
00114          02  TRM  OCCURS 3.                                       00011300
00115            03  TRA  PICTURE 99.                                   00011400
00116            03  TRB  PICTURE 9.                                    00011500
00117        01  HTERMSV  PICTURE X(18)  VALUE 'SPRINGSUMMER  FALL'.    00011600
00118        01  HTERMSF  REDEFINES HTERMSV.                            00011700
00119          02  HTERMS  PICTURE X(6)  OCCURS 3.                      00011800
00120        01  SEQNFF.                                                00011900
00121          02  SEQN  PICTURE 9(6).                                  00012000
00122          02  SEQF REDEFINES SEQN.                                 00012100
00123            03  ASEQND  PICTURE 9(5).                              00012200
00124            03  ASEQNE  PICTURE 9.                                 00012300
00125          02  ASEQNS  REDEFINES SEQN.                              00012400
00126            03  ASEQN  PICTURE 9  OCCURS 6.                        00012500
00127        01  RDTA.                                                  00012600
00128          02  RUNSER  PICTURE 9999.                                00012700
00129          02  FILLER  PICTURE X.                                   00012800
00130          02  DATE  PICTURE X(8).                                  00012900
00131          02  FILLER  PICTURE X.                                   00013000
00132          02  TERMA  PICTURE 999.                                  00013100
00133          02  FILLER  PICTURE X.                                   00013200
00134          02  LRTP  PICTURE X(7).                                  00013300
00135          02  FILLER  PICTURE X.                                   00013400
00136          02  FILLER  PICTURE X(5).                                00013500
00137          02  HDIN  PICTURE 9.                                     00013600
00138          02  FILLER  PICTURE X(5).                                00013700
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00139          02  HOUT  PICTURE 9.                                          00013800
00140          02  FILLER  PICTURE X(5).                                    00013900
00141          02  HWIN  PICTURE 9.                                          00014000
00142          02  FILLER  PICTURE X(5).                                    00014100
00143          02  HEXT  PICTURE 9.                                          00014200
00144          02  FILLER  PICTURE X.                                       00014300
00145          02  FUNSEQ  PICTURE 9(5).                                    00014400
00146          02  FSEQNE  PICTURE 9.                                       00014500
00147          02  FILLER  PICTURE X.                                       00014600
00148          02  LDATE  PICTURE X(8).                                     00014700
00149        PROCEDURE DIVISION.                                             00014800
00150        MAIN-STUFF SECTION.                                             00014900
00151            OPEN I-O MASTER-FILE MOVE 0 TO TRKEY, SEQN.                 00015000
00152            READ MASTER-FILE INTO RDTA INVALID DISPLAY 'LABELBOMB'      00015100
00153                GO TO BOMB.  DISPLAY 'FILE AS OF ' RDTA.                00015200
00154            MOVE TERMA TO TRM (1) TRM (2) TRM (3) GO TO T123 T231 T312  00015300
00155            DEPENDING TRB (1).                                          00015400
00156        T123. MOVE 2 TO TRB (2) MOVE 3 TO TRB (3) GO TO TEX.            00015500
00157        T231. MOVE 3 TO TRB (2) MOVE 1 TO TRB (3) ADD 1 TO TRA (3) GO TO 00015600
00158            TEX.                                                        00015700
00159        T312. MOVE 1 TO TRB (2) MOVE 2 TO TRB (3) ADD 1 TO TRA (2) ADD 1 00015800
00160            TO TRA (3).                                                 00015900
00161        TEX. ACCEPT RUNTERM. DISPLAY 'RUNTERM=' RUNTERM.                00016000
00162                              IF RUNTERM = TRM (1) OR TRM (2) OR TRM (3) 00016100
00163            NEXT SENTENCE ELSE DISPLAY 'TERMBOMB' GO TO BOMB.           00016200
00164            MOVE HTERMS (RTB) TO HTERM MOVE RTA TO HYEAR MOVE           00016300
00165            DATE TO HDATE. DISPLAY 'ENTER SORT'.                        00016400
00166            SORT SFILE ASCENDING SCRID SCRF SAUTH STITL                 00016500
00167            INPUT PROCEDURE INPUT-STUFF                                 00016600
00168            OUTPUT PROCEDURE OUTPUT-STUFF.                              00016700
00169            IF TALLY NOT = 0 DISPLAY 'SORT FAILED' ELSE                 00016800
00170            DISPLAY 'PROFLIST COMPLETE'.  STOP RUN.                     00016900
00171        BOMB. CLOSE MASTER-FILE DISPLAY 'BOMBED' STOP RUN.              00017000
00172        INPUT-STUFF SECTION.                                            00017100
00173        NEXTIN. ADD 1 TO ASEQND IF ASEQND > FUNSEQ GO TO ENDIN.         00017200
00174            COMPUTE AA = ASEQN (2) * ASEQN (4) + ASEQN (1) + ASEQN (3)  00017300
00175            + ASEQN (5). MOVE AA TO ASEQNE. COMPUTE TRKEY = ASEQND / 5. 00017400
00176            READ MASTER-FILE INVALID DISPLAY 'READ FAILURE. SEQN=' SEQNF00017500
00177            GO TO NEXTIN. IF PR = 0 GO TO NEXTIN. ADD 1 TO CT1.         00017600
00178            MOVE SPACE TO ORF.                                          00017700
00179            IF TNEED (RTB) > 0 ADD 1 TO CT6 THEN                        00017800
00180              IF NCP = 0 MOVE 'X' TO ORF THEN                           00017900
00181                IF ORDR = 0 MOVE HIGH-VALUE TO SCRID MOVE BIB TO SBIB   00018000
00182                    MOVE 'Y' TO SCRF RELEASE SREC ADD 1 TO CT2.         00018100
00183            MOVE 1 TO A MOVE NCRSE TO B.                                00018200
00184        TST1. IF A > B GO TO NEXTIN. IF TERM (A) NOT = RUNTERM          00018300
00185              ADD 1 TO A GO TO TST1.  ADD 1 TO CT3.                     00018400
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00186          MOVE PROF (A) TO SPROF MOVE CRSE (A) TO SCRSE MOVE BIB TO      00018500
00187          SBIB MOVE ORF TO SORF RELEASE SREC. ADD 1 TO A GO TO TST1.     00018600
00188      ENDIN. DISPLAY 'END OF INPUT PHASE' CLOSE MASTER-FILE.             00018700
00189          COMPUTE CT4 = CT2 + CT3. COMPUTE CT5 ROUNDED = CT3 / CT6.      00018800
00190          DISPLAY 'MASTER TITLES ' CT1                                   00018900
00191          ' PROFLIST TITLES ' CT6                                        00019000
00192          ' COURSES/TITLE ' CT5                                          00019100
00193          ' INVENTORY CHECKS ' CT2                                       00019200
00194          ' TOTAL SORTIN ' CT4.                                          00019300
00195      OUTPUT-STUFF SECTION.                                              00019400
00196          OPEN OUTPUT PROFLIST. MOVE SPACE TO HCRID.                     00019500
00197          MOVE 0 TO CT1, CT3.                                            00019600
00198      NOW. RETURN SFILE END GO TO ENDPROF.                               00019700
00199          IF SCRID = HCRID GO TO SAMECRID. MOVE SCRID TO HCRID.          00019800
00200          IF SORF = 'Y' MOVE SORF TO ORF GO TO ENDPROF.                  00019900
00201      NEWCRID. MOVE SPROF TO PPROF MOVE SCRSE TO PCRSE.                  00020000
00202          ADD 1 TO PGCNT MOVE PGCNT TO PGNO. MOVE SPACE TO ORF.          00020100
00203          WRITE PREC FROM H1 AFTER 0 WRITE PREC FROM H2 AFTER 2.         00020200
00204          ADD 1 TO CT1.                                                  00020300
00205      BSKIP. MOVE SPACE TO PREC WRITE PREC AFTER 2. MOVE 0 TO CRSCNT.    00020400
00206      SAMECRID. IF SORF > ORF GO TO ORDRD.                               00020500
00207              IF CRSCNT > CRSPG GO TO OVERFLOW.                          00020600
00208      PRTCRS. MOVE SAUTH TO PAUTL WRITE PREC FROM PLIN AFTER 1.          00020700
00209          MOVE SPACE TO TBLNK. MOVE STITL TO PTITL WRITE PREC FROM       00020800
00210          PLIN AFTER 1. MOVE SPACE TO PTITL.                             00020900
00211          MOVE SEDTN TO PEDTN MOVE SDATN TO PDATN MOVE SCALN TO PCALN.   00021000
00212          WRITE PREC FROM PLIN AFTER 1. ADD 1 TO CRSCNT ADD 1 TO CT3.    00021100
00213      PRTEX. GO TO NOW. NOTE ALTER TO NOW2.                              00021200
00214      OVERFLOW. ADD 1 TO PGCNT MOVE PGCNT TO PGN2.                       00021300
00215          WRITE PREC FROM H2 AFTER 0. MOVE 0 TO PGN2.                    00021400
00216          MOVE '(CONTINUED FROM PREVIOUS PAGE)' TO PTITL                 00021500
00217          WRITE PREC FROM PLIN AFTER 2.                                  00021600
00218          IF ORF NOT = 'X' GO TO BSKIP. MOVE 0 TO CRSCNT.                00021700
00219      ORDRD. MOVE SORF TO ORF. IF CRSCNT NOT < CRSPG GO TO OVERFLOW.     00021800
00220          MOVE '***** THE FOLLOWING TITLES ARE BEING OBTAINED FOR RESER  00021900
00221          'VE ******' TO PAUTL. WRITE PREC FROM PLIN AFTER 3.            00022000
00222          ADD 1 TO CRSCNT GO TO SAMECRID.                                00022100
00223      ENDPROF. MOVE 'END OF PROFESSORS LISTS.' TO PAUTL                  00022200
00224          WRITE PREC FROM PLIN AFTER 0.                                  00022300
00225          COMPUTE CT5 ROUNDED = CT3 / CT1.                               00022400
00226          IF ORF NOT = 'Y' GO TO ENDOUT.                                 00022500
00227          ALTER PRTEX TO PROCEED TO NOW2.                                00022600
00228          MOVE 0 TO PGCNT MOVE 'PAGE ' TO PAG                            00022700
00229          MOVE 'INVENTORY CHECK' TO HDTXT. GO TO ICOVFL.                 00022800
00230      NOW2. RETURN SFILE END GO TO ENDIC.                                00022900
00231          IF CRSCNT NOT > CRSPG GO TO PRTCRS.                            00023000
00232      ICOVFL. MOVE 0 TO CRSCNT. ADD 1 TO PGCNT. MOVE PGCNT TO PGNO.      00023100
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00233          WRITE PREC FROM H1 AFTER 0.                                  00023200
00234          MOVE SPACE TO PREC WRITE PREC AFTER 3. GO TO PRTCRS.         00023300
00235      ENDIC. MOVE 'END OF INVENTORY CHECK' TO PAUTL                    00023400
00236          WRITE PREC FROM PLIN AFTER 2.                                00023500
00237      ENDOUT. DISPLAY 'TOTAL COURSES ' CT1 ' TITLES/COURSE ' CT5.      00023600
00238          CLOSE PROFLIST.                                              00023700
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00001          IDENTIFICATION DIVISION.                                  00000100
00002          PROGRAM-ID. 'XREFRESV'.
00003          AUTHOR. H.J.HETLAND.                                      00000300
00004          ENVIRONMENT DIVISION.                                     00000400
00005          INPUT-OUTPUT SECTION.                                     00000800
00006          FILE-CONTROL.                                             00000900
00007              SELECT MASTER ASSIGN 'MASTER' UTILITY.
00008              SELECT CROSSREF ASSIGN 'CROSSREF' UTILITY.
00009          DATA DIVISION.                                            00001600
00010          FILE SECTION.                                             00001700
00011          FD  MASTER
00012              RECORDING F BLOCK 5 RECORDS
00013              LABEL RECORD STANDARD DATA RECORD MASREC.
00014          01  MASREC.
00015           02     PR        PICTURE 9    COMPUTATIONAL-3.          00002100
00016           02     BIB.                                              00002200
00017            03       AUTH    PICTURE X(76).                        00002300
00018            03  TITL.
00019             04  TITL4     PICTURE X(4).
00020             04  XMAIN     PICTURE X(72).
00021            03       EDTN    PICTURE X(10).                        00002500
00022            03       CATN    PICTURE X(10).                        00002600
00023            03       CALN    PICTURE X(30).                        00002700
00024            03       LOCN    PICTURE X(10).                        00002800
00025           02      INVENT.                                          00002900
00026            03       CRDR    PICTURE 99.                           00003000
00027            03       NCP     PICTURE 99.                           00003100
00028           02      CPFF.                                            00003200
00029            03       CPF     PICTURE 9    COMPUTATIONAL-3  OCCURS 99.  00003300
00030           02      CRSES.                                           00003400
00031            03       NCRSE   PICTURE 99   COMPUTATIONAL-3.          00003500
00032            03       TNEED   PICTURE 99   OCCURS 3.                 00003600
00033            03       SHORT   PICTURE S99  OCCURS 3.                 00003700
00034            03       CRSF                 OCCURS 8.
00035             04       NEED   PICTURE 99.                            00003900
00036             04       CID.                                          00004000
00037              05       TERM PICTURE 999.                            00004100
00038              05       CRID.                                        00004200
00039               06       CRSE PICTURE X(15).                         00004300
00040               06       PROF PICTURE X(15).                         00004400
00041           02  SEQN    PICTURE 9(6).
00042          FD  CROSSREF
00043              RECORDING F BLOCK 5 RECORDS
00044              LABEL RECORD OMITTED DATA RECORD PREC.
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00045          01  PREC     PICTURE X(133).
00046          SD  SFILE RECORDING F DATA RECORD SREC.
00047          01  SREC.
00048           02  SMAIN  PICTURE X(72).
00049           02  SXREF  PICTURE X(76).
00050           02  SXSEQN PICTURE 9(6).
00051          WORKING-STORAGE SECTION.                                  00007300
00052          77  MCTR     PICTURE S9999 COMPUTATIONAL VALUE 0.
00053          77  LN       PICTURE S9999 COMPUTATIONAL VALUE 50.
00054          77  LNCT     PICTURE S9999 COMPUTATIONAL VALUE 0.
00055          77  PGCT     PICTURE S9999 COMPUTATIONAL VALUE 0.
00056          77  XCTR     PICTURE S9999 COMPUTATIONAL VALUE 0.
00057          01  PCC.
00058           02  PC      PICTURE  9 COMPUTATIONAL-3 VALUE 0.
00059          01  PHEAD.
00060           02  FILLER     PICTURE X.
00061           02  FILLER  PICTURE X(51) VALUE
00062                '      RESERVES CROSS REFERENCES BY MAIN ENTRY AS OF '.
00063           02  HDATE       PICTURE X(8).
00064           02  FILLER      PICTURE X(9) VALUE '     PAGE '.
00065           02  PGN         PICTURE Z(4).
00066          01  MLIN.
00067           02  FILLER PICTURE X.
00068           02  PMAIN       PICTURE X(72).
00069          01  XLIN.
00070           02  FILLER      PICTURE X.
00071           02  FILLER      PICTURE X(7) VALUE '     X  '.
00072           02  PXREF       PICTURE X(76).
00073           02  FILLER      PICTURE XX VALUE SPACE.
00074           02  PXSEQN      PICTURE 9(6).
00075          01  RDTA.                                                 00007900
00076           02  RUNSER  PICTURE 9999.                                00008000
00077           02  FILLER  PICTURE X.                                   00008100
00078           02  DATE  PICTURE X(8).                                  00008200
00079           02  FILLER  PICTURE X.                                   00008300
00080           02  TERMA  PICTURE 999.                                  00008400
00081           02  FILLER  PICTURE X.                                   00008500
00082           02  LRTP  PICTURE X(7).                                  00008600
00083           02  FILLER  PICTURE X.                                   00008700
00084           02  FILLER  PICTURE X(5).                                00008800
00085           02  HDIN  PICTURE 9.                                     00008900
00086           02  FILLER  PICTURE X(5).                                00009000
00087           02  HOUT  PICTURE 9.                                     00009100
00088           02  FILLER  PICTURE X(5).                                00009200
00089           02  HWIN  PICTURE 9.                                     00009300
00090           02  FILLER  PICTURE X(5).                                00009400
00091           02  HEXT  PICTURE 9.                                     00009500
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00092          02  FILLER  PICTURE X.                                    00009600
00093          02  FUNSEQ  PICTURE 9(5).                                 00009700
00094          02  FSEQNE  PICTURE 9.                                    00009800
00095          02  FILLER  PICTURE X.                                    00009900
00096          02  LDATE  PICTURE X(8).                                  00010000
00097       PROCEDURE DIVISION.                                          00010800
00098           SORT SFILE ASCENDING SREC
00099               INPUT PROCEDURE IN-PROC
00100               OUTPUT PROCEDURE OUT-PROC.
00101           IF TALLY = 0 DISPLAY 'CROSSREF COMPLETE. '
00102               MCTR ' MAIN ENTRIES LISTED.'
00103           ELSE DISPLAY 'SORT FAILED.'.
00104           STOP RUN.
00105       IN-PROC SECTION.
00106           OPEN INPUT MASTER.
00107           READ MASTER INTO RDTA END DISPLAY 'NO MASTER FILE.' STOP RUN.
00108           DISPLAY 'USING FILE AS OF ' RDTA.
00109       LP1.    READ MASTER END GO TO ENDIN.
00110           IF PR = POC GO TO LP1.
00111           IF TITL4 NOT = 'SEE ' GO TO LP1.
00112           ADD 1 TO XCTR.
00113           MOVE XMAIN TO SMAIN. MOVE AUTH TO SXREF. MOVE SEQN TO SXSEQN.
00114           RELEASE SREC GO TO LP1.
00115       ENDIN.  CLOSE MASTER.
00116           DISPLAY 'END OF INPUT. ' XCTR ' CROSS REFERENCES FOUND.'.
00117       OUT-PROC SECTION.
00118           OPEN OUTPUT CROSSREF.
00119           MOVE DATE TO HDATE.
00120           COMPUTE LNCT = LN + 1.
00121       LP2.    RETURN SFILE END GO TO ENDOUT.
00122           IF SMAIN = PMAIN GO TO SAMES.
00123           IF LNCT > LN MOVE 0 TO LNCT
00124               ADD 1 TO PGCT MOVE PGCT TO PGN
00125               WRITE PREC FROM PHEAD AFTER 0.
00126           MOVE SMAIN TO PMAIN.
00127           WRITE PREC FROM MLIN AFTER 2.
00128           ADD 2 TO LNCT. ADD 1 TO MCTR.
00129       SAMES.  MOVE SXREF TO PXREF.
00130           MOVE SXSEQN TO PXSEQN.
00131           WRITE PREC FROM XLIN AFTER 1.
00132           ADD 1 TO LNCT GO TO LP2.
00133       ENDOUT. MOVE 'END OF CROSS REFERENCE LIST.' TO PMAIN.
00134           WRITE PREC FROM MLIN AFTER 2.
00135           CLOSE CROSSREF.
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