ANALYSIS OF THE CLERICAL FUNCTION

# 388 - 67

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November 15, 1967

Mr. David L. Everhart
Administrator
The Johns Hopkins Hospital
601 N. Broadway
Baltimore, Maryland 21205

Dear Mr. Everhart:

Enclosed are the recommendations and results of the analysis conducted since February, 1967, of the clerical function of the Department of Radiology.

A study team consisting of Dr. Russell H. Morgan, Dr. Martin W. Donner, Dr. Stanley I. Margulies and Messrs. Glenn R. Mitchell, Richard A. Olden, James Burgess and myself contributed to and coordinated the analysis, recommendations and implementation of this study.

I would also like to acknowledge the cooperation and assistance of the entire clerical staff of the Department of Radiology, upon whom many demands were made during the analysis and implementation stages of the study.

Respectfully submitted,

James G. Kuyava, Jr.
Project Director

JGK/sjk
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Synopsis

During the fiscal year of 1965-1966, in excess of 100,000 diagnostic examinations were performed in the Department of Radiology. Statistics of previous years indicate that the case load of diagnostic exams has been increasing at a rate close to 5% per year.

In addition to the growth rate of the diagnostic examinations, there has also been a significant increase of the number of examinations performed in other divisions of the Department of Radiology as well as a marked increase in the activity of loaning x-ray films to the various inpatient and outpatient clinical departments and private physicians.

During this period, it became apparent that the workload of the present clerical routines and filing procedures had approached a level at which the present clerical system could no longer operate efficiently.

The analysis and recommendations contained in this report reflect the study team's efforts to attain the goal of an efficient clerical and filing system for the Department of Radiology.

The text of the report leads off with an introduction and summary of recommendations, followed by the analysis of the Film Vault, Film Library, C.M.S.C., Evening and Weekend operation, and O.P.D. This is followed by a discussion of Phases II, III, and IV of the proposed system.
Introduction and Summary of Recommendations

Implementation of the proposed clerical and filing systems are presently in various stages of completion; therefore for discussion purposes, the present system of each area will be defined as that which existed before the study began, and the proposed system as that which will exist following complete implementation of the following recommendations:

Phase I - this phase of the proposed system involves the documentation and implementation of the proposed clerical routines, filing procedures and related clerical staffing.

a) Convert the sequential filing system into a terminal digit color-coded system.

b) Provide and adhere to written schedules of all personnel and monitor the absentee rate.

c) Reduce the number of file clerks in the Film Vault from 8 to 4 and provide adequate supervision and a co-ordinator position to control the flow of work to and from the Vault area (this will result in a net reduction of 3 clerk positions).

d) Discontinue the team approach of retrieval and filing and divide the Vault file area among the four proposed clerks to further control the input and output of the Film Vault.

e) Periodically review the workload of the Vault area for problems of loan-outs and inefficiencies and redundancy in requesting master jackets.

f) Revise the flow process (see Appendix A).

g) Initiate the job descriptions and routines that are presented in this report.
h) Reduce the Library file clerks from 6 to 4 positions and provide adequate supervision and a co-ordinator position to control the flow of work to and from the Film Library (this results in a net reduction of 1 clerk position).

i) Provide the purging technique discussed in this report to the C.M.S.C. operation. This will eliminate the peakload of refiles in the Vault which is a result of the present C.M.S.C. monthly purge.

j) Due to the expansion of the C.M.S.C. operation and the elimination of weekend coverage by the full-time file clerks, expand the evening and weekend coverage from 120 hours per week to 160 hours per week.

k) Continue to monitor the need for this part-time coverage in the evenings and weekends.

l) Provide adequate supervision for the evening shift.

m) Given the feasibility of remodeling the receptionist area of the OPD operation and the continuance of the present workload, the OPD section could be staffed by 1 file clerk and 1 receptionist plus the availability of report typing as opposed to the present staff of 2 file clerks, 1 receptionist, and 1 dictaphone operator.

Phase II - the implementation of a viewing conference.

a) With the successful implementation and expansion of the viewing conferences re-evaluate the need for the proposed staffing of the loan-out window on day and evening shifts.
Phase III - the generation of an x-ray report via the Computer.

a) With successful implementation of the reporting phase via the computer, a reduction of 1 dictaphone operator II position and 5 dictaphone operator I positions at an estimated payroll savings of $25,000 per year, could be realized.

Phase IV - the feasibility of a microfilm and/or ADP system for the Department Radiology.

a) Explore in depth the feasibility of microfilm and ADP applications for the clerical function of the Department of Radiology, and the related advantages and disadvantages of economics and service improvements.
The Film Vault is the main file area of the Department of Radiology and contains the bulk of the patients' case material. All examinations and reports of a particular patient are filed under that patient's unit number in one jacket which is called the master jacket.

The main function of the Vault is to provide patients' master jackets as needed for:

(a) "new film" processing functions in the Department;
(b) "loan-outs" to clinics, physicians, and other areas that require the Department's case material to complete or support diagnoses.

A flow chart has been included in Appendix A to illustrate the detailed clerical and filing procedures of the Vault as well as the relationship and procedures of the related sections of the Department for the "new film" and "loan-out" procedures. It is desirable to highlight some of the important portions of this chart and the related filing procedures and problems of the Vault to provide continuity for the reader in evaluating the proposed system which is later presented in this section.

**Filing Procedures**

The present system utilizes a sequential filing system of the master jackets by history number in the Vault. These jackets are retained for a period of three years from the date of the last examination. Those cases which are indexed for pathology are retained for six years and autopsy cases are permanently stored.

A piece of colored tape on the jacket edge indicates the last year in which an examination was performed. In addition to the year tape, a piece of gold tape denotes a case indexed for pathology and double gold tape indicates an autopsy.
At the beginning of the study, the Film Vault was in quite a state of disorder due to misfiles, overflowing files, poor layout, high absenteeism of the Vault staff, virtually no training of personnel and inadequate supervision. In addition, the volume of work to be done was an unknown and, thus, job routines were poorly planned.

To initiate a jacket search in the Vault under the present system, the following procedures were used to provide the patient name and history number to the Vault, retrieve the jacket and transport the jacket to the requesting area:

1. Three intercoms (OPD, C.M.S.C., and the Film Library) were used to relay verbal requests for a jacket search to Vault personnel, who posted the name and history number to a white card and began a search of this file. In addition to this initial posting of the patient's name and number, the same information was posted to a grey work jacket, (in the case of "new film" processing) or a brown loan-out jacket, (in the case of a clinic or physician loan-out). In addition, the date and borrower were posted to the master jacket and brown jacket for loan-outs.

2. A dumbwaiter connecting the Film Library and Vault was used to transport clinic lists to the Vault and to transport jackets or information concerning requested jackets to the Library.

3. Two pneumatic tubes were used to transport jackets to and from the OPD and C.M.S.C. sections of the Department.

It is important to note that these input and output devices of the Vault were not under the control of one person. Thus, the vital communication to and from the Vault regarding the status of the various jacket searches being made was strictly dependent on the ability and integrity of the file clerk that received the initial request. As a result, there were numerous occasions when
the same master jacket had to be requested again, which caused a duplication of effort on the part of the requesting section, as well as the Film Vault.

In summary, the disadvantages of the present Vault filing and clerical procedures were:

1. The transferring of loaned films to loan-out jackets required a significant amount of duplication of posting information to loan-out jacket, master jacket and white card.

2. The refiling of films contained in brown jackets to their master jackets was extremely time consuming and usually was back logged.

3. Jackets that were suspended in the current file of the Library were only kept there 48 hours. Invariably, these jackets were returned to the Vault and filed, only to be requested for loan-outs or for additional exams. Thus, a high volume of loan-out requests or new film requests descended on the Film Vault merely because the jackets suspended in the current file were not kept a sufficient length of time and were returned to the Vault at a time when these jackets were still in a state of loan-out and/or new film activity.

4. Lack of co-ordination at the sending and receiving stations of master jackets resulted in an inefficient flow of master jackets and information.

Present Workload of Film Vault

It became apparent that before control of Vault activity could be realized, a knowledge of the volume of master jacket requests made to the Film Vault was needed. The following table depicts the daily volume of jacket requests made to the Film Vault by area. This data was gathered during the months of March and April of 1967.
## Day Shift Operation

<table>
<thead>
<tr>
<th>Area</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Film Library (Intercom)</td>
<td>132</td>
<td>132</td>
<td>132</td>
<td>132</td>
<td>132</td>
</tr>
<tr>
<td>C.M.S.C. (Intercom)</td>
<td>62</td>
<td>62</td>
<td>62</td>
<td>62</td>
<td>62</td>
</tr>
<tr>
<td>O.P.D. (Intercom)</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Accident Cases</td>
<td>211</td>
<td>94</td>
<td>94</td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td>Clinic Lists</td>
<td>199</td>
<td>196</td>
<td>242</td>
<td>253</td>
<td>184</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>679</strong></td>
<td><strong>559</strong></td>
<td><strong>605</strong></td>
<td><strong>616</strong></td>
<td><strong>547</strong></td>
</tr>
</tbody>
</table>

During the time that this data was gathered, it was observed that:

1. Approximately 35% of the requests resulted in information from the Vault that the jacket could not be found. This was mainly due to the condition of the file area (misfiles and overflowing files).

2. Depending upon the area, between 35-50% of the intercom calls resulted in information from the Vault that the requested jacket was in the requesting area. This indicated that the requesting areas were devoting little, if any, time to search their own files before requests were made to the Vault.

3. The processing of x-rays from the Accident Room was a significant problem since there existed no co-ordination or control of these cases in combining the new x-rays with the master jackets for reporting by the radiologist.

4. An unknown peak load of accident cases existed on Monday.

5. Clinic lists represented the largest volume of jacket requests for the Vault (further discussion of the clinic lists will be presented in this section).
The routine of the Vault to handle this workload was as follows:

1. All private patient and C.M.S.C. lists were to be pulled by 8:30 A.M.
2. At 8:30 A.M., process the "new film" requests, accident cases and clinic lists (all clinic lists were to be pulled by 2:30 P.M.).
3. At 11:30 A.M. begin work on new masters, refile x-rays from brown loan-out jackets to master jackets and file all reports that were sent to the Vault to the master jackets. The fact that numerous reports had to be filed in the Vault was another indication that jackets were not retained in the Library with sufficient time to complete the new film process.
4. Between 4:30 P.M. and 5:00 P.M., OPD sent all of its master jackets, reports, etc., to the Vault, via pneumatic tube, to be sent to the Film Library for reporting and/or storage.

Staffing and Scheduling

As previously stated, high absenteeism created many problems of staffing and scheduling. Charts are contained in Appendix B that depict the absenteeism that existed in the Vault during the months of April and May. It is interesting to note that the absenteeism ranged from 20% (more personnel than was actually scheduled to work) to 60%. Prior to the appointment of the Administrative Clerical Supervisor, there was no written schedule that indicated the number of clerical personnel that was scheduled for a particular week for each area. During this period, nothing prevented a clerk from being absent during the week and working Saturday to maintain a 40 hour work week. It was also virtually impossible to find out whether or not the file clerk was in attendance Saturday.

Under the present system, the Vault was staffed by:

1 Clerk III (Supervisor)
3 Clerk II
5 Clerk I
The verbal schedule indicated that two clerks worked on Saturday from 8:30 A.M. to 5:00 P.M. with the option of a Tuesday, Wednesday, or Thursday off during the week to stay within the 40 hour week. As can be seen from the workload chart, Tuesday - Thursday proved to have the heaviest workload and Friday, which was omitted from the option, had the lightest workload.

Film Vault
Proposed System

Phase I
The Department of Radiology recognized the need for a complete overhaul of the Film Vault. New shelving, lighting, and painting preceded the implementation of the new filing system and procedures. (New layout of file area is located in Appendix C).

Filing Procedures
The problems of filing errors, conservation of filing space and duplication of information posting have been virtually eliminated by the introduction of a terminal digit color-coded filing system. This system is a method of dividing the entire file into 100 equal divisions according to the last two digits in the record number; thus, there will be a primary division for each pair of terminal digits from 00-99. Every master jacket to be filed will automatically fall into its own division according to this method. (For example, in the Jacket number, 354384, 84 is the primary division). Visual identification of the primary division is accomplished by color coding the next to last digit (8 in the example) by a colored jacket or band on the jacket edge and by covering one of the pre-printed numbers of 0-9 on the jacket edge by a white
tape (4 would be covered in the example number).

Within each primary division, the file is further divided by guide inserts which will group all jackets with the same middle or secondary digit (in the example, the jacket would be grouped with all jackets having the middle digit 43 within the primary division of 84). The jacket itself is also colored-coded to reflect the middle digit, thus, giving a further visual aide in spotting misinformation. The same coloring scheme used to color-code the terminal digit, (the color band of the jacket) is employed to color-code the middle digit. This was done to facilitate the learning process of the file clerk and to avoid confusion.

Thus, each primary division is sorted into 100 secondary divisions for a total of 10,000 sections in the file (100 primary divisions x 100 secondary divisions/primary divisions).

Finally, within each of these secondary divisions, the jackets are filed by numerical order of the digits preceding the secondary and primary digits (in the example, jacket number 354384 would be filed by the digit 35 and would be filed between jackets 344384 and 364384, if they existed.)

The year tape, pathology and autopsy indices have been retained in the proposed system but modified to fit the proposed color-coding scheme as necessary.

To successfully implement the conversion process of old master jackets, time values and procedures were formulated and a layout of the conversion workbench was drawn. This procedural guide was documented and used during the conversion process and is located in Appendix C of this report.

A flow chart of the proposed system is in Appendix A, and, as in the case of the present system, it is desirable to highlight some of the more important
phases of the system.

1. The use of a co-ordinator to distribute work to and from the Vault file clerks provides a control of the jacket request or master jacket while it is in a state of activity within the Vault.

2. The workload of the Vault has been divided among the proposed number of file clerks by assigning a group of terminal digits to each file clerk. Thus, further control is gained by the co-ordinator having the knowledge of which file clerk was responsible for the filing or retrieval of any jacket in the Vault.

3. By the use of the new forms for OPD appointments, "new film" and loan-out requests, the duplication of posting information has been eliminated.

4. The new filing system has eliminated the transferring of films to brown loan-out jackets. Thus, the refiling operation of the Vault has been significantly reduced.

Workload of Film Vault

The table given below depicts the revised workload of the Vault personnel, which is a result of avoiding duplication of requests and changing the flow patterns of requests so that the file area that has the highest probability of successfully retrieving that particular record is contacted initially. Thus, many of the "false starts" of contacting the wrong file area initially, which have occurred in the past, have been eliminated.
Day Shift Operation

<table>
<thead>
<tr>
<th>Area</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Film Library</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>C.M.S.C.</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>OPD</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Accident Cases</td>
<td>105</td>
<td>94</td>
<td>94</td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td>Clinic Lists</td>
<td>199</td>
<td>196</td>
<td>242</td>
<td>253</td>
<td>184</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>434</strong></td>
<td><strong>420</strong></td>
<td><strong>466</strong></td>
<td><strong>477</strong></td>
<td><strong>418</strong></td>
</tr>
</tbody>
</table>

As previously stated, the outpatient clinic request for loan-outs represents the largest volume of filing and retrieval to the Film Vault. Studies indicated that approximately 85-90% of the requested jackets are not used by the clinics. Jacket flaps were taped prior to delivering to the clinics and only 10-15% of the jackets returned with the tape seal broken.

The figures for the clinic lists given in the above table are approximate since additions were constantly being sent to the Department from the clinics, and it was impossible to record these additional requests 100% of the time.

As a result of this study and other analysis of the clinic list problem, procedures were formulated to:

1. Improve the service of the Department of Radiology in the loan-out phase of its operation.

2. Significantly reduce the number of loan-out requests, since the majority were never used.
By the use of the redesigned OPD appointment slip, it is hoped that the need of the x-ray jacket will be questioned each time when the patient is given his new appointment. Therefore, only a positive indication from the physician of the need for the patient's case material will result in the two-part requisition for the master jacket being sent to the Department of Radiology (this requisition is part of the new OPD appointment slip and eliminates the need of a clinic list of requests for x-rays).

To date, the use of the appointment slip has had no effect on the volume of requests from the clinics. During interviews with the staff from the Outpatient Department and the Department of Radiology, it had been stated that, rather than being selective, the physicians tend to order all x-ray master jackets of those patients to be seen in the particular clinics. It was stated that the reason for this procedure is that when there is doubt by the physician that he will need the x-rays, the physician feels that it is better to have them on hand and not use the x-rays, than it is to discover a need for the films and not be able to receive them in a reasonable length of time. This practice is self-defeating since the more master jackets that are ordered per clinic, the more time is required to expedite clinic requests.

It was also stated that the "no-show" rate in the clinics is very high (patients not keeping clinic appointments). It is agreed that this problem of "no-show" is a significant one, since knowledge of which patients will not keep their appointments, obviously, is not known when a clinic request is made to the Department of Radiology. However, this is not so significant that it indicates that nothing can be done to reduce the volume of requests.
During Phase I of the proposed system, attempts will be made to significantly reduce the volume of clinic requests and to provide a rapid pick-up and delivery system of x-rays to and from the inpatient, as well as the outpatient clinics either using the Messenger Service, clinic personnel, or personnel from the Department of Radiology. Phase IV, which will be discussed later in this report, is devoted to further improvement of the outpatient clinic request procedure.

The use of coordinators in the Vault and Library and the increasing of the length of stay of jackets in the Library's active file from 48 hours to a week, has reduced the volume of loan-out requests and redundant requests.

In summary, the basic approach of the proposed system in this area has been to eliminate, when possible, duplication of posting, unnecessary filing, retrieval and delays, and to evenly distribute the daily and weekly workloads of the Vault.

**A Proposed Conveyor System**

In the early stages of the study, the use of a conveyor system for the filing and retrieval operations of the Vault was investigated. The objective of the use of the conveyor was to minimize the amount of walking time of the clerical personnel in the Vault by:

1. Using the belt of the conveyor to transport loan-out, new film requests and x-ray jackets to and from the file area.

2. Having the entire file area divided among clerical staff of the Vault (division by a certain number of terminal digits/file clerk.)
Thus, all file requests or refiles would be channeled to the specific file area by the co-ordinator of the Vault.

The analysis indicated that the proposed conveyor system would provide a faster filing and retrieval operation than an operation that required file clerks to walk to and from a "central" location to pick up requests for x-ray jackets and to place the requested jackets.

Obviously, the conveyor system approaches the level of being an advantageous system as the volume of requests for x-ray jackets from the Vault increases. Thus, as the demand increases, the gap widens between the staff using a proposed conveyor system and the staff using a system that requires walking to and from the file area. The cost of the conveyor system can be rapidly retrieved by reduction in clerical staff. However, when this system was tied-up with other recommendations of the study, it soon became apparent that the volume of requests that involved filing and retrieval operations in the Vault would be significantly reduced with successful implementation.

Since the volume of the requests to the Vault would be restricted to "new film" requests and a reduced loan-out volume, the difference in man-time to process the requests and refiles with and without the conveyor became insignificant and the cost and space requirement of the conveyor system became prohibitive.

**Staffing and Scheduling**

With a firm base of workload and filing procedures established, time studies and work sampling of the Vault's activity were conducted to convert the workload into required staffing. The basic objective was to create a Vault Staff that had a supervisor whose main task was supervision and training,
a position that established co-ordination and control of the Vault activities and an adequate number of positions for the filing and retrieval procedures.

The following table shows the present and proposed Vault staff.

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Present</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clerk III</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Clerical Supervisor</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Co-ordinator (Clerk II)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>File Clerk (Clerk I)</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>File Clerk (Clerk II)</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

The proposed number of file clerks was based on the time requirements for the Vault's filing and retrieval procedures and were established from the studies mentioned above. As a result of these time requirements, the Vault's terminal digit file will be divided into four equal parts; one section of the file for each file clerk. Thus, each request made to the Vault can be easily traced by the co-ordinator or supervisor to the responsible file clerk. This eliminates the ineffectiveness of control, training and supervision that was apparent in the present system.

The following are job routines for each position of the proposed Vault staff:
Job Description
Of
Clerical Supervisor Of The Vault (Day Shift)

Reports to: Administrative Clerical Supervisor of Radiology
Supervises: Vault File Clerks and Vault Co-ordinator

Basic Function

Responsible for expediting all requests for master jackets made to the Film Vault through adequate training and supervision of subordinates.
(l Vault Co-ordinator and 4 File Clerks)

Primary Responsibilities

1. Overall responsibility of distributing workload of clinic requests, accident and new film cases, and physician loans to Vault file clerks via the Vault co-ordinator.


3. Co-ordinates Vault activity as it applies to requesting area by supplying jackets or accurate information pertaining to jackets to the requesting area via the co-ordinator.

4. Trains file clerks in the filing and retrieval systems of the Film Vault.

5. Informs Administrative Clerical Supervisor of problems affecting the performance of the Vault; such as, lateness of clinic lists, personnel problems of lateness, absenteeism, inefficiency, and inadequate performance of other clerical areas within the Department of Radiology.

6. Be aware of daily workload and time schedules of the Vault and adjust the assignments of the Vault Staff when necessary to meet this service demand.
Job Routine
of
Vault Co-ordinator

Reports to: Clerical Supervisor of Vault

General Duties: Maintains co-ordination and control of input and output of Vault file clerks.

Specific Duties

1. Master Jacket Requests.
   All master jacket requests will be assigned to one of the four file clerks for retrieval by placing the request to one of the four input sections of the co-ordinator's file (see following page for a sketch of the proposed file). Periodic review of length of time taken by file clerk to retrieve jacket or information will occur via Film Library co-ordinator or by posting on the request the time that the request was placed in file. All consistent inefficiencies and problems will be conveyed to the Vault supervisor.
   As requested master jackets or information are placed in the output section, they are checked and promptly sent to the requesting area. All new master jackets will be examined for accuracy.

2. Jackets to be filed.
   As in the case of jacket requests, master jackets delivered to the Vault for filing will be placed in one of the four jacket input sections of the co-ordinator's file.

3. Clinic Requests.
   In addition to the receiving and checking function, the clinic requests will be grouped by clinic by the co-ordinator for distribution to the clinic.
Job Routine of
Vault Co-ordinator, Cont.

4. Maintains close communication with the supervisor of the Vault for performance evaluation of the file clerks, reassignment of the file clerks when necessary, and problems caused by the requesting area when it affects the Vault's service.

Note: See following page for sketch of Vault co-ordinator's file used for distribution of work to the file clerks.
VAULT CO-ORDINATOR'S FILE

TERMINAL DIGITS
00-00-00-24
00-00-00-50
00-00-00-99

JACKET REQUESTS

MASTER JACKETS

CLERK I

CLERK II

CLERK III

CLERK IV

INPUT (MATERIAL TO BE TAKEN TO FILES)

OUTPUT (MATERIAL FROM FILES)

THIS FILE WILL BE LOCATED WITHIN CLOSE ACCESS OF DUMBWAITERS AND PNEUMATIC TUBES SO THAT THE COORDINATOR CAN CONTROL INPUT AND OUTPUT OF THE VAULT WITH A MINIMUM AMOUNT OF WALK TIME.
Job Routine
Of
Vault File Clerk

Reports to: Clerical Supervisor of Vault

General Duties: Responsible for all filing and retrieval operations of assigned file area. Works closely with Vault co-ordinator in receiving requests for case material or material to be filed and in delivering all requested master jackets or information pertaining to requests.

Specific Duties

Accident Cases or New Film Requests.

1. Receive 2-part request from assigned input section of co-ordinator's file.

2. Walk to assigned file area and pull master jacket from file and attach copy of request to the jacket.

3. Place original copy of request to an out-guide and file in place of master jacket, and deliver jacket to output section of the co-ordinator's file.

4. If an out-guide is in the file, copy information on the new request as to the individual or clinic that possesses the jacket on loan, attach request to report envelope and deliver jacket to the output section of the co-ordinator's file.

5. If there is no out-guide and no master jacket, prepare a new master jacket, attach the copy of the request to the jacket and complete step 3.
Clinic or Individual Loan-outs.

1. Receive 2-part request from assigned input section of co-ordinator's file.

2. Walk to assigned file area and pull master jacket from file and attach copy of request to the jacket.

3. Place original copy of the request with the report envelope in an out-guide and file out-guide in place of master jacket. Deliver jacket to the output section of the co-ordinator's file. (Note: in the case of a loan-out request that will be seen in the Department, leave the report envelope in the master jacket).

4. If there is no record or an out-guide is in the file, copy this information on the request and deliver to the output section of the co-ordinator's file.

Refiles.

1. Receive jackets to be filed from assigned input section of the co-ordinator's file.

2. Walk to assigned area and remove out-guide from file.

3. In the case of loan-outs, replace report envelope into the master jacket and file the master jacket.

4. Remove the request copy from the out-guide and return to co-ordinator.
Film Library
Present

The Film Library is the main service area of the Department of Radiology. The two principal services provided by the Film Library are the processing of "new films" and the loaning of x-rays to outside physicians and clinics.

As in the case of the Film Vault, the details of the Film Library procedures are shown on the flow chart in Appendix A; however, some of the disadvantages of the present Film Library system are pointed out in this section:

1. There was a total lack of control or follow-up of the activities of the Library file clerks. The person in charge of the Film Library knew little, if anything, of the adequacy or ability of the Film Library staff.

2. There existed no measurement of the workload or output of the Library staff.

3. There were no specific areas or assignments within the Library established for each file clerk. This caused duplication of effort in sending and receiving information and master jackets and, coupled with the lack of co-ordination of the Library staff internally as well as externally (contact with other clerical sections of Radiology) resulted in mass confusion.

4. As indicated in the Vault section of this report, the current file in the Library did not retain active master jackets a sufficient length of time. This not only caused unnecessary filing and retrieval time in the Vault, but also resulted in redundant requests to the Vault, and caused an avoidable delay in service time at the loan-out window.
5. It is apparent from the statements above, that there existed no formal training procedures or job routines for the Library staff.

6. The workload of the dispatcher position of logging and charging inpatient requisitions did not warrant a full-time file clerk.

7. The Library was in need of a good housecleaning of accumulated reports, x-rays and files, and an elimination of unnecessary "storage" areas that allowed personnel to hold something out of circulation which was usually left without anyone's knowledge. There were numerous occasions when this "stored" record was being searched for in the Library and Vault.

8. Since no measurement of workload existed, many times, the Library functioned as a go-between for the Vault and requesting clinics, merely because there was no knowledge as to where the bulk of loan-out jackets were to be found.

   An analysis revealed that the bulk of most clinic requests were eventually found in the Vault and, hence the present flow pattern of

   Clinic → Library → Vault → Library → Clinic

   was contrary to what it should be. Hence, a clinic loan-out station was set up that dealt directly with receiving and sending of clinic requests and master jackets. This significantly reduced the Library's activity in clinic requests. The flow pattern is now from

   Clinic → Vault → Library → Vault → Clinic.

9. Films were being counted prior to loaning them out at the window station in the Film Library, however, they were not counted upon their return.

**Present Workload of the Film Library**

As in the case of the Vault, the volume of the workload of the Library needed documentation. The table below lists the average number of new film cases,
loan-outs at the window, and accident cases that are processed daily. In addition to this workload is the filing of typed reports to master jackets and the servicing of clinic lists at the loan-out window.

<table>
<thead>
<tr>
<th>Day Shift Operation</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Loans (window)</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Accident cases</td>
<td>211</td>
<td>94</td>
<td>94</td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td>New Film cases</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
</tr>
</tbody>
</table>

The data above concerning loans was gathered in the months of September and October, 1967 and reflects the implementation of some procedures in the Library and Vault; however, this implementation should not affect the number of individual loans that are made at the loan-out window. Many of the statements concerning the workload of the Vault pertain to the Library's workload as well, since the two functions are integrated:

1. An unknown peak load of accident cases existed on Monday which affected the Library's function.
2. The processing of accident cases existed with very little control and co-ordination with the Vault.

**Staffing and Scheduling**

Appendix B shows the absentee rate of the Library during two distinct periods. The latter period (August through October) indicates a marked improvement in the absentee rate. This is attributed to the documentation and adherence to schedules made up by the Administrative Clerical Supervisor of the
Department of Radiology.

Under the present system, the Library was staffed by:

1 Clerk III (Supervisor)
3 Clerk II
3 Clerk I

By the use of a verbal schedule, the Library was covered on Saturdays and Sundays, as was the Film Vault, with the option of a Wednesday or Thursday off, to maintain a 40 hour work week. (A detailed discussion of the entire weekend and evening coverage for the clerical division of the Department of Radiology will be presented later in this report.)

Film Library
Proposed System

Phase I

Appendix A contains the flow chart of the proposed system which closes many of the gaps that existed in the present system. In addition, many of the disadvantages of the present system of the Film Library cited in the previous section, have been overcome by:

1. Cleaning of the Film Library of accumulated reports, x-rays and files, and eliminating the unnecessary storage areas that allowed personnel to inadvertently lose case material.

2. Initiating control of the request made to the Film Vault by a Library co-ordinator.

3. Using written schedules for maintaining proper evening and weekend coverage.
4. Increasing the length of stay of jackets in the current file from 48 hours to a week.

5. Outlining specific job routine for each Library file clerk.

6. Deleting the clinic request function from the Library's responsibility and assigning it to the Vault operation (a vast majority of the jackets needed for clinic requests, will be found in the Vault).

7. Eliminating the counting of x-rays prior to loan-outs since it serves no useful purpose.

Proposed Workload

During Phase I, an attempt was made to avoid duplication of requests to the Film Vault by controlling all requests by a Vault co-ordinator. Also, the bulk of the clinic lists are presently being processed by the Vault. With successful implementation of the viewing conference and the computer and/or microfilming operations (Phases II, III and IV) which will be discussed later in this report, it is hoped that a significant reduction of individual loan-out requests will be realized. The peak load of accident cases on Mondays has been reduced by a more effective control of x-rays taken in the Emergency Room.

Staffing and Scheduling

As in the Vault, the Library's activities were studied and, using work sampling and time study techniques, the following proposed staff was formulated.
<table>
<thead>
<tr>
<th>Job Title</th>
<th>Present</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clerk III (Supervisor)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Clerical Supervisor</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Library Co-ordinator</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Clerk I</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Clerk II</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

The above proposed staff provides adequate coverage of the Library activity headed by a supervisor completely removed from the daily routines.

The following are job routines for each position of the proposed Film Library Staff.
Job Description of

Clerical Supervisor of the Film Library (Day Shift)

Reports to: Administrative Clerical Supervisor of Radiology
Supervises Library file clerks and co-ordinator

Basic Function

Responsible for expediting new film process, loan-outs occurring at the loan-out desk and co-ordination of the clerical function and the procedures and requests of radiologists and physicians.

Primary Responsibilities

1. Overall responsibility of distributing workload of the Film Library to Library personnel via the Library co-ordinator.
3. Trains file clerks in the filing and retrieval procedures of the Film Library.
4. Informs the Administrative Clerical Supervisor of problems affecting the performance level of the Film Library.
Job Routine

Of

Film Library Co-ordinator

Reports to: Clerical Supervisor of Film Library

General Duties: Maintains co-ordination and control of input and output of Film Library file clerks.

Specific Duties

1. Charge all incoming requisitions for inpatients.

2. Log all incoming requisitions and requests for jackets.

3. Contact via phone clinics and individuals that have in their possession jackets needed for new film processing and further loan-outs.

4. Alert Vault of "on-call-status" of jackets.

5. Post to log all history numbers requiring a Vault search (time down, file clerk's name, time up, comments (where is jacket), area to contact, on-call-status, final disposition made (check or initial).

6. Maintain close communication with Vault Supervisor or Vault Dispatcher for searches that have been unusually long and/or with no results.

7. Maintain close communication on performance levels of Library file clerks with supervisor and clerks.

8. Screen and dispatch all jackets and information made to and from the Vault, and all jackets coming "over the counter" in the Library.

9. Handle mail outs.
Job Routine of
Film Library Co-ordinator, Cont.

10. Investigation of "double masters" with necessary contacting of Medical Records.

11. Co-ordinate Library operation of the day shift with the night shift supervisor so that unprocessed work is completed before the next day.
Job Routine
Of
Library File Clerk
(Loan-out Window Position)

Reports to: Clerical Supervisor of Film Library

General Duties: Expedites all requests for master jackets made at the loan-out window. Provides additional coverage of new film processor when loan-out operation is slack.

Specific Duties:

1. Have borrower fill out loan request.
2. Search for jacket in current files.
3. Initiate a Vault search when necessary.
4. Maintain a file of all jackets being seen within the Department until returned.
5. Provide additional coverage for new film processor during slack periods.
Job Routine

Of

Library File Clerk
(X-omat Position)

Reports to: Clerical Supervisor of Film Library

General Duties: Controls the merging of new film from x-omat and the requisitions and providing a liaison between the Library function and the radiologists' function.

Specific Duties:

1. Receive requisitions for new film from co-ordinator.
2. Attach requisitions to the proper new films.
3. Place films to view boxes for censor's approval.
4. File censor approved films with requisition to the proper terminal digit processing file to await master jacket.
Job Routine

Of
Library File Clerk
(New Film Processor)

Reports to: Clerical Supervisor of the Film Library

General Duties: Searches in the Library for master jackets needed for patients that have had new films and combines requisition, new films and master jacket and file to proper reading room file. Handles loan-out window function when necessary.

Specific Duties:

1. Receive new film request from Library co-ordinator.
2. Searches current files for master jacket.
3. If not found in current files, expedite a Vault search through the Library co-ordinator.
4. Combine jacket, new film, and requisition to the appropriate reading room file, filed by terminal digit.
5. Provide additional coverage to loan-out window function as needed.
Job Routine
Of
"Float" File Clerk

Reports to: Clerical Supervisor of Film Library

General Duties: Must be knowledgeable of the specific job routines of all non-supervisory positions in the Library, as well as the Vault, to enable the supervisor to have double coverage of any position during peak workload hours. This position will also be used to cover absenteeism and vacation in the Vault and Library, in the event that the relief file clerk is not available.
C.M.S.C. Operation

Present and Proposed Systems

The C.M.S.C. operation is a satellite file and library area which processes the bulk of the new film and loan-outs of pediatric case material.

On March 1, 1967, the C.M.S.C. section of the Department of Radiology initiated a satellite file of active pediatric master jackets. Due to the space limitations of the area, only 4-6 months of jackets are retained. This file has reduced the volume of active pediatric case material which traveled between the Vault and C.M.S.C. sections.

During the analysis of the clerical division of Radiology, little time was spent in the studying of the C.M.S.C. operation. Only those clerical functions that affected the Film Library and Vault were changed.

1. The new master jackets and associated procedures were changed to conform with the Vault and Library.

2. A new purge technique was implemented which allows the C.M.S.C. file to be reduced by pulling the oldest cases in the file on a daily basis as opposed to the monthly purge which caused problems of too many refilles for the Vault during a short time span. With the implementation of the new purging system, an even workload is received from C.M.S.C. to the Vault. Basically the system allows for five terminal digits of the oldest records to be pulled daily and send to the Vault for refile. The system has an established color scheme denoting the month of the last exam for that master jacket. Due to the fact that the master jackets are filed by terminal digit, the purging technique allows the latest case material to be filed.
without shifting the files. Any case presently in the C.M.S.C file that has a new exam, will be updated by a piece of tape on the master jacket denoting the month of the latest exam. (Note: Points 1 and 2 are presently in a partial state of completion)

3. The services of the C.M.S.C. operation have been expanded and thus, requires additional clerical assistance. However, the proposed clerical expansion affects the weekend and evening coverage of that area and will be discussed in a later section of this report.

In addition to two dictaphone operators I and receptionist, the C.M.S.C. operation is presently staffed by 1 Clerk III, 2 Clerk I to cover the Monday through Friday clerical operation of the new film process and loan-outs. With the creation of the 4 to 6 months file, many of the clinic requests and individual loan-outs are now being processed in C.M.S.C. in lieu of the Vault. Since there was a limited investigation of this area, it is recommended that the workload of C.M.S.C. and the adequacy or inadequacy of the day shift staff be evaluated.
The Evening and Weekend
Clerical Coverage
Present System

The previous sections of this report dealt with a description of the present and proposed systems of the Film Vault, the Film Library, and the C.M.S.C. Monday through Friday day shift operations. These areas are also covered in the evening hours and on weekends. The primary purpose of this coverage is to:

1. Provide an extension of the loan-out service for the evening hours and the weekends.
2. Provide a "clean-up" operation of those clerical tasks to be completed by the next day. This is a variable workload, since it is dependent on the volume of new film processing and loan-out requests that the day shift left in an incomplete state.
3. Provide a shift to complete the G.O.R., Central, and OPD requests which were needed for the next day's activities.

This operation is presently staffed by the following personnel:

1 Clerk III (Supervisor)
1 Clerk II
6 part-time Clerk I
(total of 120 hours per week)

Additional coverage of the day shift staff with a half day or day off during the week as previously mentioned.

The primary problem that existed with this coverage was the lack of control of feedback on the effectiveness and output of this crew. The Clerk III,
charged with this supervisory responsibility of this operation, was so caught up in the every day job routines, that little, if any time, could be given to control the operation. Also, the lack of co-ordination with the day shift crews caused the night shift operation to be quite ineffective in the "clean-up" operation that they were expected to perform. As in the case of the aforementioned clerical sections there existed no documentation of the workload, procedures, and personnel schedules for the weekend and evening coverage. In addition, the absentee rate was a significant problem (see Appendix B).

The Evening and Weekend
Clerical Coverage

Proposed System

Phase I

The primary objectives in the analysis of night shift and weekend coverage was to:

1. Provide adequate supervision of the night shift operation.
2. Delete weekend coverage from the day shift personnel. (The day shift proposed staffing does not allow for a half day or day off during the Monday through Friday operation.)
3. Provide sufficient coverage during the Monday through Friday operation for the expansion of the C.M.S.C. operation and the new viewing conference that was initiated in October, 1967 (discussed in Phase II).
4. Set up a daily contact scheme for the night shift supervisor with the supervisors of C.M.S.C., the Film Vault, and the Film Library.
5. Provide feedback to the Administrative Clerical Supervisor of the Department of Radiology as to the workload of the evening crew.

Due to the variation of the workload and the effects of implementation
it may be possible to reduce the proposed evening coverage in the Film Vault and Library at a future date.

Workload

The C.M.S.C., Film Vault, and Library evening and weekend coverage is charged with the responsibility of

1. the completion of the G.O.R. list,
2. completion of the Central and O.P.D. new film requests,
3. processing accident cases,
4. providing evening and weekend coverage of the loan-out operation,
5. providing coverage of the viewing conferences,
6. maintaining and processing the active files in the Library and C.M.S.C., and completing the refile routines of the Vault as needed.

Staffing and Scheduling

The following table depicts the proposed coverage of the C.M.S.C., and Central evening and weekend operations. It should be noted that the indicated part-time coverage can be filled by any number of personnel. This is strictly dependent on the availability of the part-time file clerks.

<table>
<thead>
<tr>
<th>Schedule of Weekend and Evening Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor 2:30-11:00</td>
</tr>
<tr>
<td>Clerk II 1:30-10:00</td>
</tr>
<tr>
<td>(Part-time coverage) 5:00-9:00</td>
</tr>
<tr>
<td>Vault and Library 5:00-9:00</td>
</tr>
<tr>
<td>C.M.S.C 5:00-11:00</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>2:30-11:00</td>
</tr>
<tr>
<td>1:30-10:00</td>
</tr>
<tr>
<td>5:00-9:00</td>
</tr>
<tr>
<td>5:00-9:00</td>
</tr>
<tr>
<td>5:00-11:00</td>
</tr>
</tbody>
</table>
This proposed schedule provides 24 man-hours of clerical time per evening in the Film Vault - Library area and 6 man-hours per evening in the C.M.S.C. section, in addition to the 8 hours of supervisory coverage.

The coverage for weekends is as follows:

<table>
<thead>
<tr>
<th></th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vault</td>
<td>9 Hrs.</td>
<td>-</td>
</tr>
<tr>
<td>Library</td>
<td>13 Hrs.</td>
<td>-</td>
</tr>
<tr>
<td>Vault + Library</td>
<td>-</td>
<td>11 Hrs.</td>
</tr>
<tr>
<td>C.M.S.C.</td>
<td>8 Hrs.</td>
<td>8 Hrs.</td>
</tr>
</tbody>
</table>

It is well to point out that, in the future, further thought be given to supervisory coverage of the weekend operation. This could be accomplished by having the Clerk II and Evening Supervisor alternate for Saturday or Sunday coverage. This can only be realized if:

1. The Clerk II position is filled by a person capable of supervision.
2. A thorough analysis is conducted of which evening affords the opportunity to be without the supervisor and Clerk II.

The following job routines are presented in an attempt to define the responsibilities and procedures of the evening and weekend coverage.
Job Description
Evening Supervisor

Reports to: Administrative Clerical Supervisor of Radiology

Supervises: Film Vault, Library, C.M.S.C. at night

Basic Function: Responsible for expediting all requests for master jackets that have not been found during day through proper supervision and training of personnel. Responsible for providing clerical coverage needed to expedite the viewing conferences.

Primary Responsibilities:

1. Expedite G.O.R. list through doctor contact and search.
2. Accident cases.
3. Room lists.
4. Maintain close communication with C.M.S.C. supervisor for C.M.S.C. workload at night.
5. Maintain close communication with Vault and Library supervisors to tie in day and night operations for a close continuous operation.
6. Training and supervision of personnel.
7. Have knowledge of retrieval and filing systems.
Job Routine

Of

Evening File Clerk

(Viewing Conference Co-ordinator)

Reports to: Night Shift Supervisor

General Duties: Responsible for the set-up and clerical assistance necessary for inpatient viewing conferences.

Specific duties:

1. Log all films to be seen at the viewing conference.
2. Set up all films on viewers by floors of building.
3. Provide necessary assistance to viewing conferees as to the location of films that they wish to see.
4. After viewing conference, provide assistance in expediting night shift operation.
Job Routine
Of
Part-time Positions
In
Film Vault, Library and C.M.S.C.
(Evening and Weekend coverage)

Report to: Night Shift Clerical Supervisor

Monday through Friday nights

1. Complete any work left in the process file by the day shift.
2. Maintain coverage of loan-out window as described in day shift operation.
3. Complete the G.O.R. list, Central's Room list, and OPD Room list by searching Library and Vault files as described in routines for day shift.

Weekend Coverage

In addition to above, process accident cases by charging and finding appropriate jackets.
The OPD Operation
Present and Proposed Systems

The OPD section is a satellite Library area which is responsible for the clerical processes of the new film work and review of OPD case material. This area is staffed by the following complement of personnel:

1 Receptionist
1 Clerk III
1 Clerk I
1 Dictaphone Operator I

Studies conducted of the clerical procedures of the OPD section of the Department of Radiology indicated that the OPD workload did not warrant 2 file clerks for the Library operations. In addition, the receptionist and dictaphone operator did not have the opportunity to complete the required daily volume of report typing. Studies indicated that due to the physical layout of the area, the receptionist and dictaphone operator were acting in a capacity of receptionists. With a revised layout of the area, it is felt that the combined duties of the two receptionists could easily be handled by one position.

Reorganization of this section is difficult to accomplish since plans are being made to shift an additional workload to the OPD operation. However, if the operations as defined during the study remained constant, a receptionist and file clerk plus an availability for report typing would be adequate staffing for this area. The attainment of the proposed staff is strictly dependent on the successful implementation of a rapid co-ordination system whereby OPD personnel are not required to repeatedly send new film requests to the Vault.
Proposed System

Phase II - The Viewing Conference

Through the efforts of Dr. Russell H. Morgan, Dr. Martin W. Donner, and Dr. Stanley I. Margulies, a viewing conference was initiated in October 1967. This review provides a service to House Staff and Residents of viewing the latest inpatient films generated in the past 24 hours. Clerically, this conference had been staffed by a Clerk II and a part-time clerk to prepare for and aid during the conference. This conference presently is for the films generated for the Osler, Halsted, and Marburg inpatients, but the apparent success of the need for such a service results in a prediction that these conferences will be expanded. The conferences provides many advantages to the Department of Radiology from a professional as well as clerical aspect:

1. With the presence of a staff radiologist, the reporting phase of the films the following day is far easier since the films are discussed during the viewing conference with the radiologists and residents from the department responsible for the reporting phase present, as well as the House Staff and Residents.

2. It is hoped that the availability of the films with the discussion during these conferences provide the opportunity to decrease the volume of individual loan-outs, presently occurring at the loan-out window, thus reducing the workload with an obvious reduction of clerical man-time necessary for this function.

3. More important, is that this conference provides a unique approach of a Radiology and House Staff merging that discusses case material. It is apparent that this communication provides an opportunity for the interpretation that no report could hope to obtain.
It is too early to predict the clerical man-time reduction which will eventually be realized as a result of these reviews; however, the volume of the individual loan-outs will be monitored to reach a conclusion of the decrease in workload of the Film Library and Film Vault as a result of these conferences.

**Proposed System**

**Phase III - The Generation of an X-ray Report**

In the early stages of the study, it became obvious that the dictaphone operation of the Department of Radiology was in need of improvement. In addition to the central dictaphone operator pool, which is staffed by 1 dictaphone operator II and 3 dictaphone operator I; there are numerous dictaphone operator positions throughout the various sections of the Department, some of which were beyond the scope of this study.

An evaluation of the amount of work generated and the tie-in of the dictaphone operation and the sections of the Department revealed that the present system had many disadvantages:

1. The lag time is 3 man-days from the time that the report is dictated to the distribution of the typed report.

2. Under the present system, the report, although typed, would remain in the dictaphone operator's file until the proofreading and correction by the radiologist and retyping was completed.

3. The output of the central pool of 4 dictaphone operators was low (efficiency ranged from 60 to 85%).

4. The "incentive system" for dictaphone operators was ineffective due to the fact that the operator at the time of evaluation,
was alerted that a monitoring count was to take place. With the knowledge of a future count, this period was obviously one of significant increase in output over her normal volume. The incentive system did not provide for a monitoring system without the operator's knowledge.

5. With the delay of report distribution that exists with the present system not only are reports held from the medical record and physician or clinic, but the radiology case material for that patient is in an incomplete state during this time. The lack of interpretation with the film for this period has been alleviated somewhat by the viewing conference; however, it is obvious that the viewing conferences, no matter how much they are expanded, do not provide an adequate substitute for an accurate, rapid reporting system.

The use of a flexo-writer or magnetic tape typing system to provide a more rapid, accurate system for typing the average "normal" cases (estimate of 27,500 diagnostic chest exams per year) was investigated and eventually dropped in lieu of a reporting system via computer.

Dr. Morgan and others have developed a reporting system that follows the following flow:

1. When the reporting function is to begin, the new film and patient case material merges as in the present system along with a "header card" which contains statistical information of the patient generated from the requisition.

2. With the use of a 10 x 10 matrix keyboard and a lexicon of the coded system, the radiologist is able to interpret the films and key-in the coded interpretation.
3. This information is sent to the computer to be translated and sent back via the printer for editing by the radiologist.

4. If the information is incorrect, the process (2. and 3.) is repeated; when the report is correct after editing and repeating the process for the corrections, the correct report is transmitted to the computer for the generation of a 3-part report (physician, medical record copy, and the master jacket copy) and the update of a taped file in the computer.

5. At this point, the new film, master jacket, and the report is ready for the next process.

The two obvious advantages of this system are:

1. The delay time, from the interpretation to a final report ready for distribution, is significantly cut from an average of 3 day delay to a maximum of 24 hours after the x-rays were taken.

2. In addition, this process, when proven successful and implemented in the OPD, C.M.S.C., and central sections of the diagnostic division, will reduce 6 dictaphone operator positions (1 Dictaphone Operator II, 3 Dictaphone Operator I from the Central Pool, and 2 Dictaphone Operator I positions from C.M.S.C.) at an estimated savings of $25,000 per year. Presently, Dr. Morgan has estimated that approximately 10% of the diagnostic exams may not fit the coded reporting system and an additional report of that exam may be needed; however, an initial report will be given with a notation of more information to follow. The absorption of this 10% can be easily accomplished by the present dictation system and typing by the remaining secretarial and dictaphone operator personnel.
The experimentation of Phase III will begin in the OPD section under the direction of Dr. Russell H. Morgan in November 1967.

**Proposed System**

**Phase IV - The Design of a Microfilm and/or ADP System for Clerical Process and Control**

Phases I - III of the proposed system have dealt mainly with the problem of expediting the professional and clerical services of the Department of Radiology; however, there is a need to explore the possibilities of providing a rigid control of a retrieval system from those areas provided with patients' case material. Without the prompt return or control of master jackets, the update of the patients case material is delayed and other areas that request that same case material are denied access to this information. Presently, there is an exploration of two possibilities to provide this needed control:

1. The possibility of microfilming the x-ray and report after interpretation and a merging with the medical record to provide a unit record with x-rays, is being investigated by Mr. Melvin Covig, Director of Medical Record Services and Dr. Russell H. Morgan. To date, the problem has been to find a film or process that is capable of providing both the contrast range needed for the duplication of x-rays and the capability of being copied and distributed on demand. If successful, the microfilming process will have a profound effect on the clerical division's workload since it will significantly reduce, if not eliminate, the entire loan-out process.

2. An ADP System is currently in the design stages that will eventually provide an inventory of the case material contained in the Department of Radiology, what exams are contained in the master jackets, and in
what section of the Radiology Department these jackets are filed.

It is strongly recommended that:

1. A thorough knowledge of the manual system be completed prior to any design of an ADP System.

2. The economic or service improvement of this system be explored in depth.

3. If this system is implemented in lieu of a microfilm system, it must provide for adequate control of the loan-out process (individual and clinics).
Conclusion

It is obvious from this report that progressive strides have been accomplished by the Department of Radiology during the analysis and implementation stages of this study.

Although many of the clerical inefficiencies of the Department have been eliminated and the service of the Department has improved, there remains further work in the Department from a clerical as well as a professional and technical approach. However, through the capable leadership of Dr. Russell H. Morgan and the various aptitudes of the members of the Operations Committee for the Department of Radiology, there is little doubt that further improvements in service and the efficient use of manpower will be realized.
APPENDIX A

PRESENT AND PROPOSED FLOW CHARTS
-OUT AND REFILE PROCEDURE

PRESENT SYSTEM

FILM LIBRARY

FILM VAULT

BRONN LOANOUTS AND MASTERS RECEIVED

FILE MASTER ENVELOPES AND PULL ENTRIES

IS MASTER IN FILE?

NO

YES

PULL MASTER FROM FILE

PLACE IN RED STRIPE AND SEND TO LIBRARY

FIND MASTER CURRENT OR PROCESSING FILES

RECORD DATE AND PLACE FILMS TO MASTER

UPDATE INFORMATION ON MASTER AND ISSUE JACKET AND REFILE

RE-FILE MASTER JACKET

IDENTIFY LIBRARY OF THIS FACT
PROPOSED FLOW OF NEW FILM CASES (CTD)

SHEET 2 OF 2

OUT-GUIDE - NO REPORTS

1. STATE ON REG. LOANER (NEW FILM OR DEPT. LOAN) → SEND REQ. TO VAULT COORDINATOR & JACKET STATUS → MASTERCHECK, INFORMS LIB. COORD., ASK FOR STATUS AND RETURNS REQ. → LIBRARY COORD. INFORMS LIBRARY TO RETURN JACKET ON INFORMATION CLOCK TO SEARCH FILES AGAIN → LIBRARY COORD. ALERTS LOAN-OUT DESK → WHEN JACKET IS RETURNED, INDICATE ON LOG.

OUT-GUIDE & REPORTS

2. FILL REPORTS AND TRANSFER INFORMATION OF LOANER TO REQUEST → SEND REPORTS AND REQUEST TO VAULT COORDINATOR → MASTERCHECK, INFORMS LIBRARY COORD., ASK FOR JACKET → LIBRARY COORD., INFORMS LIBRARY TO RETURN JACKET → LIBRARY COORD., ALERTS LOAN-OUT DESK → WHEN JACKET IS RETURNED, INDICATE ON LOG.

NO OUT-GUIDE

3. CHECK INDICATOR NO RECORD FOR REQUESITION → MAINTAIN SEARCH P. OR MAKE NEW REQUESITION → SEND REQ. AND OUT-GUIDE TO BE FILED IN LIBRARY → ATTACH COPY OF REQ. TO MASTER AND SEND TO FILM LIBRARY → LIBRARY COORD. INDICATES DISPOSITION ON LOG. → REMOVE OUT-GUIDE

4. JACKET IS PLACED IN IN-PROCESS FILE AND REQ. AND OUT-GUIDE TO ACTIVE FILE → WHEN M.F. APPROVED, MASTERCHECK, AND STAFF CARD COMBINED → JACKET ACQUIRED. INFORMS FILE AND SEND TO SEPARATE TEAM OR HPS FOR VIEWING CONFERENCE → RADIOLOGIST NOTS IN HPS, RADIOLOGY IS CONFIRMED OR READER AND IS APPROVED → 3 M.F. REPORT (QUALIFIED & PROFESSIONAL) COMBINED, PAGES TO PHYSICIAN

COMPUTER FILE

JACKET TO VAULT

JACKET TO LIBRARY ACTIVE FILE

JACKET TO ARCHIVAL FILM

ARCHIVAL LOCATION OF MICRO-FILMING
**PROPOSED FLOW OF INDIVIDUAL LOAN OUTS**

1. **JACKET IN VAULT**
   - Pull jacket
   - Assign group of slips to librarian
   - Is jacket in active file?
     - Yes: Indicate, store, and inform coordinator if necessary
     - No: Is an outguide in file?
       - Yes: Indicate what search needed on log and send
       - No: Vault coord. sends requisition
         - Yes: Is jacket in file?
           - Yes: Vault coord. sends requisition
           - No: Vault coord. sends requisition
         - No: Vault coord. sends requisition
2. **JACKET NOT IN FILE**
   - Indicate no record on log
   - Send to vault coord. (now residence search)
     - Yes: Location of jacket and send to library coord.
     - No: Library coord. alerts to location and sends requisition requiring party to loan-out slip

**PROPOSED FLOW OF CLINIC LOAN-OUTS**

This flow is the reverse of the individual loan-outs, since the majority of the clinic requests will be found in the vault. The loan-out process first and if an outguide is found with NF indicated on the loan-out slip, the requisition is sent to the library. The internal processing of vault and library is exactly the same as shown on the chart.
APPENDIX B

ABSENTEE ANALYSIS OF VAULT AND LIBRARY PERSONNEL

Pages B5 - B7  Period 8/27/67 - 10/1/67
Scheduled vs. Actual Hours
Worked in the Film Library
(Night Shift)

Hours Scheduled
Hours Worked

Note: Shaded Area Is
Hours of Absenteeism
Scheduled vs. Actual Hours
Worked in the Film Vault
(Night Shift)

Hours Scheduled

Hours Worked

Note: Shaded area is hours of absenteeism.
APPENDIX C

GUIDE FOR MASTER JACKET CONVERSION

AND

NEW LAYOUT OF THE FILM VAULT (PAGE C5)
Conversion to New Master Jackets

The conversion of old master jackets to the new color-coded jackets will require three groups of personnel to execute the conversion with an efficient production-like set-up:

1. The Sorting Operation (2 positions)
   This operation involves walking to and from the temporary files where the old jackets are stored, pulling and placing the jackets to the carts and placing these jackets in the input section of the conversion file by terminal digit.

2. The Converting Operation (5 positions)
   This operation follows the following sequence:
   a) Remove old jacket from input tier.
   b) Select proper color jacket and report envelope.
   c) Copy history number twice on the new master jacket and once on the report envelope using a magic marker.
   d) Copy the patient name to the master jacket.
   e) Get one piece of white tape and cover the appropriate digit (last digit of the patient history number).
   f) Select and place appropriate tapes for middle digit, year, pathology and autopsy indices (the preprinted X on the master jacket denotes the first middle digit. This is the fourth digit reading from the end of patient history number. The preprinted Y on the master jacket denotes the second middle digit or, reading from the end of the patient history number, the third digit.)
g) Remove x-rays from old master jacket and place to new jacket.
h) Remove reports from old master jacket and place to new report envelope.
i) Get scissors and cut history data from old master jacket and place with reports to the new report envelope.
j) Remove history number from the old envelope and place in a container provided at the work station.
k) Discard the old master jacket.
l) Place the new master jacket to output section of the file.

In the event of an incomplete master, follow the same procedures as outlined in steps a) through j) and

k) Initiate a copy of the loan-out request and discard old master jacket.
l) Place this request with the new master jacket in an out-guide and file in the output section of the file.

In the event of a white card in lieu of an old master jacket, follow the following steps:
a) All white cards denoting a master jacket out of the file for new film processing will be placed in the output section of the file.
b) All white cards denoting department loans will be set aside for further follow-up and retrieval.

3. The Filing Operation (3 positions)
   a) Load carts with completed master jackets from the output tiers of the file.
   b) Travel to the new file area and file by terminal digit.
   c) Return empty cart to conversion area and repeat process.
In addition to the tasks of sorting old master jackets for conversion, and filing new master jackets by terminal digit in the new file area, the 5 clerks will have sufficient time to supply the 5 operators converting to master jackets with new jackets, tape, report jackets, and any other supplies needed.

The following page depicts the layout of the conversion operation. Each work station of this operation will be provided with a chart depicting the color code of terminal digits, middle digits, year tapes and pathology and autopsy indices.
EXPLANATION
A-No.1 & 2 are MASTER JACKET # I
B-No. 3 & 4 are MASTER JACKET # II
C-No. 5 & 6 are REPERT ENVELOPES

WORK AREA

STOOLS

SHELVING

TOP VIEW

FOOTNOTES
1. THERE ARE FIVE (5) OF THESE WORK STATIONS, ALL IDENTICAL. EACH STATION CONTAINS THE FOLLOWING:
   (1) A STOOL (2) FILE (3) TAPE DISPENSER (4) SCISSORS
   (5) MAGIC MARKER

2. THIS IS A FIVE (5) LEVEL FILE, OPEN ON BOTH SIDES. THERE ARE FIVE (5) WORK AREAS. EACH OF THE FIVE (5) LEVELS ARE BROKEN INTO 24 HOLES PER LEVEL PER WORK STATION. LEVEL 1 \( \frac{1}{2} \) ARE OUTPUT. LEVELS 3 \( \frac{1}{4} \) ARE INPUT. THE FIFTH LEVEL IS VACANT AND COULD BE USED FOR STORAGE.