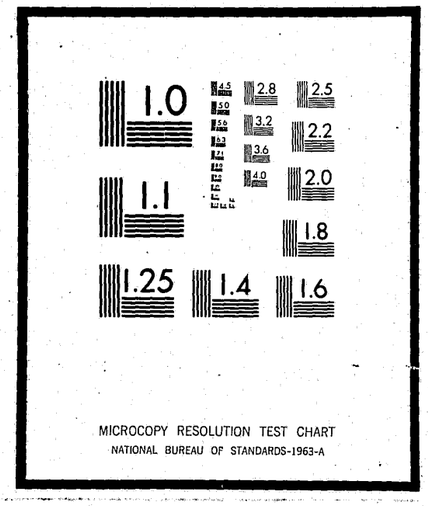
If you have issues viewing or accessing this file contact us at NCJRS.gov.

NCJRS

This microfiche was produced from documents received for inclusion in the NCJRS data base. Since NCJRS cannot exercise control over the physical condition of the documents submitted, the individual frame quality will vary. The resolution chart on this frame may be used to evaluate the document quality.



Microfilming procedures used to create this fiche comply with the standards set forth in 41CFR 101-11.504

Points of view or opinions stated in this document are those of the author(s) and do not represent the official position or policies of the U.S. Department of Justice.

U.S. DEPARTMENT OF JUSTICE
LAW ENFORCEMENT ASSISTANCE ADMINISTRATION
NATIONAL CRIMINAL JUSTICE REFERENCE SERVICE
WASHINGTON, D.C. 20531

Date filmed 1/21/76

COURTRAN II

AN ASSESSMENT OF APPLICATIONS
AND COMPUTER REQUIREMENTS

15489

Prepared by:

Charles W. Nihan
Federal Judicial Center
Revised September 1974

TABLE OF CONTENTS

		Page
I.	Introduction	1
II.	COURTRAN II Terminal Operation	6
III.	Court Functions to be Supported by COURTRAN II	11
	A. Immediately Attainable Functions	12
	1. Civil and Criminal Caseflow Management	12
	2. Bankruptcy Petition Management	18
	3. Maintenance of the Master Name Index	21
	4. Jury Selection and Utilization	24
	5. Calendar Management	25
	6. Clerical Assistance to the Clerks Office	26
	7. Appellate Information Sub-System	28
	B. Potential Functions	29
	1. Computer Transcription	30
	2. Word Processing Capabilities	32
	3. Indexes for Individual Judges	34
	4. Assistance in Brief Preparation	35
	5. Refined Statistical and Forecasting Cabilities	37
IV.	Proposed Mini-Computer Configuration	39
	A. Central Processing Unit	40
	B. Magnetic Tape Unit	41
	C. Line Printer	42
	D. Magnetic Disks	43
	E. Input/Output Terminals	44
V.	Mini-Computer Selection Considerations	45
	1. System Expandability	46
	2. Open-Ended System	47
	3. Interrupts	47
	4. Asynchronous Input/Output	49
	5. Memory Protection	50
	6. Interval Timing	51
	7. Response Time	51
	8. Advanced Operating System	54
	9. Minimum Site Reconfiguration	55
	10. Vendor Supplied Training	55
	11. Sole Source Maintenance	56
VI.	COURTRAN II Funding Requirements	58
	A. Equipment Costs and Operating Expenses	58
	B. Potential Dollar Savings	60
VII.	Summary	64

ANNEXES

		Page
A.	Computer Equipment and System Support Technical Specification	A1
B.	COURTRAN Evaluated by Clerical Work Measurement	B1

I. INTRODUCTION

For several years the Federal Judicial Center has been experimenting with the use of computers to support federal court caseflow management and research operations. During this period we have developed a sophisticated court management and statistics system called COURTRAN I, which has provided pilot courts with an introduction to data processing support, and has prepared a number of management reports which have proved extremely useful to judges and clerks office personnel in the day-to-day operations of the court. Additionally COURTRAN I has provided the Center with an automated court research system which has successfully analyzed the data collected during the civil speedy trial project and has produced sophisticated statistical analyses of the operations of the COURTRAN I pilot courts. However, COURTRAN I had some serious drawbacks which limited its ability to operate as an integral part of clerk's office operations and made it difficult to replace manual operations now performed by clerks office personnel. The primary drawback stemmed from the method of obtaining computer processing time to support COURTRAN I operations.

COURTRAN I was operated in a Batch environment using computer time rented from commercial firms. The computer was not located in the court and had to be scheduled well in advance to be available for court use. The court was

required to record the information they desired to input into the computer on punched cards and then hold these cards until they had accumulated a sizeable number (approximately two to four weeks of transactions). This accumulated punched card data was then taken to the remote computer site and "read" into the machine. After the computer had successfully manipulated the data in the desired manner the court personnel would receive a number of management reports as output, as well as all of the punched cards on which they had previously recorded their data. Although this method proved quite cost-effective it proved to have two serious limitations. The first was that the output information was dated in the sense that it reflected the state of the courts calendar on the date the reports were actually produced by the computer. After several days the information became "stale" due to the inability of the court to continuously update and modify the information contained on the reports to show the most recent developments in any given case. Additionally the report production process was extremely cumbersome to the court. Transportation to and from the remote computer site, particularly in light of the large number of punched cards which had to be transported each and every time reports were to be produced, became a considerable logistical problem. And since the reports

were being produced on a computer which was not under the control of the court but rather was being controlled by a company commercially engaged in selling computer time, scheduling difficulties frequently arose. This might mean that the court would have to wait several days longer than desired to obtain the computer time required to produce their reports.

As the final stage in our local court management information project the Center now proposes to undertake the development and pilot operation of a vastly improved court management information and research system which will overcome the limitations of COURTRAN I, and which more importantly will provide courts with the means to substantially improve the efficiency of clerks office operations. A direct result of this improved efficiency will be a considerable dollar savings to be achieved primarily through the reduction of the staff of the clerks office. The reduction will be achieved, as discussed in detail later in this paper, by eliminating the need to repetitively prepare and document the identical information as a case progresses through the court.

COURTRAN II will be operated on a computer located in the courthouse, operated by court personnel, and dedicated to court operations. This means that there will be computing power available twenty-four hours a day to provide assistance

to the court. It also means that all data contained within the COURTRAN II system will always be under the direct control of the court. This latter fact has two important impacts. First it means that it will not be necessary for the court to reload its data each and every time reports are to be produced and then unload the data when processing is completed. Once information is read into the COURTRAN II computer it will be permanently stored on either disk packs or on magnetic tape. Although this method of storage was technically feasible in COURTRAN I the fact that the data would have had to be left with a commercial firm outside of the direct control of the court forced the Center to forego its use. Secondly, and closely related to the first point, is that the security which will be provided by the COURTRAN II mode of operations will allow the COURTRAN II system to provide support in areas not addressed by its predecessor such as word processing functions in support of opinion or correspondence drafting, or the storage of non-public information desired by ancillary court agencies such as the U.S. Marshall's office or the Probation Office.

The purpose of this paper is to analyze the potential COURTRAN II applications in federal courts, to propose a mini-computer configuration to support COURTRAN II operations, to briefly discuss the factors considered by Center design personnel in selecting the proposed configuration, and

finally to summarize the probable operating costs and dollar savings which would result from the introduction of COURTRAN II into the court environment.

II. COURTRAN II Terminal Operation

Although the exact computer equipment configuration required to support COURTRAN II is discussed later in Section IV, a brief explanation of the terminals used to enter data into the computer as well as to display the computers response to user inquiries should assist comprehension of the discussion of potential court applications. The primary input/output terminal for the COURTRAN II system will be a cathode-ray tube (CRT) with an attached typewriter keyboard. Terminals such as these are commonly used today by stock brokerage firms, airlines, particularly in their reservation departments, and insurance companies. The CRT screen closely resembles that of a small television set. When a CRT user desires to enter data into the computer, or to direct an inquiry concerning the status of a particular case to the COURTRAN files, he or she will use the typewriter keyboard attached to the CRT. The data typed on the keyboard will be displayed on the CRT screen to allow the user to verify its accuracy while the message is being prepared. When the user has finished typing his command or entering his data he will depress a transmit key and the information displayed on the CRT screen will be sent to the computer.

If an inquiry of the case files has been transmitted the computer will immediately display the desired response

on the CRT screen for the user to review. In the event that the amount of information to be displayed exceeds the size of the screen the computer will automatically inform the user of the number of "screens" of information, called "pages", which it has to display and it will then display the first page of information along with one or two lines of constant identifying information such as the case docket number, case short title and judge to whom the case is assigned. If at any time the terminal user should desire a copy of the information displayed on the screen he will merely have to give a print command to the computer and all of the information then displayed on the screen, or at the users option all of the information included in the response to a single inquiry when a multiple page response is involved, will be reproduced on the system printer.

We should note at this point that individual printers will not initially be attached to each CRT unit but rather a single heavy-duty high-speed printer will be located in space designated by the clerk of court. However, should operation of the COURTRAN II system indicate that it would be beneficial to equip some or all of the CRT units with a light-duty printer this could be easily accomplished.

If a CRT user is entering data to the system case files he will be provided with automatic data format and accuracy checks by the computer. For example, if a deputy

clerk were attempting to enter a "trial end" transaction to the computer file of a particular case and a "trial begin" transaction had not previously been entered for that case the system would instantly make this fact known to the user. In all instances where the computer believes a transaction to be incorrect or illogical it will, in addition to noting this fact, provide the user with a diagnostic message explaining the reasons it believes the transaction to be in error.

This "dialogue" between the user and the computer should assist courts utilizing COURTRAN II in maintaining a high degree of accuracy in the data entered into the system files.

The CRT units themselves can be moved about within the court. They will be connected to the COURTRAN II mini-computer by local telephone lines. The user will merely have to dial the computer, as he would to make any telephone call, and when he hears the "tone" emitted by the computer insert the telephone into the cradle attached to the CRT. The computer will then sign-on by identifying itself and asking the user what type of operation (e.g. data entry, data display, report preparation) he wants completed. The mini-computer specifications prepared by Center personnel call for the computer to be capable of supporting the operation of thirty-two separate CRT terminals, although

the number we initially propose to attach will be eight to ten. The final number of CRT's attached to the computer of any pilot court will be dependent upon the volume of transactions directed to the system as well as the desires of the court.

It is also possible to "hardwire" certain terminals directly to the computer. If this procedure is followed there is no need to use telephone service to connect the CRT and the computer, for the hard-wired terminals are in effect continually connected. With a hard-wired terminal the user would only have to depress a single key to alert the computer that he desired to transmit a command or enter data.

Each user court will be able to establish its own security measures for system use. Additionally each court will have complete freedom to determine CRT locations, system users, and what operations each user can perform. For example a court might want to limit the terminals which can direct the computer to prepare management reports, or to designate certain terminals as display only units. These latter CRT's would have the capacity to display certain public information contained in the system case files, but they would not have the ability to modify or augment the existing files.

In fact one of the purposes of our pilot project will be to discover the number of terminals necessary for optimum system operation, learn where they should be located, and what types of restrictions, if any, should be placed on them. Procurement of a computer configuration as proposed herein does not foreclose any of these issues. In fact the COURTRAN II system will allow each user court to decide how the COURTRAN system can best support the operations of its court and so configure its system, without having any restrictions imposed by the decisions made in these areas by other user courts.

II. COURT FUNCTIONS TO BE SUPPORTED BY COURTRAN II

We have identified twelve separate functional areas in which we believe the COURTRAN II system could provide significant assistance to judges and members of the court staff. For purposes of the following discussion of these functional areas they have been divided into those which appear immediately attainable, and therefore those which the Center would propose to develop first, and those which although they appear technically feasible would be developed at a later date. The areas which are discussed should be by no means considered definitive either from the viewpoint of identification of those court operations which could benefit from computerized support or of the processing capabilities of the mini-computer configuration. The mini-computer which the Center proposes to acquire will have the capacity to support an almost limitless range of functions. As the pilot courts gain experience in using the COURTRAN II system they will undoubtably identify a number of additional court operations which would benefit from computerized support.

Not all of the areas in which automated support appears beneficial to the court would require the same degree of

automated support. Some existing clerical functions, such as docket sheet preparation, may be replaced entirely, while other functions such as financial accounting will receive only limited assistance.

Nor will all court data processing applications require the same speed of response from the computer. An inquiry from a judge or a member of his staff concerning future scheduling conflicts will be answered within seconds, while a task such as the preparation of questionnaires to prospective jurors may be completed during the evening when normal court operations have ceased.

The remainder of this section will discuss each of the twelve functional areas identified as likely candidates for computerized support starting with those areas in which it appears feasible to provide immediate assistance. These areas are:

- CIVIL AND CRIMINAL CASEFLOW MANAGEMENT
- BANKRUPTCY PETITION MANAGEMENT
- MAINTENANCE OF THE MASTER NAME INDEX
- JURY SELECTION AND UTILIZATION OPERATIONS
- CALENDAR MANAGEMENT
- CLERICAL ASSISTANCE TO THE CLERK'S OFFICE
- APPELLATE CASE INFORMATION SYSTEM

(1) CIVIL AND CRIMINAL CASEFLOW MANAGEMENT

When either a civil or criminal case is commenced in a district court a deputy clerk will sit at the CRT

terminal and enter all of the case identifying information then available such as the docket number assigned, the case short title, the names and addresses of all the parties, the judge to whom the case has been assigned, etc. This is the one and only time this information will have to be entered into the COURTRAN system. Of course modifications of the data, such as a judge change, can be entered at any time. The COURTRAN II system will then automatically create the necessary computer files to properly store the information provided. Immediately after it has been entered by the CRT terminal operator this information is permanently stored in the COURTRAN case files and can be displayed on any of the COURTRAN II CRT's, or it can be reproduced at the system printer. As the case progresses through the court system each new piece of information concerning the case from the addition of third parties in a civil action or the addition or deletion of specific indictment counts in a criminal action will be entered into the computer system via the CRT keyboard by a deputy clerk. Deputy clerks will also enter all significant events which occur during the life of the case such as the filing of briefs, or answers to pleadings or interrogatories, the occurrence of status calls or pre-trial hearings, the scheduling of all prospective court appearances such as trial commencement dates or sentencing dates, and any other information which the court deems helpful.

This information should always be entered on an "as occurring" basis. There will be no need to accumulate transactions for subsequent entry into the COURTRAN II system, as was the case with COURTRAN I, but rather the information will be entered as soon as convenient following its receipt. To enter case related information into the system the COURTRAN operator need only identify himself to the computer to signify that he is an authorized COURTRAN user, and then provide the computer with the identifying data (docket number and case type) of the specific case the operator desires to update. The system will in turn display the basic case identifying information already contained within the system to allow the user to positively identify that the correct case is being updated. The operator will then enter the "mnemonic" describing the event to be reported, or if it is information not amenable to mnemonic description the operator will enter the text of the entry exactly as it is to be subsequently displayed upon the CRT or the docket sheet. The COURTRAN system will automatically perform a variety of format and logical edits on the information to see if it meets the established format standards and is consistent with information previously entered.

Once the data has been entered into the COURTRAN II system it can be accessed by any system CRT, and the data

will also be included in any court management reports prepared by the COURTRAN system subsequent to its entry. Thus if a criminal case were involved the COURTRAN II system would immediately start monitoring the progress of the case against the courts Criminal Rule 50(b) plan, would note whether or not a jury demand had been made in the case, and if it had the COURTRAN system would make that information known to the courts jury clerk in the form of consolidated jury report showing all juries required for the upcoming week. If future court appearances were scheduled for a date certain the system would automatically prepare notices to all parties and counsel involved in the case. All of these operations can be accomplished without the need, as is currently the case in court operations, to retype any of the information which had previously been correctly entered into the system.

Detailed systems analysis of District Court operations conducted by Center personnel in conjunction with staff members from the Office of the Clerk of Court for the Northern District of Illinois have tentatively concluded that it may be possible to utilize the COURTRAN II computer to prepare the docket sheet for all cases entered into the COURTRAN data base. Since the docket sheet is in effect a chronological index to the significant events

which have occurred during the life of a case it would seem feasible to have this data entered via a system CRT on an as occurring basis during the life of the case. This "docket sheet" could be displayed for review on any system CRT during the normal processing of the case. If the court desired a printed copy of the docket sheet one could be produced by the systems high speed printer. However, our study revealed that most court personnel consulting the docket sheet do not require a copy of the docket sheet itself but rather they consult it for information such as to determine if a particular paper has been filed, or if any parties have been added or severed from the case. COURTRAN II will eliminate the duplication of information recordation which now takes place in most clerk's offices.

Most existing procedures require a deputy clerk to be present in the courtroom to record significant case events, such as rulings on motions, which transpire. The significant information is noted on whatever form is in use in that particular court (short book, blotter, minute slip, etc.). This form is then forwarded to the docketing section where the entries are then copied or summarized onto the courts docket sheet. The docket sheet itself is usually filed in the official case record. In some courts the judges staff maintain an abbreviated form of

the official docket sheet for their own management purposes. The point is that many of the clerical efforts associated with case processing involve repetitive typing of the same information. If the courtroom deputy had made only brief notes of what transpired in the courtroom, or in the judges chambers, and then rather than completing the form utilized in the court to transmit this information to the docketing section, had entered the information into the COURTRAN II system via a CRT keyboard, there would be no need for either the docket clerks or others in the court desiring all or part of the information to duplicate the original effort of the courtroom deputy. All other authorized users would be able to display desired information on a system CRT or reproduce it on the system printer. Should there be additional data which the docket clerks or others wanted to enter on the computer maintained docket sheet which had not been available to the courtroom deputy they would be completely free to augment his information as they desired. The important point is that they would only have to enter that data which had not previously been entered - there would not be a requirement to redo what had already been completed.

In the area of Civil and Criminal Case Flow Management the COURTRAN II system can allow the court to (1) save a considerable amount of clerical effort in performing

those administrative tasks associated with moving a civil or criminal case through the court; (2) receive the spectrum of data analysis and management reports provided by the COURTRAN II system; (3) have an effective case-flow monitoring system operating in the court; and (4) have the capacity to avoid scheduling conflicts whereby individual attorneys, expert witnesses, or prosecutors are ordered to appear in two separate courtrooms on the same date.

The court will also have a complete data base consisting of all recorded events in every case which has gone through the court. This data base will allow the court to analyze its own operations and to evaluate the impact of local rules or procedures on court operations. This data base will also be invaluable to organizations dedicated to improving court operations, such as the Federal Judicial Center, in conducting analyses of court processes. Normally the effort in court studies is collecting the data. The existence of a complete data base created by COURTRAN II on a day-to-day basis will allow the major effect to focus on data analysis.

(2) BANKRUPTCY PETITION MANAGEMENT

The COURTRAN II system would support bankruptcy petition management in much the same manner as it would support civil and criminal caseflow management. The

concept of entering the basic identifying data into the COURTRAN II system when a bankruptcy petition is first filed, and additional information on an as occurring basis as the "case" progresses through the court would remain the same. The data would be entered from a CRT keyboard in the identical manner previously described. Yet due in large part to the financial accounting functions common to most bankruptcy proceedings a number of additional computer programs would be required to perform the desired accounting tasks.

It should be pointed out that computer systems to support the operations of bankruptcy offices have been successfully operated in the batch operating mode for several years. These computer support operations have been provided by commercial firms to selected bankruptcy offices and the reaction of the bankruptcy judges involved has been quite favorable. The major drawback to the expanded use of these commercial services has been their high cost. If a mini-computer is obtained for COURTRAN II development, support can be provided to bankruptcy operations at no additional processing cost.

A study completed by the clerk's office of the U.S. District Court for the Northern District of Illinois has concluded that there appear to be no impediments

to automating the docket sheet now manually prepared by clerical personnel supporting bankruptcy judges. Automation seems particularly feasible for "no asset" bankruptcy cases where the docket entries in some courts have already been standardized to a degree where the majority of docket entries are made with rubber stamps.

Bankruptcy operations are characterized by even more repetitive clerical functions than criminal or civil cases. When a bankruptcy case is commenced the court personnel compile a list of all known creditors and their mailing addresses. During the life of the average bankruptcy case this information is subsequently retyped on numerous occasions. Notices of the first and subsequent meetings must be mailed to creditors, they must be notified of the appointment of a trustee, and informed of the official notice of discharge. Much of this information is also duplicated in performing the accounting functions associated with preparation of the trustee's final account, and in drafting the order for payment of dividend.

Our conclusion that automation can in fact provide substantial assistance to

federal bankruptcy operations is supported by the final report of the RAND Corporation[1] concerning, inter alia, the management of the U.S. bankruptcy system. The report was prepared in 1973 at the request of the Commission on the Bankruptcy Laws of the United States, and states that "(c)urrent experience with automated systems indicates that both straight bankruptcies and wage-earner plans can be easily accommodated in an automated data processing system."[2] The report additionally stated that "...the bankruptcy administrators would obtain timely and accurate information on current operations and, for audit purposes, detailed visibility of the proceedings in individual cases"[3] from the introduction and operation of an automated system.

(3) MAINTENANCE OF THE MASTER NAME INDEX

Most Federal district courts now maintain an alphabetized listing of the names of all parties in civil, criminal, and bankruptcy cases pending before the court,

---

1 Rand Corporation, The Impact of Proposed Changes in Bankruptcy Administration, (1973)

2 Id. at vii.

3 Id.

as well as those which have been terminated within the past several years. This index is maintained by typing the name, last name first, of each and every party as it appears on the appropriate docket sheet onto an index card. These cards are then centrally stored in file drawers or in a rotating drum type index to allow court personnel to perform name searches. All clerical effort associated with the maintenance of master name indexes is duplicative in that all of this information has been previously typed by members of the clerk's staff. The COURTRAN II system will eliminate this duplication in that it will automatically construct the master name index as a normal byproduct of the maintenance of the COURTRAN files. Whenever a party name is recorded as being involved in a case the name will immediately be added to the master name index. The court will also be given the capability to add names not contained as party names in a case to the master name index, such as the popular name of a case like "The Chicago Seven." Each entry in the master name index made by COURTRAN II will also show both the date the case in question was filed and the docket number of the case. If additional information concerning the case is desired the COURTRAN user need only type the docket number of the case on a CRT keyboard and the entire docket sheet of the case will be displayed on the CRT screen.

Using the COURTRAN computer to conduct a name search provides the user with an added search capability. If the operator desires to locate a name which is difficult to spell, he or she has the option of only entering the first two or three characters of the name and then typing an asterisk. The computer system will then search its files and display to the operator every name contained within the data base which starts with the two or three characters preceeding the asterisk regardless of the total number of characters in the name. If too many names are produced in response to the two or three character search for convenient review, the terminal user can add one or more characters to the search key until the number of names in the computer response is reduced to a manageable number.

It will also be possible to program the computer to conduct phonetic name searches so that frequently misspelled names can still be located. Basically this technique ignores vowels and double consonants in names, and treats frequently confused letters, such as "M and "N" as identical. This technique is widely utilized by police departments and state motor vehicle agencies.

For purposes of this discussion the technique utilized to retrieve a name is not important. What is of interest is that the index, less popular names, is entirely constructed and maintained as a normal byproduct

of COURTRAN II operations without the need for additional clerical effort. The computer maintained index will also always be up-to-date. When a name search is conducted the user does not have to be concerned that cases filed during the preceeding few days have not yet been indexed, as the name file will be automatically constructed by the computer at the time a case is opened.

(4) JURY SELECTION AND UTILIZATION FUNCTIONS

A number of the larger federal district courts now have automated jury selection support provided by state or local court computer systems, or by commercial services (including GSA) which are funded centrally by the Administrative Office. Since the computer logic for the processing of these systems has already been developed and successfully operated, programs compatible with any computer hardware obtained by the Center could be quickly written to allow COURTRAN II to assume these jury selection and notification functions. This service could be made available to all federal courts who have access to computerized voter lists, or any other computerized files from which jurors could be selected. The assumption of jury related data processing functions by COURTRAN would produce an immediate dollar savings to the courts, as well as providing the courts with more responsive data processing services.

The COURTRAN II programs would be capable of selecting the jurors to comprise the Master Jury Wheel from the computerized files obtained by the courts. The computer could then prepare any questionnaires the court desired to mail to jurors, address the necessary envelopes, and tabulate and display the results of all questionnaires returned. The computer should also be able to provide assistance with the financial accounting associated with payments for juror attendance and juror travel. Additionally the court would be continually provided with up-to-date juror utilization statistics, and with assistance in determining the proper size for future jury calls. Experience gained by the Center to date has shown that substantial dollar savings can be realized by effective juror utilization programs which are based upon data which must be manually collected and manipulated. The use of a computer to assist the court in these operations will hopefully produce even greater savings.

(5) CALENDAR MANAGEMENT

The COURTRAN II system will be programmed to assist the court in calendar management by identifying potential scheduling conflicts for judges, attorneys, or witnesses. The system also will have the capacity to identify potential conflicts regarding the scheduling of court resources such as courtrooms for those courts which do not have courtrooms permanently assigned to individual judges.

In the event that a last minute scheduling reorganization is required the COURTRAN II system will automatically provide court personnel with the name and office phone number of all attorneys of record in those cases to be rescheduled to assist them in providing timely notification.

The maintenance of a data base containing the names of all attorneys as well as all cases in which they are counsel of record will also allow the court to conduct refined analyses of the case loading of individual attorneys or firms to determine if the size of their pending caseload has an adverse impact upon caseflow in the court. Additionally the court will have the ability to monitor attorney appointments, such as those authorized by the Criminal Justice Act, to insure that no single attorney is receiving a disproportionate number of appointments.

(6) CLERICAL ASSISTANCE TO THE CLERK'S OFFICE

The creation of computerized data files in support of the courts clerical functions has tangible benefits over and above the tremendous savings which may be realized from avoiding repetitive recording of information. In the first place more than one person can have access to the same information at one time. With computer files the number of authorized users who can simultaneously review information contained in the computers case files is limited only by the number of CRT's connected to the

system. And the use of common scheduling data by the court, the U.S. Attorney, and the U.S. Marshall can avoid clerically introduced scheduling errors which frequently result from the maintenance of separate record systems by each agency involved in court proceedings.

When the COURTRAN II system has been successfully functioning for a period of time it might be practical to transfer responsibility for the entry of selected data elements to those court related agencies most familiar with the data. Thus the U.S. Attorney might be provided a terminal and requested to enter information concerning the assignment of prosecutors to individual cases, or the U.S. Marshall given responsibility for entering information regarding the incarceration status of criminal defendants. The existing COURTRAN I system now provides these agencies with periodic computer print-outs displaying information of interest to them and their response to this service has been positive.

COURTRAN II will free the clerk's office from the task of preparing periodic statistical reports required for both internal management purposes as well as for external consumption by agencies such as the Administrative Office. The computer can prepare these reports more rapidly and accurately than is possible when they are

manually assembled. Reports can also be prepared for any defined time period without additional effort on the part of the court. If the court desired to analyze filing trends over a six month period, or to compare terminations in certain types of cases with those of the same months of the preceeding year the necessary data could be rapidly prepared by the computer. Without automated support such an undertaking would require extensive effort on the part of the clerks office and for this reason might not be prepared.

(7) APPELLATE CASE INFORMATION SYSTEM

The COURTRAN II system will have a full capability to support caseflow management and research activities in a United States Court of Appeals. The existing COURTRAN I system now provides a sizeable amount of information to participating district courts concerning the status of the preparation of the record on appeal, the status of transcript completion by the official court reporter, and an inventory of district court cases in which normal processing has been suspended pending appellate resolution of an appeal in another case containing a controlling point of law or of an interlocutory appeal in the instant case.

The module(s) of the COURTRAN II system which will be developed to provide support to Courts of Appeal will be designed to draw the maximum amount of information possible from the automated COURTRAN files maintained by the district court in which the appeal originated. This procedure will again assist in avoiding repetitive information preparation.

FUTURE FUNCTIONAL AREAS FOR COURTRAN II SUPPORT

The following five areas in which automated support is both technically feasible and operationally practical have been selected for development after the applications previously discussed have been successfully completed. In most cases the decision to delay development is due to the complexity of the computer programs which would be required and the concommitant extended time needed for development. In some cases we have decided to delay development due to the limited portion of the court family who would be served by the completed computer programs. It should be emphasized that these applications are not impractical. In fact many of them are now being successfully operated by commercial firms or government agencies, albeit on larger computers than those now being considered by the Center.

The five functional areas in which COURTRAN II support could be provided at a later date are:

- Computer Transcription
- Word Processing Capabilities
- Indexes for Individual Judges or Courts
- Assistance to the Bar and Court Related Agencies
- Refined Statistical and Forecasting Capabilities

(8) COMPUTER TRANSCRIPTION

The concept of using computers to assist court reporters in the transcription of their stenotype notes thereby helping to aleviate the problem of delay in the completion of trial transcripts is by no means novel. Several commercial firms are now offering these services to reporters covering the proceedings of the courts, the Congress, and administrative agencies.

Existing systems use the computer to convert the stenotype symbols which have been reproduced on a tape cassette by the court reporters stenotype machine into natural English text. The text is then displayed, page by page, on the CRT video screen allowing the reporter to confirm the accuracy of the translation, and if inaccurate to make necessary corrections. For example, the reporter may be called upon to select between two or more words which have the identical stenotype symbolic representation ("two", "too", and "to"). In such cases the computer cannot select the correct word but it can display all of the possibilities to alert the

reporter that an ambiguity requiring his resolution exists. Once the court reporter has certified that the computer translated text which is displayed on the CRT is correct, he or she need only push a key on the system console to have the page neatly printed on the computers high speed printer. The reporter is thus freed from translating the vast majority of his or her stenotype notes. In fact, reporter intervention is only required to assist in the selection of words with common or identical stenotype representation, or to translate a string of symbols which are not contained in the computers translation dictionary. Once the computer generated text is approved by the reporter and the necessary corrections made utilizing the keyboard attached to the system CRT the reporter is freed from the time consuming process of typing the official transcript.

When the COURTRAN II applications previously discussed are completed there would be no technical reasons not to utilize the COURTRAN mini-computer to assist court reporters with transcription tasks. Due to the limited size of the central processing unit of those computers being considered for COURTRAN II operations there might be a requirement to limit the hours of the day during which this service could be made available. This limitation would allow the computer to

devote its full processing capacity to respond to on-line court inquiries. However, since many court reporters will be occupied in recording official in-court or in-chambers proceedings this restriction on the availability of computer support may not prove to be a serious hinderance.

(9) WORD PROCESSING CAPABILITIES

The computer supporting the COURTRAN II system will be fully capable of providing word processing support to judges, law clerks, secretaries, and members of the clerk's staff. In fact service can be provided to any member of the court family who has a requirement to prepare repetitive correspondence, revise initial drafts of textual material such as opinions, or periodically revise long lists of information such as personnel rosters, telephone directories, or library acquisition lists.

The system would allow users the opportunity to prepare their first draft of any material using the typewriter keyboard attached to any system CRT, or to prepare their material on any electric typewriter which had been modified to allow entry of the typed material into the computer. The material could be subsequently modified as desired, including the addition of entirely new sentences or paragraphs. When any of modifications are performed the

user need only retype that material which differs from that originally entered into the system.

The computer itself will perform a multitude of formatting functions such as automatically centering any titles, adding page numbers, printing individual lines with the exact number of characters desired or printing a specified number of lines per page, and even justifying the right margin as well as the left. This service can be quite helpful if the author of a long draft desires to add or modify only a few paragraphs. By using the COURTRAN word processing capability the typist would only have to make the few changes desired and the computer would complete the remainder of the revision effort.

Although commercial firms now offer services of this type, for example IBM's Magnetic Tape Selectric Typewriter (MTST), these services are expensive and because of this fact must be restricted to a limited number of units. By using the word processing capability of the COURTRAN II computer this service could be provided to all members of the court family at no additional cost.

It may also be feasible to reduce printing costs by having the final version of judicial opinions prepared on a COURTRAN CRT or compatible typewriter. If this were

done the system could produce a magnetic tape which would be delivered to the printer. If this approach were utilized the printers would be spared the task of retyping the entire opinion to prepare it for printing and also spared the many proof reading operations required by current procedures. By using magnetic tape as the medium for delivering opinions to the printer costs should be reduced and delivery of the printed opinion speeded up.

As was the case with computer transcription, text management support services such as those described above are now in wide commercial use, and the COURTRAN II computer will be capable of supporting such operations.

(10) INDEXES FOR INDIVIDUAL JUDGES AND COURTS

The COURTRAN II computer would be able to maintain indexes for individual judges, or for, individual district courts, of information such as the specific points of law which had previously been researched by judges of the court during the preparation of opinions or of legal memorandums. To assist the clerk in assignment, indexes could also be maintained of those litigants who had previously filed 1983 petitions with the court. This latter issue has been brought to the attention of the Center by several federal judges who have stated that their courts spend an unnecessary amount of judge time dealing with

repetitive 1983 petitions. In the absence of such an index the resubmitted petition may not be assigned to the judge who handled the prior filing thereby causing the same petition to unnecessarily consume judicial resources.

(11) ASSISTANCE IN BRIEF PREPARATION

Funded by a two-hundred and fifty thousand dollar grant from the Office of Economic Opportunity a design group consisting of attorneys and computer programmers have developed a series of computer programs to assist potential litigants in drafting legally precise and sufficient briefs. The system allows the computer to pose several hundred questions to the litigant or his attorney concerning the subject matter of the complaint. In a domestic relations case, for example, the computer would present questions drawn previously constructed by experienced trial attorneys. Once a question concerning a particular area of the potential suit has been answered in such a way as to indicate that the remainder of the series of questions concerning that area are not applicable to the instant case, all other questions covering that area are automatically dropped from the remainder of the interview by the computer. Thus if a

potential litigant in a domestic relations action stated that there were no children involved in the marriage all questions pertaining to children would then be deleted from the remainder of the dialogue. Most questions posed give the potential litigant a series of answers from which to choose so that the person (litigant, legal assistant or counsel) operating the computer console need only respond with a single letter indicating the most applicable response. At the end of the interview the computer will provide a detailed summary of all responses given and indicate to a qualified member of the bar what additional information should be considered prior to drafting a formal action.

A service of this type might have benefit in allowing attorneys or parajudicial personnel of the court staff to assist pro se litigants in preparing more technically complete pleadings prior to filing with the court, or it might allow new members of the judges staff a means of quickly identifying any missing essential jurisdictional facts or other necessary information which had been omitted from pleadings filed with the court. Such assistance might be especially helpful when dealing with a petition for habeas corpus drafted by a prisoner without the aid of legal counsel. Once deficiencies were

detected the computer could automatically produce a printed request, addressed to the litigant, itemizing the additional information required to make the pleadings complete.

A service of this type might also prove beneficial to public defenders or new members of the local bar to assist them in confirming that all aspects of their cases had been addressed prior to their final preparation of the complaint to be filed with the court.

(12) REFINED STATISTICAL AND FORECASTING CAPABILITIES

From the outset COURTRAN II will provide pilot courts with a range of statistical reports which will break down the pending caseload by case type and category, case age, judge to whom assigned, etc. The entire spectrum of management reports produced by COURTRAN I will be available to COURTRAN II pilot courts. This will include the special capabilities of COURTRAN I to remove non-triable time from computations of case age, and to prepare court statistics on a per judge rather than a per judgeship basis.

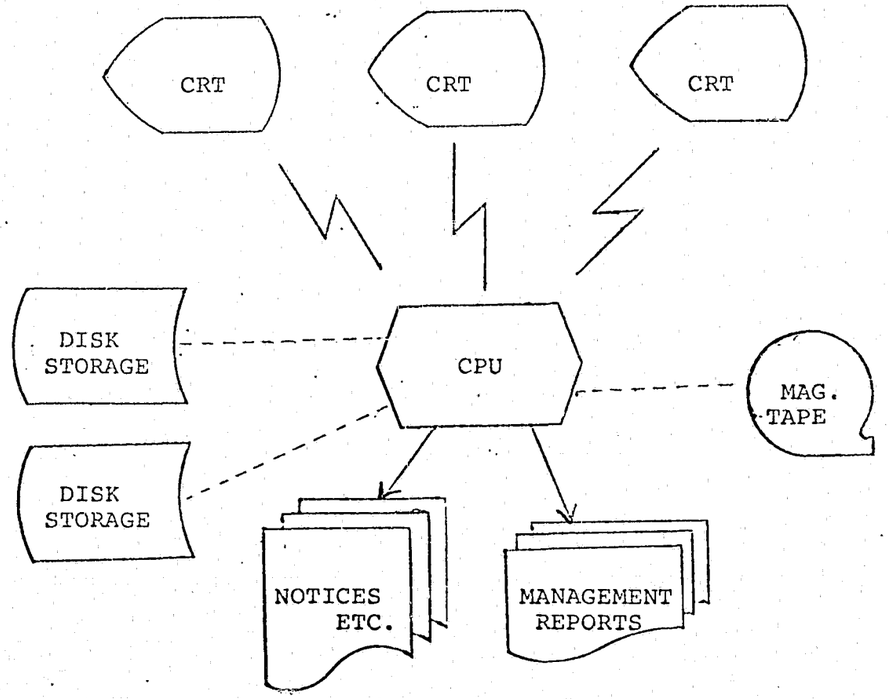
COURTRAN II will offer courts a more refined statistical analysis capability. It will be possible

to identify trends, to compare filings or terminations with those of the previous six month (or any other number of months) period or with the same month of the previous year. We hope to be able to utilize the methodology and results of the Battelle caseload forecasting project to develop a forecasting model for each federal district court which will predict future needs for personnel, facilities and budgetary support.

Mini-Computer Configuration

The basic mini-computer configuration necessary to support the COURTRAN II concept of operations is set forth below, followed by a brief discussion of each of the major system components. The detailed system technical specifications prepared by Center personnel are attached to this report as Annex A.

Minimum COURTRAN Computer Configuration



I. Central Processing Unit

The Central Processing Unit (CPU) is where the computer performs the calculations and data manipulations directed by the user application programs. Naturally the size of the CPU -- the number of characters of information which can be manipulated at one time -- and the speed with which the CPU executes its instructions determine the programming techniques which must be used, as well as the time required for the computer to respond to user directions. The following minimum CPU parameters were determined to be necessary to allow the COURTRAN II concept of operations previously described to be carried out.

(a) The CPU must have a minimum of thirty-two thousand, sixteen bit addressable locations. Additionally the architecture of the computer must be such that an additional thirty-two thousand, sixteen bit addressable locations can be added to the machine at a future date without the need to rewrite the existing computer software.

(b) The CPU must have a maximum non-volitale memory cycle time of 1.5 microseconds.

(c) The system must have a direct memory access (DMA) channel which will support Data Transfers to Magnetic Disk at a speed of 1.25 million characters per second.

(d) Additionally the DMA transfer must be capable of operating simultaneously with slow speed data input/output transfers to system consoles.

The CPU described above is the equivalent of that on a medium sized IBM 360 computer. The initial specified size of thirty-two thousand, sixteen bit addressable locations is sufficient for the projected system workload now anticipated in a metropolitan district court. However, in the event that normal system growth, or the increased processing load introduced by regional operation, makes this initial CPU size insufficient to handle operations within the established response times, we have specified that it must be possible to double the size of the CPU without the need to redo the computer programs which operated in the smaller CPU.

Since the COURTRAN II concept of operations will involve the transfer of large amounts of data to and from the CPU, unlike some scientific applications where the computer is called upon to perform extended mathematical calculations on a limited amount of input data, we have specified that our machine be equipped with a direct memory access channel capable of sustaining extremely high speed transfers of data from the system mass storage devices to the CPU.

II. Magnetic Tape Unit

The COURTRAN II mini-computer will initially be equipped with a single industry compatible tape drive. The main functions of the drive will be (a) to back-up the system disk packs which will be the main mass storage devices of the COURTRAN system, (b) to provide storage for information concerning closed cases which are no longer frequently

queried by system users, and (c) to facilitate the transfer of data and computer programs between the Center and pilot court installations.

As was the case with the CPU, the Center specifications call for the capability to increase the number of tape drives attached to the system at a future date without requiring major revisions in the system operating system or in application software. The basic technical parameters established for the tape drive(s) are as follows:

(1) Capable of handling more track tape, 2400 feet in length, 1/2 in width, and 1.5 mils thick.

(2) A minimum write speed of 45 inches per second with a packing density of 800 characters per inch.

(3) A minimum rewind speed of 200 inches per second.

III. Line Printer

COURTRAN II will require a heavy-duty line printer due to the large volume of printing operations to be supported. We have established a relatively slow minimum printing speed (200 lines per minute) due to the fact that the majority of long printing tasks can be completed during non-peak hours, probably in the evening when the court is not open for normal business. However, it will be necessary for the printer to be fully buffered so that printing operations which are undertaken while other operations are being completed

will not tie-up system resources. Buffering in effect allows the CPU to transfer the data to be displayed by the printer at high speed to a temporary storage device (buffer) in the printer. If this storage device were not available data transfer speeds to the printer would be limited by the speed of the printer itself. Since the CPU has the capacity to operate at a speed a hundred times faster than the printer, the absence of a buffer would require the CPU to sit idle while it waited for the printer to catch-up.

The printer must also have the capability to print both upper and lower case characters, as well as all normal punctuation symbols, to allow the system to support word processing applications.

IV. Magnetic Disks

The primary mass storage devices to be utilized by the COURTRAN computer configuration will be magnetic disks. Our specifications call for the disk controller to be capable of supporting four disk packs, although the initial configuration will contain only two disks. Each disk must be capable of storing thirty million characters of information.

In the event that the amount of data to be stored in these mass storage devices exceeded the 120 million characters specified (four disk packs) it would be possible to obtain a second disk controller and thereby attach additional disk

packs to the system, or the types of disks used could be changed to a type allowing a storage density greater than 30 million characters.

V. Input/Output Terminals

The primary data input and display terminals, cathode-ray tubes with attached keyboards, have previously been discussed in detail. These terminals are in effect the interface between the computer and the user. The exact number of CRT terminals to be connected to the computer in each of the pilot courts will be determined after they have had the opportunity to utilize the system. Eight to ten CRT's will be initially provided to the pilot courts.

As previously mentioned the terminals are portable and will be connected to the computer by phone lines. Each pilot court will therefore be able to decide where the CRT's should be located to provide optimum support.

V. Mini-Computer Selection Considerations

This section briefly discusses eight computer hardware and software factors, and three system support factors, considered by Center personnel in drafting the COURTRAN technical specifications attached as Annex A, and in selecting the mini-computer configuration discussed in the previous chapter. The particular factors discussed are:

(1) System Expandability
(2) Open-Ended System
(3) Interrupts
(4) Asynchronous Input/Output
(5) Memory Protection
(6) Interval Timing
(7) Response Time
(8) Advanced Operating System
(9) Minimum Site Configuration
(10) Training
(11) Sole Source Maintenance

1. SYSTEM EXPANDABILITY.

We determined that any computer selected for COURTRAN II support would have to have the capability of allowing additional core storage to be added at a future date without the need to rewrite the existing computer programs. It would also be desireable, though not mandatory, for the computer to allow its internal processing speed to be increased by hardware modification without the need to rewrite the existing programs. In the absence of one or both of these capabilities the computer might soon become unable to respond to user inquiries in an on-line real-time (OLRT) mode due to overloading caused by normal system growth.

In a batch operating environment, such as that used by COURTRAN I, a computer executes programs one at a time. When it has completed processing the first program it produces the output (a report or display) of that program and then commences execution of the next program. This type of operation forces the user to accumulate or "batch" the information he desires to input to each program prior to starting the computer run. When a system of this type becomes overloaded due to expanded processing the problem can be resolved by operating the computer for longer time periods each day. However, in a OLRT system such as that proposed for COURTRAN II the batch solution is of no value because

the computer must now deal with inquiries as they arise. It certainly would not be acceptable to respond to an inquiry message concerning the status of the docket sheet or requesting a display of an attorneys future scheduled court appearances with the message that the computer would process that request later that afternoon.

2. OPEN-ENDED SYSTEM.

We also determined that any computer selected for COURTRAN II operations would have to be open-ended in the sense that the peripheral equipment (printers, CRT's, disk packs etc.) could be expanded or modified in both type and mix at a future date. This capability of modify the peripheral configuration must extend as well to the communication lines which the system can accommodate. If system growth is such that we desire to increase the number of CRT's supported by the system by half, either to support increased internal processing requirements or those imposed by the introduction of our concept of regionalized (circuit wide) processing, the COURTRAN II computer must be able to accommodate this change.

3. INTERRUPTS.

When describing the internal operations of a computer, an "interrupt" means that when certain events occur within the computer system, such as the arrival of an inquiry from

a user terminal, the computer will halt (interrupt) the processing of its current program and execute a different program which services the interrupt. When the interrupt has been dealt with, for example, by providing the inquiry with sufficient system resources to process the desired response, the computer will return to the processing of the program which was interrupted and continue as though nothing had happened.

In a multi-user system such as COURTRAN II interrupts, and the internal speed with which they are executed, are extremely important. If five different users direct an inquiry to the computer at the same time the computer is in the process of completing a long printing task such as a report showing all Civil Cases in which no activity has occurred for 60 days, we want every user to feel that he has the full attention of the computer. In such a situation - what will in fact have happened is that the computer will interrupt its printing job to respond to the incoming inquiries, although this will not be evident to the users. Once the computer determines what information will have to be retrieved from its disk storage files to respond to the first inquiry, it will commence analysis of the second inquiry while it is retrieving the information required by the first, and will continue this process until all the inquiries have been dealt with. To each user it appears that the computer

is devoted to the resolution of his particular problem when in fact the machine is servicing multiple users at the same time. Obviously, there is some point at which the volume of simultaneous inquiries will exceed the capacity of system resources to deal with them, but this situation should not arise with the anticipated number of terminals and usage volume projected for COURTRAN II. Should this condition come into being, the expandability feature discussed above will allow us to successfully resolve the problem.

Interrupts allow a system to respond to multiple users simultaneously rather than requiring each user to wait until the computer had completed processing the job preceeding his. This is possible due to the extremely fast processing speed of the CPU when compared with the speed with which deputy clerks enter data and commands using CRT terminals. COURTRAN II use of interrupts will allow peripheral units to be kept continuously busy, and will allow the central processing unit to be operated nearer its capacity.

4. ASYNCHRONOUS INPUT/OUTPUT.

The terminals of the COURTRAN II computer should be asynchronous, that is, not time dependent upon the central processing unit for the execution of an input/output operation but rather should allow these operations to occur independently in time to the main computer processing.

To ease the programming burdens encountered in using asynchronous peripheral units, we have established standard interface characteristics for all peripheral units. This will allow us to avoid the programming problems associated with developing a system with a mix of equipments made by different manufacturers.

5. MEMORY PROTECTION.

In a multiprogramming environment such as that proposed for COURTRAN II it is important to ensure that different programs which are being concurrently executed do not interfere with one another in their use of system resources. This is particularly true when different programs use varying amounts of core for their read and write operations associated with program execution. Without memory protection devices the results of one program might be written over the results of another program. Memory protection devices will prevent any single program from exceeding its predetermined core boundaries during execution.

Center specifications also require the vendor of any computer bid to the Center to offer a means of "locking" individual records so that they cannot be accessed by other users or by other application programs during the time that the information in an individual record is being modified or updated.

6. INTERNAL TIMING.

It is desirable that the COURTRAN II computer be equipped with a real-time clock or an interval timer to allow the machine to:

1. Be able to know and print the day and the time of day on reports and especially on system usage logs.

2. Be able to take corrective action if an event does not occur within a pre-programmed time interval.

3. Allow the system to detect an application program malfunction such as a programming error which places the program in a closed loop. When this occurs system resources are effectively denied to other users until the error is detected and corrected. An internal timing device will allow the computer to automatically inform the operator that a program has been utilizing system resources for an extended time period and the operator will then make the decision as to whether this extended execution time is correct.

7. RESPONSE TIME.

The COURTRAN II system will be designed to respond within different time frames to different inquiries. For purposes of this discussion "response time" will be defined

as the interval between the terminal operator pushing the last key on the CRT terminal keyboard and the computer displaying the first character of the response on either the terminal screen or the system printer. In the COURTRAN system as now proposed, certain jobs such as the preparation of juror questionnaires will constitute background work, constantly giving way to on-line inquiries received from system terminals which require a response within seconds. Once the COURTRAN system has satisfactorily responded to the terminal inquiry, it will return to the background processing which was in progress when the more urgent inquiry was received.

The COURTRAN system will offer users three categories of response time. The first is "conversational." In this response category, the computer must reply to inquiries or commands at a speed that approximates human conversation. Our target for conversational response is to have the computer react to ninety percent of incoming transactions within two seconds. Examples of transactions which will receive conversational responses are searches of the master name index to determine if a given individual has every been a party in a proceeding before the court, or a command to display all future scheduled court appearances for a given attorney. In these situations, the terminal operator will most probably want to make a decision (whether or not to schedule attorney

X for a status call on date Y) based upon the computer's response. Conversational inquiries will therefore receive the highest processing priority.

The second COURTRAN response category will be "as soon as convenient." An example of this type of transaction would be a request by a deputy clerk for a management report. Although the information contained in the report is essential to the clerk in most cases it would not be required instantly. The computer will therefore process such a report during periods when it is not responding to conversational inquiries, or completing work on an earlier "convenient" task. In the majority of cases, tasks assigned a "convenient" category will be completed within two hours.

The third response category will be "deferred." Tasks in this category will in most cases be processed by the computer during non-peak hours, probably after the normal working day has ended. This will allow the computer to attain the response goals established for transactions in the "conversational" and "convenient" categories and still complete all data processing tasks assigned by the court. Tasks in the "deferred" category, such as the processing of juror accounting data, will normally be completed within 24 hours of receipt.

(8) ADVANCED OPERATING SYSTEM

Any computer selected by the Center must have an advanced operating system which at a minimum will:

(a) Allow tasks of equal priority to share time equally. It is essential that the operating system, in addition to servicing high priority tasks before low priority tasks, equitably share processing time between tasks of equal priority. Absent this capability a user could be forced to wait for system resources at the end of an internal service queue for an extended time period.

(b) Exert full control over interval timing and application program execution.

(c) Handle, analyze, and assign system resources to service all interrupts.

(d) Operate in a manner that is independent of specific input/output devices.

(9) MINIMUM SITE RECONFIGURATION

It is desireable that any mini-computer selected for COURTRAN II support require a minimum of site preparation to allow equipment installation and subsequent operation. Ideally the system selected would operate within the following parameters:

(a) Electrical - The system would operate from a power source of 115 volts of AC current at 60Hz, single phase. The system would be internally protected against line transients. Short circuit and overload protection should be provided on all internal power supplies.

(b) Cooling - Any cooling apparatus needed for proper operation of the system should be provided as an integral part of the equipment and should not require any special air or water facilities external to any system components.

(b) Size - All system components exclusive of any keyboard/CRT terminals which might later be attached should fit in a floor space of less than 150 feet and should have a nominal rack height of not more than six feet.

(10) VENDOR SUPPLIED TRAINING

Since the COURTRAN II computer will be operated by court personnel it is essential that the vendor of any system selected by the Center offer a spectrum of training

courses. The courses should be offered several times a year and should cover all phases of system programming, operation, and maintenance.

(11) SOLE SOURCE MAINTENANCE

Although the Center has informed vendors that they may include equipment components manufactured by other firms in any configuration submitted in response to our request for bids, we have specified that any vendor submitting a bid must be willing to issue a maintenance contract covering all of the equipment contained in his proposed configuration. It is not uncommon in the mini-computer market for manufacturers of various computer components to combine their equipment to form a basic configuration desired by a purchaser. However, each manufacturer normally continues to maintain his own components. This is not a limitation when the resultant mini-computer configurations are utilized by organizations with experienced technical staffs. However, since staff personnel of federal courts will be relatively unsophisticated in data processing technology and computer operations we have established the requirements of sole source maintenance. Without this

restriction a court with an equipment malfunction might find itself in the position of having each of several component repair personnel assigning the blame for system malfunction to vendors of other components.

VI. COURTRAN II Funding Requirements

A. EQUIPMENT COSTS AND OPERATING EXPENSES

The Center has transmitted copies of our computer hardware and software technical specifications to selected computer manufacturers and requested each of them to submit bids for our review. Analysis of those responses received to date indicates that we will be able to procure a mini-computer suitable for COURTRAN II operations for less than one hundred thousand dollars. The exact system cost will be dependant upon the number of terminals desired by the court and the amount of disk storage required by the individual user courts.

The pilot courts will provide all necessary housing for the computer and also those personnel required to enter the courts information into the computer at no cost to the Center. Individual courts will also be responsible for furnishing electrical power, air conditioning, and support equipment such as desks and telephones.

The only costs over and above the initial procurement of the computer itself will be a monthly maintenance charge of approximately $1,200 per month ($14,400 per year) and the salary of a computer operator/technician capable of running the system for the court during pilot operations.

The annual salary for such an individual should be in the vicinity of $22,000 per year.

All of the equipment purchased would be covered by a manufacturers warranty for two or three years. After that time we estimate that approximately $1,000 per year would be required for equipment replacement.

B. POTENTIAL DOLLAR SAVINGS

To test the potential manpower savings which might be realized by the implementation of COURTRAN II in the daily routine docketing and courtroom functions performed by personnel assigned to the Office of the Clerk of Court in a U.S. District Court, the Center commissioned Mr. Earl Kulp, currently a consultant on automation to the Supreme Court, to conduct an in-depth study of two metropolitan District Courts. Mr. Kulp based his study on a technique widely utilized in industry and in the Department of Defense called Clerical Work Measurement (CWM) which allows a researcher to assign numerical time values to individual clerical functions, and to then mathematically compute the manpower savings which would be realized if all or part of any given clerical function were replaced by an automated function. To arrive at the overall computation of savings which any organization would achieve the researcher must naturally subtract the amount of effort necessary to complete the replacement function from the savings to be realized by replacing the old functions.

Mr. Kulp limited his analysis to clerical procedures associated with the processing of civil and criminal cases. He did not attempt to assess the benefits which might be achieved by providing automated data processing support to bankruptcy or jury operations, nor did he measure the

savings which might be achieved by court related agencies such as the U.S. Attorney, U.S. Marshall, or Probation Office who, at no additional effort to the District Court, can easily be provided with meaningful management information as a normal byproduct of the District Court ADP system.

Mr. Kulp's main conclusions[2] were that COURTRAN II, applied to existing routine clerical functions performed in processing civil and criminal cases, would achieve... "substantial savings by eliminating at least 80% of the work now done by the docket sections..." as well as providing "...significant improvements in management information available to schedule and keep cases moving efficiently..." In commenting on COURTRAN II's probable dollar impact on the operations of the U.S. District Court for the Northern District of Illinois Mr. Kulp noted that "...in terms of the docket operations alone... savings can be estimated at a minimum of seven persons..." In terms of dollars seven positions translates to approximately fifty-six thousand dollars (7 X $8,000 per year salary per position).

In a separate analysis conducted by the Center in conjunction with personnel from the Clerk's office of

---

[2] Mr. Kulp's report is attached as Annex B to this report.

Northern Illinois which projected Mr. Kulp's analysis into the areas of bankruptcy, jury selection, financial accounting, and other support which could be rendered to the Clerk of Court it was estimated that an additional four positions (or thirty-two thousand dollars) could be saved by the introduction of COURTRAN II.

In view of the multi-year period required to get COURTRAN II operating successfully in all identified areas many of the "saved" positions will be realized by the absence of the need to expand the Clerk's staff as caseloads increase. In fact, there may be a need to temporarily augment the staff of pilot courts during the initial phases of system implementation due to the requirement to continue to perform all existing manual functions while COURTRAN is being debugged.

In addition to the above savings which would continue to be realized each and every year the initial pilot system to be located in the District of Columbia would also allow the Federal Judicial Center to transfer its research and development processing tasks to the pilot computer thereby eliminating existing commercial processing. Center expenditures for commercial computer services have steadily increased during the past three years. We now estimate that if these expenditures were to remain at their current level

for the next 18 months we would recover the cost of an entire mini-computer system by transferring our data processing work for that 18 month period performed to the pilot COURTRAN computer.

We have not attempted to assign dollar savings to the many nonquantifyable benefits which will be provided a pilot COURTRAN II installation such as improved internal operations, timely transcript production, conflict free scheduling, word processing capabilities and more efficient jury utilization. In the latter area the introduction of improved manual jury utilization procedures saved five-hundred thousand dollars in one large metropolitan court in a single year. While we do not claim that the introduction of a computer system alone will produce similar results, it seems reasonable to assume that the sophisticated assistance provided by COURTRAN II will result in significant dollar savings.

We conclude that the savings to be realized by the procurement of a COURTRAN II mini-computer and its integration into district court operations far outweigh the costs associated with undertaking the project.

VII. Summary

A systems design team consisting of members of the Center staff, district court clerks, and private consultants has conducted a thorough examination of federal court operations to determine whether or not the development of a court management information and research system operated on a mini-computer located in the courthouse would be capable of providing meaningful support to court operations in an economic manner. We have concluded that the answer is overwhelmingly yes.

We have identified twelve functional areas where we believe the COURTRAN II system operated on a mini-computer could provide substantial assistance. We have discussed our tentative findings with chief judges, circuit executives, and clerks of court and have asked for their critical review and comment. In all cases we received encouragement to proceed as rapidly as possible with further development so that early pilot operation of the COURTRAN II system could be accomplished. Additionally, the Center retained Arthur Young and Company to conduct an in depth examination of our COURTRAN II planning and development work, and specifically requested them to identify any weaknesses which existed. Their report to the Center dated January 31, 1974 stated that all aspects of system development and planning, including cost-benefit analysis, had been thoroughly

considered and concluded with the statement "(w)e believe that the Federal Judicial Center approach towards using mini-computers for developing the next generation of federal court information systems is quite sound and technically attainable."

We have prepared cost estimates to determine as accurately as possible the overall net cost of the COURTRAN II project. Although computer development projects are rarely, if ever, justified today on the basis of actual dollar savings we were pleasantly surprised to discover that COURTRAN II would in fact result in substantial savings over its projected system life. Further, most of the projected savings will be realized on an annual basis during the life of the system.

In short, COURTRAN II appears to be a functionally and economically sound project which offers federal courts the opportunity to acquire a much needed ADP capability within a short period of time.

COURTRAN II

COMPUTER EQUIPMENT AND SYSTEM SUPPORT

TECHNICAL SPECIFICATIONS

Prepared by Innovations and
Systems Development Staff,
Federal Judicial Center

Annex A

MANDATORY SYSTEM PARAMETERS

1. The central processing unit must have a maximum non-volatile memory cycle time of 1.5 micro-seconds.

2. The system must have a word length multiple of 16 bits.

3. The system must have a minimum initial memory size of thirty-two thousand 16 bit addressable locations. Memory must be capable of future expansion to sixty-four thousand 16 bit locations. Offerors should state the amount of memory accompanying any proposed system which is directly addressable.

4. The system must have the capability for byte handling instructions.

5. The system must have an autonomous direct memory access channel which operates on a memory cycle steal basis. Offerors must state the limitations on any proposed system regarding concurrent CPU operation, multiplexor or party line input/output operations, and direct memory access transfers.

6. The system must have a hardware power fail/auto restart capability.

7. The system must have a memory protect capability which (a) allows memory to be segmented into discrete blocks and (b) will permit any program to read a protected location although inhibiting any attempt to write into a protected segment.

8. The system must have a direct memory access channel which will support independent direct memory access transfers simultaneously with slow speed input/output transfers. The direct memory access channel must be capable of supporting transfers to magnetic tape or magnetic disc at a speed of 1.25 million bytes per second.

9. The system must have the equivalent of a Model 33 ASR teletypewriter as the system console, with all cables, connectors, controllers and other equipment or software necessary for successful operation.

10. The system must contain one industry compatible magnetic tape unit with the following characteristics:

    a) nine tracks.
    b) a minimum write speed of 45 inches per second, and a minimum rewind speed of 200 inches per second.

    c) a packing density of 800 characters per inch.
    d) a tape format that is IBM compatible.
    e) a minimum transfer rate of 36 thousand bytes per second.
    f) a capability to handle 2400 feet of 0.5 inch wide, 1.5 mil thick tape.

11. The magnetic tape interface supplied with the system must have the capability of handling four magnetic tape units, although only a single tape unit is initially desired. Any responses should state the complete price of three additional tape units.

12. The system must contain a fully buffered line printer capable of a minimum speed of 200 lines per minute, where a line consists of 132 print positions utilizing a 64 character print set.

13. The system must contain a minimum of 60 million bytes of disc storage evenly distributed between two spindles. The disc storage proposed must be fully capable of operating as an integral part of the overall system, and any price quoted must include all cables, connectors, controllers and other equipment or software necessary for successful operation.

14. The disc controller supplied with the system must be capable of allowing the addition of two additional spindles and an additional 60 million bytes of useable storage at a future date without requiring modification or the addition of other equipment.

15. The system must contain either diagnostic hardware or diagnostic software sufficient to verify the correct operation of all system components.

16. The offeror of any system will be required to offer the government a prime-shift maintenance contract for all components of any proposed system whether or not the offeror is the manufacturer of all components. The government does not desire to deal with more than one contact in any matters pertaining to system maintenance. Depot maintenance will not be acceptable.

17. The offeror of any system will be required to furnish the government with complete training for four programmer analysts and for two system operators. The training must cover the operation and use of all components of any system the offeror proposes.

18. Offerors are requested to separately list all costs associated with items 16 and 17 above. In addition any other maintenance costs such as transportation or shipment of repair parts which the offeror will expect the government to pay should be clearly stated.

MANDATORY SOFTWARE REQUIREMENTS

1. Any software necessary or desireable for the operation of any proposed system which is not provided without charge must be clearly priced. Additionally if there is any charge for both source code and binary code listings of all software provided this charge should be clearly stated. Any restrictions which exist regarding the future use of any software or listings provided should be clearly stated.

2. The software proposed must have the capability of supporting either (a) time-sharing operation or (b) real-time multiprogramming operation.

3. If software to support real-time multiprogramming operations is proposed it must have the capacity to allow tasks of equal priority to share time equally.

4. If software to support real-time multiprogramming operations is proposed it must allow multiple applications to operate concurrently with inter-leaving capabilities. Additionally it should allow background applications to be rolled out to provide necessary memory space for non-resident foreground applications.

5. The operating system must control all internal timing, as well as automatically maintain the calendar date and time of day.

6. The operating system must allow tasks to communicate with other tasks, as well as allowing tasks to activate and execute other tasks.

7. The operating system should automatically handle and service all interrupts.

8. The system must allow all input/output operations to be device independent, as well as allow all device allocation to be accomplished without requiring an alteration to the operating system software.

9. The operating system must allow all tasks to communicate with the operator via the console.

10. The operating system must handle the proper execution sequence of various tasks with different priority levels.

11. The operating system must allow on-line compilation and assembly of user programs.

12. The operating system must allow the user to debug and test programs in an on-line environment.

13. The operating system must support the accessing of all peripheral devices.

14. The operating system must allow named file handling.

ADDITIONAL INFORMATION DESIRED

1. The government desires to be required to complete a minimum of site modification to successfully operate any system proposed. Desireable, though not mandatory, environmental operating requirements would be as follows:

   (A) Electrical - The system would operate from a power source of 115 volts of AC current at 60Hz, single phase. The system would be internally protected against line transients. Short circuit and overload protection should be provided on all internal power supplies.

   (B) Cooling - Any cooling apparatus needed for proper operation of the system should be provided as an integral part of the equipment and should not require any special air or water facilities external to any system components.

   (C) Size - All system components exclusive of any keyboard/CRT terminals which might later be attached should fit in a floor space of less than 150 feet and should have a nominal rack height of not more than six feet.

However, systems operating in all environments will be considered. In any response offerors must specify the minimum tolerable operating conditions for each system component, as well as state any special or unique site preparation requirements which would have to be accomplished to operate any system proposed. Comments regarding environmental operating conditions should at a minimum cover: POWER: voltage, phasing, amperage and power source

AIR CONDITIONING: operating temperature range, relative humidity, and cooling capacity required

FLOORING: equipment size, ceiling height needed, weight limits for flooring, and amount of cableing

2. The government desires to commence software development prior to the delivery of any system which might be procured. Offerors should state whether or not a system fully compatible with any proposed could be made available to the government in the Washington, D.C. metropolitan area. Offerors should additionally list the costs which would be assessed the government for the use of this equipment as well as any restrictions such as availability times or pre-empt possibilities which would accompany the equipment.

3. Offerors should clearly state the delivery time for each component of any system proposed, as well as stating the time and additional costs, if any, associated with the assembly of all components and the installation of the system in a location to be specified by the government.

4. Offerors should state the amount of technical assistance which will be provided to the government, if any, during the period of software development and equipment installation. All costs associated with such technical assistance should be clearly stated.

C O U R T R A N

E V A L U A T E D

B Y

C L E R I C A L

W O R K

M E A S U R E M E N T

PRELIMINARY REPORT SUBMITTED BY EARL M. KULP, SEPTEMBER 20, 1973

BASED ON ANALYSIS OF THE FEDERAL DISTRICT COURT OF NORTHERN ILLINOIS

Annex B

C O U R T R A N E V A L U A T E D B Y C W M

The principal routine docketing and courtroom tasks of the Federal District Court of Northern Illinois were analysed by MTM-based Clerical Work Measurement (CWM) standard data, to determine:

- potential work savings by Courtran computerization of Federal District Court clerical operations
- potential applicability of CWM data and techniques for planning of court clerk office operations.

Background

Planning for increased productivity must be based on meaningful data. In industry it was long ago found that time study could not give such meaningful data economically. Collection of such data was cumbersome, costly, and friction-generating; the results were often, indded usually, too full of anomalies and inconsistencies to be of use.

About thirty years ago three engineers at Westinghouse in Pittsburgh took several million feet of slow-motion movies of workers. They found a high degree of consistency in the time taken for elemental arm, leg, and eye motions. From this they derived tables of Method-Time-Measurement (MTM) data, which have since become the accepted basis of work measurement in industry.

Much as computer assembly language has been synthesized into higher languages to speed application, the basic MTM data has been synthesized into more powerful elements. Within the US Government, the main effort has been in the Air Force Logistic Command, which developed General Purpose Data (GPD) and Clerical Measurement Data (CMD). The tables of these data are given in Annex 2.

Application of such data in the office has been surprisingly slow. Many banks and insurance companies are using office-oriented syntheses of MTM, but few other offices are using it in private businesses. In the government, application has been limited to some Census operations, the Post Office, and the Air Force and Navy logistic and maintenance operations. The hesitency has been due to the misconception that it was only applicable to office operations of a volume and repetitiveness which simulated factory conditions. It was assumed that the ordinary office situation involved too great a variety of tasks, making analysis and subsequent measurement of actual work inpractical.

This study was undertaken to demonstrate how CWM can be applied quickly and economically in planning office operations of a scale that is typical not only to the Courts but to many government agencies. The problem addressed specifically was computerization. Can it actually save personnel? Specifically where and how? In addition to improved information, can specific cost savings be realized in the Courts from ADP which can justify the investment by rigorous cost-benefits criteria?

Main Conclusions:

Batch Courtran, when fully implemented, can give highly useful management information, but it cannot realize any actual savings by eliminating complete jobs. OLRT Courtran, an on-line-real-time system with data display and entry to and from the courtroom itself, can realize substantial savings by eliminating at least 80% of the work now done by the docket sections. To realize the full financial and other benefits of OLRT Courtran---indeed, in order to make it work at all---a radical reorganization of the Clerk operations will be necessary.

Further analysis is needed of the Jury and Bankruptcy operations, to determine the full potential benefits of ADP in Federal District Courts and the maximum configuration required for a dedicated computer system.

The general configuration of the Courtroom and Docket portion of Full OLRT Courtran are illustrated on table 1.

POTENTIAL TIME SAVINGS

Tasks which can be automated are analysed on the forms in Annex 1. The results are summarized on table 2. The time values are stated in TMU, Time-Motion-Units of 1/100,000 of an hour. Tasks are listed alphabetically by their mnemonic codes. After the automatable operations of the Docket and Courtroom Clerk personnel come the Special Macro-Elements, suboperations which may be common to more than one task.

In applying CWM data, it has been found that direct measureable work of office personnel amounts to 400,000 TMU per day, about 50% of an 8-hour day's work. With proper planning and guidance based on CWM, this figure can be raised to about 75%.* Thus, automation can eliminate positions only if the manual operations replaced amount to around 400,000 TMU per day, for particular individuals.

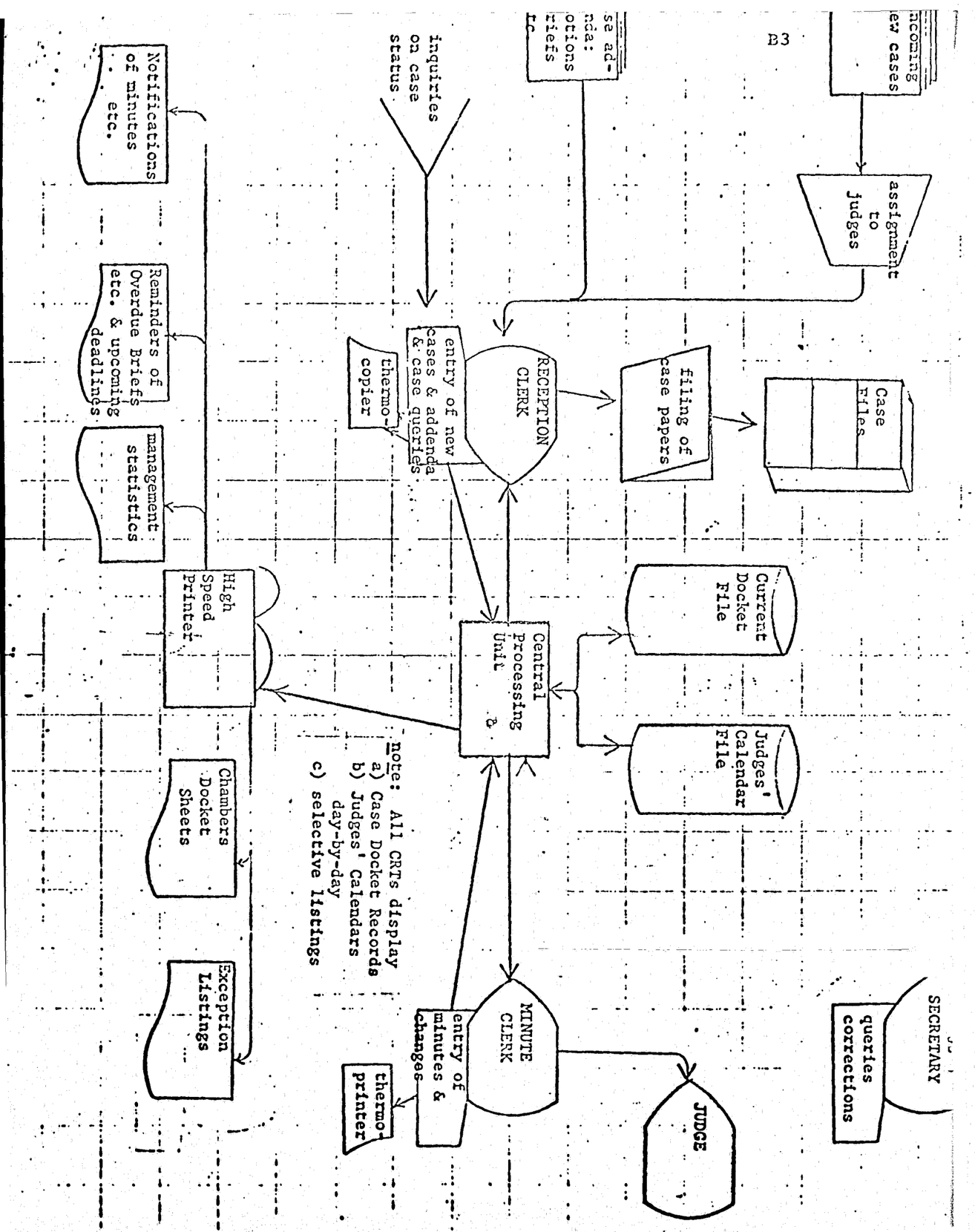
Batch Courtran Savings

Present and planned batch operations provide significant improvements in management information available to schedule and keep the cases moving efficiently. They do not provide significant savings in time that could lead to reduction of staff.

The Minute Clerks still must carry on all their previous clerical operations. They must write out minute orders and post them to the pending case, list, the calendar, and in some cases, the chambers docket. For those who have maintained tickler files on briefs due, exception reporting will save some time:

CTR-TE Brief Tickler File First Entry	5 per day x 4,129 =	.21 hrs.
CTR-TU Brief Tickler File Update	8 per day x 2,643 =	.21 hrs.
	net saving	.42 hrs.

Some further minutes are saved by format improvements of new batch Courtran reports. A critical part of the work of an effective minute clerk is crash rescheduling, finding cases to fill in unexpected gaps in the trial schedule. When a minute clerk must get on the phone and call attorneys to advance cases to trial tomorrow or the next day, minutes saved may count. Slightly faster ability to identify reschedulable cases make a few extra dispositions ...



SUMMARY OF CWM OPERATION TIMES

mnemonic	operation		TMU
DKT	Docket Operations		
DKT-IE	Initial Case Docket Entry		23,055
-IET	" " " " --typing elements		10,227
IEC	--CRT elements		1,570
DKT-MO	Post Minute Order to Docket Sheet		8,964
-MOT	" " " " " " --typing elements		1,660
DKT-CP	Prepare Monthly New Cases Pending List	per batch	11,557
		per case	1,219
CPT	" " " " " " --typing elements		849
CTR	Courtroom Operations		
CTR-CL	Calendar Entry		2,182
CTR-MOL	Write Minute Order by Longhand		4,326
CTR-PM	Post Minute Order to Chambers Docket	per batch	5,089
		per case	1,944
CTR-TE	Brief Tickler File--First Entry		4,127
TET	" " " " " --typing elements		2.323
CTR-TU	Brief Tickler File -Update		2,643
TET	" " " " --typing elements		1,157
SME-	Special Macro-Elements		
-CE	Correct Typing Error		.323
-EV	Type Envelope		712
-FT	Filing in a Tray		
A	Find & Take out Docket Sheet		567
B	Put back docket sheet - Position Open		345
C	Find Location & Put Back Docket Sheet		446
-GF	Get Forms from Cabinet		748
		per foot over 10' from desk	+15
-MT	Type Minute		1,660
-SF	Stamp Fixed Caption	first copy	365
		additional copy	192
-SS	Sign & Seal Summons		3,367
-XR	Xerox Copies (on #3000)	first copy	2,562
		per foot over 20' from desk	+15
		per added original	+805
		per added original on autofeed	+100
		per added copy	+30

Allowances: DKT and CTR Operations include a 20% supplementary allowance. No additional allowance is included in the suboperation or SME times.

per month. But the minutes saved do not in any way add up to a job saved.

The Docket Supervisor is now saved the job of typing a monthly list of new cases pending:

DKT-CP Prepare Monthly New Cases Pending List
11,557 TMU + 1,219 TMU per case
x an average 375 cases a month = 4.3 hours
x a peak loand of 600 cases a month = 7 hours

This workload to be done at the start of each month when other reports were also due. Relief from this monthly chore permits the supervisor to exercise another full day of effective supervision and trouble-shooting each month. It does not add up to a job saved.

By OLRT Courtran

The Minute Clerk would enter minutes to the case record by CRT from the Courtroom as the judge takes action, in lieu of writing minutes orders. It should be somewhat faster than writing or drafting minute orders longhand. The clerk would first enter the case number; the screen would display the title in response, to verify the number. The clerk would then enter the mnemonic for the actim; the screen would verify the entry by displaying the full text. The clerk would then enter the next scheduled date; the screen would display the calendar for that date. These built-in responses are important to avoiding errors. Some time may be saved, but it will be insignificant except for those clerks accustomed to typing minute orders after drafting them in courtroom. The computer will print out the notifications to parties.

Elimination of the following operations by ADP will provide some savings, on the basis of an average of 15 minutes and a peak of 30 minute orders per day:

	Std. TMU	average	peak load
CRT-CL Post Minute Order to Calendar	2,182	.33 hr.	.66 hrs.
CRT-PM Post MO to Chambers Docket	5,089 + 1,944	.34 "	.68 "
CRT-TE Brief Tickler File 1st Entry	4,127	.21 "	.42 "
CRT-TU Brief Tickler File Update	2,647	.21 "	.42 "
		1.1 hrs.	2.2 hrs.

All this should facilitate and encourage all minute clerks to do a more thorough analysis and management of their judges' pending dockets.

The Docket Clerk job can be eliminated almost entirely:

	Std. TMU	average	peak load
DKT-IE Initial Case Docket Entry (1-2/day)	23,055	.23 hr.	.46 hrs.
DKT-MO Post MO to Docket (20-40/day)	8.964	1.8 "	3.6 "
DKT-AD Post Incoming Addenda (10-20/day) = DKT-MO - (SME-XR + SME-EV)	4,200	.42 "	.84 "
		2.5 to	5.9 hrs.

There will still remain the task of initial case entry to the computer. This can be handled in one of two ways. It can be merged with assignment of cases to judges, which can be largely computerized. Or it can be handled by the Reception Clerk for a team of jeudges. For a peak intake of about 25 cases a day, the total time required will be:

DKT-IE Initial Case Docket Entry	23,055
- DKT-IET typing elements	-10,225
+ DKT-IEC CRT elements	+ 1,570
per case entered by CRT	14,400
x peak daily load	x 30
	432,000

Thus the peak load can be handled by one person entering cases by CRT.

A full meaningful estimate of potential savings by ADP must come after a similar analysis of the jury, bankruptcy and financial sections. Filing and addressing of notifications is now handled largely by personnel primarily concerned with bankruptcy. Initial data entry may be handled either by the assignment clerk or by clerks handling filing for a team of judges. Filing must also be considered in estimating OLRT Courtran staffing and net savings.

In terms of the docket operation alone, OLRT can replace some 8 present docket clerks with the equivalent of one person handling initial docket entry. Savings can be estimated at a minimum of 7 persons x $8,000 minimum per year = $56,000.

REORGANIZATION

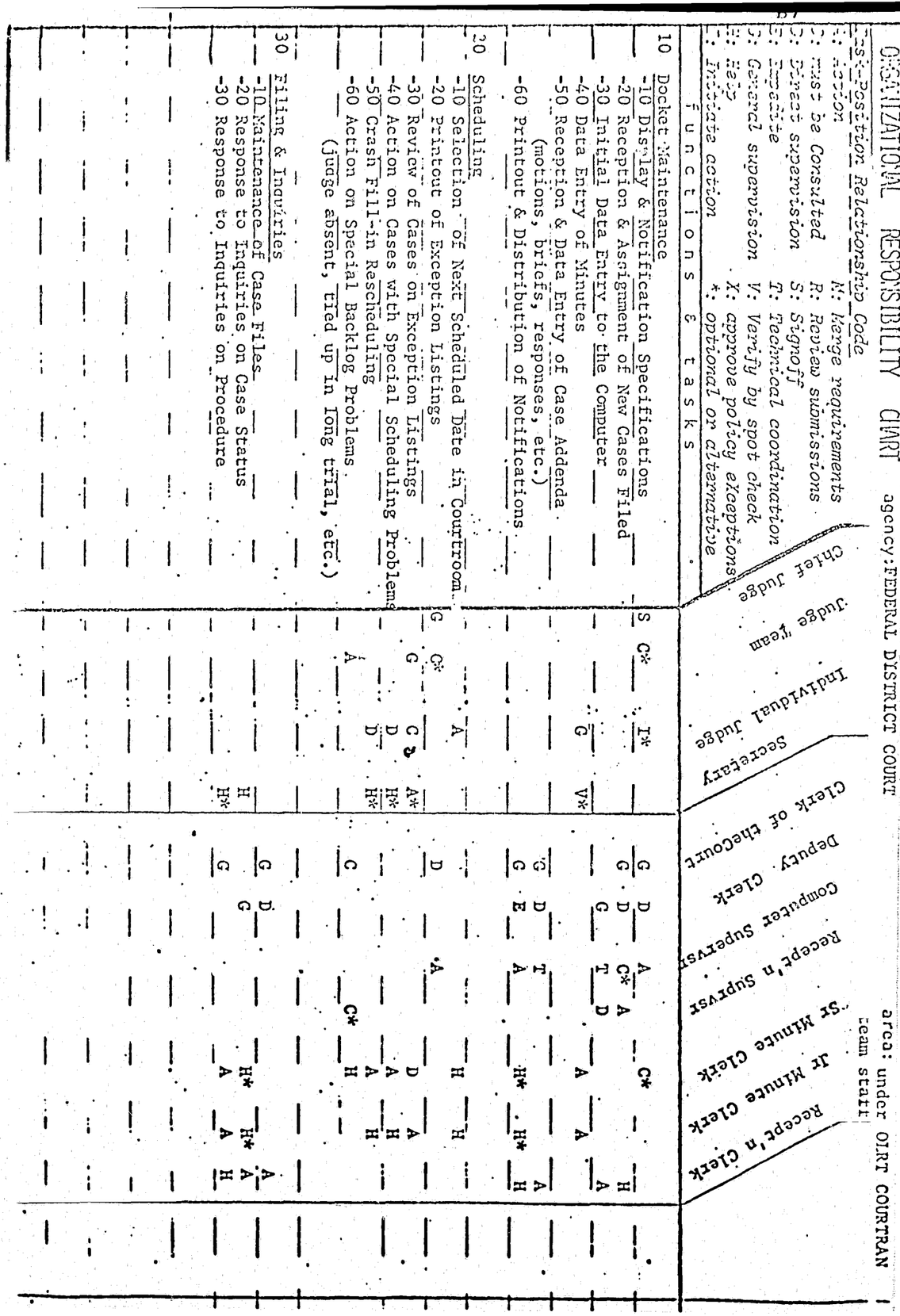
In order to make OLRT Courtran work and realize its full benefits, a thorough reorganization of Clerk Office functions is needed. The main features of such a reorganization are:

- abolition of the Civil and Criminal Docket Sections
- grouping judges and staff in teams of 3-5 judges, supported by
  - Minute Clerks
  - one Minute Clerk acting as Senior Minute Clerk
  - one Reception Clerk

The general configuration of the computer system and the inputs and outputs is illustrated on table 3. The organizational relationships are illustrated on table 4.

Routine

The Reception Clerks would concentrate in the morning on admission of new cases and response to inquiries, both of which are likely to peak from 10:00 to 12:00. In the afternoon they would concentrate on input of new cases and filing of case papers. They would continue to handle admissions and most inquiries. The reception clerks would rotate as primary assignment clerks and would take up additional assignment clerk stations whenever incoming cases begin to queue up. They would handle all inquiries in the first instance, refering them to secretaries of judges in the morning and courtroom deputies in the afternoon when they queue up or involve special complications.



The Minute Clerks would spend most of the morning in court and most of the afternoon at their desks. Entry of minutes to the computer could either be made direct from the courtroom or afterward. In some cases the judges' secretaries would carry some of the responsibilities of the minute clerks. The senior minute clerk, in addition to servicing his judge, would guide and assist the other minute clerks in difficult situations. In particular, the senior minute clerk would assist in emergency rescheduling, getting on the phone himself to call attorneys.

It should be noted that the structure provides an effective career ladder: Reception Clerk to Minute Clerk to Senior Minute Clerk.

Key Features

The suggested OLRT Courtran organization and procedures have certain key features encouraging and sustaining high performance:

. Effective Assignment of Responsibility: Individuals and teams have a continuing responsibility for a case from filing till disposition. If there are any delays or errors, the persons responsible will be obvious. Those inputting data to the computer or papers to the files are the very persons who will subsequently have to retrieve the data or papers; they thus get an immediate direct penalty for any errors they may make. Since they work with the same cases repeatedly they cannot plead ignorance; they have opportunity and incentive to know the cases as substance and personality rather than as fleeting numbers.

Contrast this to the situation of the full time key-punch operator or file clerk, to whom the data is meaningless numbers that will never be seen again.

. Timely Feedback: The system provides some immediate flagging of input errors and fairly prompt signalling of cases requiring attention. CRT data entry provides interactive responses to flag certain errors. When the operator enters a case number, the screen displays the title, indicating any error in the key number entered. The operator enters an action by a three-letter mnemonic; the screen displays the full text of the action and tells the operator whether he entered the right code. The operator enters the next scheduled date; the screen displays the calendar for that date, which may indicate to the operator whether he entered a wrong date.

Similarly, on a weekly or biweekly basis, exception reports can flag cases needing attention: cases on which no next date is set, cases on which briefs are overdue, cases which are exceptionally old, etc.

Again, we may contrast the CRT response to inputs with the lack of response to key-punched inputs.

. Flexible Mutual Backstopping: Critical functions and peak workloads are effectively reinforced by the system. This is particularly important on service to the public. If incoming visiting attorneys or incoming phone calls begin to queue up, the structure and procedure automatically brings in more personnel to service them. On admission and assignment of cases, additional

reception clerks take their places at admission & assignment desks if a queue begins to form. On incoming phone calls, the reception clerk can switch extra calls up to the secretary or minute clerk, if he is already tied up with an inquiry. The secretary and minute clerk also have immediate access to a CRT display of the docket sheet for a case.

Similarly, on crash troubleshooting tasks, the system can provide reinforcement. If a minute clerk must fill in a gap in a schedule, the senior minute clerk as well gets on the phone to help him. If he has particular difficulties with a case, the senior minute clerk can help him. If the reception clerk cannot answer an inquiry, more senior employees are on tap to help him.

Finally, it should be noted that the system can accommodate different work patterns of different judges. A judge can get involved or stay detached from schedule work. A judge can alternately assign certain scheduling responsibilities to his secretary or minute clerk. It may not be possible, however, for a judge to keep his minute clerk tied up in trial just to administer oaths; it may be unfair to his colleagues on the team whose minute clerks are spending afternoons helping each other.

. Job Enlargement: The error-generating monotony of data entry and filing is considerably reduced and alleviated by this system. First of all, CRT data entry is considerably easier and faster as well as more interactive than conventional typing and longhand. Time required for the mechanics is reduced, and the mechanical work is ancillary to work of servicing people.

Just as management statistics indicate relative competitive performance of individual judges, so the statistics can be structured to measure the competitive performance of teams. Along with the usual statistics of cases pending, cases backlogged, median disposition time etc., the computer can monitor number of inquiries and some other work statistics of the team. Thus the reception clerks as well as the minute clerks can all feel that they are taking responsibility for maintaining the productivity and performance of the team.

CTR-CL

WORK MEASUREMENT STANDARD DATA COMPUTATION SHEET

Page of Pages | DATE

JOB ASSIGNED TO SYSTEM

COMPUTED BY

INSTRUCTIONS: Industrial Engineering Division will complete "Work Measurement Requirements" and furnish cut sheets to applicable using activities for each type of computation sheet as required.

WORK ORDER FORM NO.	PART NUMBER FORM TITLE	STOCK NUMBER Oper No.	JOB STANDARD	STATION NO. W/C

NOUN REFERENCE	QUANTITY	STD HRS PER	PIECES	TIME PER PIECE
Calendar Entry				

WORK MEASUREMENT REQUIREMENTS: APPLICATION SHEET FOR FORM COMPLETION

APPLICATION ELEMENTS CODE	IDENTIFICATION	OCCURRENCE: Entry		Case No.	Title	Time						TOTAL OCCUR	ELEMENT TMU	TOTAL TMU
BWR-DA-01	DATE PRINT												X 136 =	
BWR-DA-02	DATE WRITE												X 120 =	
BWR-DN-01	DATE NUMERIC												X 110 =	
BWR-SL-01	SIGNATURE												X 224 =	
BWR-LL-01	LONGHAND-LOWER				5							5	X 15 =	75
BWR-LL-02	LONGHAND-UPPER				40							40	X 23 =	920
BWR-MD-01	MOVE (LL-01)												X 8 =	
BWR-LP-01	PRINT-LOWER												X 18 =	
BWR-LP-02	PRINT-UPPER			2								2	X 23 =	46
BWR-NO-01	NO PER DIGIT			6		4						10	X 16 =	160
BWR-MS-01	✓												X 17 =	
BWR-PS-01	.					2						2	X 8 =	16
BWR-PS-02	, -												X 10 =	
BPL-AL-01	MOVE "F"				5							5	X 2 =	10
BPL-AL-02	1 - 3"				1							1	X 5 =	5
BPL-AL-05	3 - 9"												X 9 =	
BPL-AL-12	9 -15"												X 13 =	
BPL-AL-15	15-21"			1	1/5							1.2	X 17 =	20
OTHER APPLICABLE ELEMENTS: (such as tmu required calc on the form, turning form over, transposing, writing other misc symbols, punctuation, places, moves, etc.)														
Bel-Et-2	Find data			4	4							8	x 6	48
Bel-Et-1	Focus			2	4							6	x 1	6
BRD-Ws-2	Read word				5							5	x 2	35
BRD-N2-1	"1st Digit			1								1	x 12	12
BRD-N2-2	"Up to 6 Digits			7								7	x 7	49
PEL-FA-CA	Find page	1										1	194	194
MPL-EE-6	GSA pen	1										1	77	77
MPL-EE-18	GSA order	1										1	103	103
IPHRA-D3	GSA batch	1/10										1/10	135	14
MPL-EL-24	GSA Diary	1/10										1/10	80	8
CONVERSION: TMU X = MIN.													TOTAL	1815

APPROVALS	DATE	APPROVALS	DATE
INDUSTRIAL ENGINEER		WORK CENTER FOREMAN	
PROCESS TECHNICIAN			

AMC FORM 774 REPLACES AMC FORM 1424, JUN 68, WHICH MAY BE USED.

CTR-MQL

WORK MEASUREMENT STANDARD DATA COMPUTATION SHEET

Page of Pages | DATE

JOB ASSIGNED TO SYSTEM

INSTRUCTIONS: Industrial Engineering Division will complete "Work Measurement Requirements" and furnish cut sheets to applicable using activities for each type of computation sheet as required.

COMPUTED BY

WORK-ORDER FORM NO.	PART-NUMBER FORM TITLE	STOCK NUMBER Oper. No.	JOB STANDARD	STATION-NO. W/C
	Minute Order			
HOUR REFERENCE	QUANTITY	STD HRS PER	PIECES	TIME PER PIECE
Longhand				

WORK MEASUREMENT REQUIREMENTS: APPLICATION SHEET FOR FORM COMPLETION

APPLICATION ELEMENTS		OCCURRENCE													
CODE	IDENTIFICATION	Case No.	Case Name	Judge	Today	Action	Next Date						TOTAL OCCUR	ELEMENT TMU	TOTAL TMU
MWR-DA-01	DATE PRINT													X 136 =	
MWR-DA-02	DATE WRITE				1									X 120 =	120
MWR-DN-01	DATE NUMERIC						1							X 110 =	110
MWR-SL-01	SIGNATURE							1					1	X 224 =	224
BWR-LL-01	LONGHAND-LOWER		40			100							140	X 15 =	2100
BWR-LL-02	LONGHAND-UPPER		5	1		5							11	X 23 =	253
BWR-MD-01	MOVE (LL-01)					10							10	X 8 =	80
BWR-LP-01	PRINT-LOWER													X 18 =	
BWR-LP-02	PRINT-UPPER	2											2	X 23 =	46
BWR-NO-01	NO PER DIGIT	6											6	X 18 =	108
BWR-MS-01	✓													X 17 =	
BWR-PS-01														X 8 =	
BWR-PS-02	" -													X 10 =	
BPL-AL-01	MOVE "f"													X 2 =	
BPL-AL-02	1 - 3"					1	1						2	X 5 =	10
BPL-AL-06	3 - 9"		1	1	1			1					4	X 9 =	36
BPL-AL-12	9 -15"	1												X 13 =	13
BPL-AL-18	15-21"													X 17 =	
OTHER APPLICABLE ELEMENTS: (such as any required calc on the form, turning form over, transposing, writing other misc symbols, punctuation, places, moves, etc.)															
Bel-Et-2	Find Data	4	4			4	4						16	x 6	96
Bel-ET-1	Focus	2	2			2	2						8	x 1	8
Brd-Ws-2	Read word		6			10							16	x 7	112
Brd-N2-1	"1st Digit	1					1						2	x12	24
Brd-N2-2	"up to 6"	8					6						14	x 7	98
MPL-JC-18	GSA Sheet	1											1	x 90	90
MPL-EE-6	GSA Pen	1											1	x 77	77
CONVERSION: TMU · X = MIN.														TOTAL	4326

APPROVALS	DATE	APPROVALS	DATE
INDUSTRIAL ENGINEER		WORK CENTER FOREMAN	
PROCESS TECHNICIAN			

AMC [illegible] 774 REPLACES AMC FORM 1624A, JUN 68, WHICH MAY BE USED. AFLMC-O-SEP 68 [illegible]

CLERICAL WORK MEASUREMENT OPERATION ANALYSIS FORM

Operation: Post Minute to Chambers Docket | Code: CTR-PM

agency | unit | analyst | date

grp & Step	description	unit	element code	TMUs	freq	base TMUs
A1	Reach for batch of MDs	batch	Bpm Hc-01	19	2	38
A2/7	GSA batch	"	Mp1 JC-24	99	1	180
A3/6	GSA Docket Bock	"	Mp1 E1-24	80	2	I60
A4	Turn pages	"	Mph B1-01	38	100	3800
A5	GSA pen	"	Mp1-Ec-12	63	1	63
B1/7	GSA one M.D.	case	Mp1-JC-18	86	2	172
B2	Read M.D. - case and title		M2d-RR-01	38	1x2	76
B3			B2d-Ws-02	7	6	42
B4	Read MO - action and next date and verify		B2d-Ws-03	9	12x2	216
			B2d-N2-03	55	1x2	110
B5	Write - dates		Mw2-Dn-01	110	2	220
B6	Write - action		Bw2-LL-01	15	50	750
			Bp1-Ls-01	8		64

base TMU 4241 per batch x 1.2 allowance = 5089 TMU allowed.
1620 " case 1.2 1944

CTR--TUL

WORK MEASUREMENT STANDARD DATA COMPUTATION SHEET

Page of Pages | DATE

JOB ASSIGNED TO | SYSTEM

COMPUTED BY

INSTRUCTIONS: Industrial Engineering Division will complete "Work Measurement Requirements" and furnish cut sheets to applicable using activities for each type of computation sheet as required.

WORK-ORDER FORM NO.	PART-NUMBER FORM TITLE	STOCK-NUMBER Open No.	JOB STANDARD	STATION-NO. W/C
	Brief Tickler File			
NOUN REFERENCE	QUANTITY	STD HRS PER	PIECES	TIME PER PIECE
Update				

WORK MEASUREMENT REQUIREMENTS: APPLICATION SHEET FOR FORM COMPLETION

APPLICATION ELEMENTS		OCCURRENCE															
CODE	IDENTIFICATION	Today	Next Date	Action											TOTAL OCCUR	ELEMENT TMU	TOTAL TMU
MWR-DA-01	DATE PRINT															X 136 =	
MWR-DA-02	DATE WRITE															X 120 =	
MWR-DN-01	DATE NUMERIC	1	1												2	X 110 =	220
MWR-SL-01	SIGNATURE															X 224 =	
BWR-LL-01	LONGHAND-LOWER			40												X 15 =	600
BWR-LL-02	LONGHAND-UPPER			5											5	X 23 =	115
BWR-MO-01	MOVE (LL-01)															X 8 =	
BWR-LP-01	PRINT-LOWER															X 18 =	
BWR-LP-02	PRINT-UPPER															X 23 =	
BWR-NO-01	NO PER DIGIT															X 18 =	
BWR-MS-01	✓															X 17 =	
BWR-PS-01	"															X 8 =	
BWR-PS-02	" -															X 10 =	
BPL-AL-01	MOVE "1"		1	5											6	X 2 =	12
BPL-AL-02	1 - 3"															X 5 =	
BPL-AL-06	3 - 9"															X 9 =	
BPL-AL-12	9 -15"	1													1	X 13 =	13
BPL-AL-18	15-21"															X 17 =	
OTHER APPLICABLE ELEMENTS: (such as any required calc on the form, turning form over, transposing, writing other misc symbols, punctuation, places, moves, etc.)																	
BelEt2	Find data	4	2	4											10	x 6	60
~~BelEt1~~	~~Focus~~	2	2	2											8	x 1	8
BRD WS2	Read word			5												x7	35
BRD WR	"1st Digit	1	1												2	x 12	24
BRD NR2	" Up to 6+	5	5												10	x 7	70

CONVERSION: TMU · X = MIN. TOTAL 1157

APPROVALS	DATE	APPROVALS	DATE
INDUSTRIAL ENGINEER		WORK CENTER FOREMAN	
PROCESS TECHNICIAN			

AMC FORM 774 REPLACES AMC FORM 142AC, JUN 68, WHICH MAY BE USED. AFLCM/AFLC 84-44

WORK MEASUREMENT STANDARD DATA COMPUTATION SHEET

Page of Pages | DATE

JOB ASSIGNED TO | SYSTEM

COMPUTED BY

INSTRUCTIONS: Industrial Engineering Division will complete "Work Measurement Requirements" and furnish cut sheets to applicable using activities for each type of computation sheet as required.

WORK-ORDER FORM NO.	PART-NUMBER FORM TITLE	STOCK-NUMBER Open No.	JOB STANDARD	STATION-NO. W/C
NOUN REFERENCE	QUANTITY	STD HRS PER	PIECES	TIME PER PIECE

WORK MEASUREMENT REQUIREMENTS: APPLICATION SHEET FOR FORM COMPLETION

APPLICATION ELEMENTS		OCCURRENCE															
CODE	IDENTIFICATION	Case #	Attorney	Phone #	Motion	Due date	Case name								TOTAL OCCUR	ELEMENT TMU	TOTAL TMU
MWR-DA-01	DATE PRINT															X 136 =	
MWR-DA-02	DATE WRITE														2	X 110 =	220
MWR-DN-01	DATE NUMERIC					2										X 224 =	
MWR-SL-01	SIGNATURE														95	X 15 =	1275
BWR-LL-01	LONGHAND-LOWER		SRO		25		40								6	X 23 =	138
BWR-LL-02	LONGHAND-UPPER						3									X 8 =	
BWR-MO-01	MOVE (LL-01)														2	X 18 =	36
BWR-LP-01	PRINT-LOWER	2														X 23 =	
BWR-LP-02	PRINT-UPPER														14	X 18 =	252
BWR-NO-01	NO PER DIGIT	6		8												X 17 =	
BWR-MS-02	✓															X 6 =	
BWR-PS-01	"															X 10 =	
BWR-PS-02	" -															X 2 =	
BPL-AL-01	MOVE "1"															X 5 =	
BPL-AL-02	1 - 3"															X 9 =	
BPL-AL-06	3 - 9"															X 13 =	
BPL-AL-12	9 -15"															X 17 =	
BPL-AL-18	15-21"																
OTHER APPLICABLE ELEMENTS: (such as any required calc on the form, turning form over, transposing, writing other misc symbols, punctuation, places, moves, etc.)																	
BelEt2	Find Data	4	4	4	4	4	4								24	x 6	144
~~BelEt1~~	~~Focus~~	2	2	2	2	2	2								12	x 1	12
~~BRDwr2~~	~~Read Word~~		2		3		4								9	x 7	63
~~BRDnr1~~	~~" digit~~	1		1		1										x12	36
~~BRDnr2~~	~~" " 24~~	7		7		7									21	x 7	147

CONVERSION: TMU · X = MIN. TOTAL 2322

APPROVALS	DATE	APPROVALS	DATE
INDUSTRIAL ENGINEER		WORK CENTER FOREMAN	
PROCESS TECHNICIAN			

AMC FORM 774 REPLACES AMC FORM 142AC, JUN 68, WHICH MAY BE USED. AFLCM/AFLC 84-44

CLERICAL WORK MEASUREMENT — TYPING APPLICATION FORM

operation: Initial Docket Entry - CRT | code: DKT-1E-2

agency: Ill. No Fed Dist Court | unit: Docket | analyst: Kulp | date: 9/15/73

	code	data fields					elem TMUs	totl freq	total TMUs
straight typing									
good 'first line	MTY-LT-03						336		
source add'l line	MTY-LT-04						309		
rough 'first line	MTY-LT-07						362		
source add'l line	MTY-LT-08						335		
non-straight typing									
key depress per stroke	BTY-KD-01	8	40	120	30	2	4	200	800
carriage return	MTY-CR-02	1	4		6		12	11	132
continuous type/inch	BTY-CT-02						39		
index additional line	BTY-LI-02	1	2				4	3	12
key lock/unlock	MTY-KL-02						8		
key shift	BTY-KS-02		6	7	2		7	15	105
move to exact line	MTY-CP-02						66		
move to exact space	MTY-CP-05						33		
other elements									
get & aside source doc.	MPL-JC-18	1					86	1	86
eye travel/in (20" max)	BEL-ET-04	20	20	20	20		1	80	80
eye focus	BEL-EF-01	1	10	6			7	17	119
read words individually	BEL-EF-01		10	20			7	30	210
" " in seg normal	BRD-WS-02						7		
" " in seg diff.	BRD-WS-04				50		11	50	55
" numbers: 1st digit	BRD-NR-01	1					12	1	12
" " ea. (2-6)	BRD-NR-02	5					5	5	25
" " ea. (7+)	BRD-NR-04	2					7		14

set-up	code			
one sheet	TTY-SU-AA	633		
sheet & carbons/form set	TTY-SU-			
remove paper	MTY-PR-01	82		
set margin	MTY-MS-01	50		
set first tab	MTY-TS-01	65		
set additional tab	MTY-TS-02	37		
clear tabs:all stops cont	MTY-TC-02	56		
other				
		TOTAL TMU		1570

Assumes electric typewriter. Does not include make-ready other than typewriter setup.

CLERICAL WORK MEASUREMENT — OPERATION ANALYSIS FORM

operation: Monthly New Cases Pending List | code: DKT-CP

agency: Ill No Fed District Court | unit: Docket | analyst: Kulp | date: 9/15/73

grp & Step	description	unit	element code	TMUs	freq	base TMUs
		Batch				
A1	Go to File Cabinet	"	Bbm-Wn-01	15	20	300
A2	Open Drawer	"	Mog-Do-03	42	1	42
A3	Get out locator cards	"	Mgt-6h-24	64	10	640
A4	Close drawer	"	Mog-Dc-03	29	1	29
A5	Go to table	"	Bbm-Wn-01	15	30	450
A6	Put down cards	"	Bpl-Cs-24	42	10	420
B1	Pick up small group		Mgt-JH-18	53	1/20	3
B2	Pick up 1 card	Case	Mgt-Jc-06	50	1	50
B3	Read name of judge	"	Bel-EP-01	7	1	7
B4	Put in pile for judge	"	Bpl-Es-24	69	1	69
A7	Pick up deck for each judge	"	Mgt-JC-24	89	16	1424
A8	Jostle Deck	Batch	Bph-Bj-01	15	5x16	1200
A9	Get rubber band	"	Mgt-Jb-24	64	16	1024
A10	Put rubber band on deck	"	Mpl-Bb-01	37	16	592
A11	Put judger deck on pile	"	Bpl-Eg-24	69	16	1104
A12	Pick up pile	"	Mgt-Jh-18	53	8	424
A13	Go to desk	"	Bbm-Wu-01	15	30	450
A14	Sit at desk	"	Bbm-Ss-02	172	1	172
A19	Open drawer	"	Mog Do-02	51	1	51
A20	Get out paper	"	MpD-JE-24	126	1	126
A21	Close drawer	"	Mog Dc-02	25	1	25
A15	Put down decks	"	MpD-JC-24	99	5	495
A16	Get decks aside	"	MpD-JC-24	126	1/16	13
A17	Remove rubber band	"	Mpl-B2-01	33	1/16	13
A18	Pick up rubber band	"	Bpl-Cs-24	42	1/16	13

base TMU ~~9631~~ *per* batch *x* 1.2 *allowance =* 11,557 *TMU allowed.*

NOTES: Counting only operations replaced by computer i.e. not counting stapling, xeroxing and distribution of reports

CLERICAL WORK MEASUREMENT
OPERATION ANALYSIS FORM

operation: Monthly New Cases Pending List — code: DKT-CP

agency — unit — analyst — date

grp & Step	description	unit	element code	TMUs	freq	base TMUs
A19	Put down deck	batch	Bpl-CS-12	31	1/16	2
A20	Type list	batch		648	1	648
B5		case		822	1	822
B6	Correct Errors 1/5 cases	case	SME-CE	323	1/5	65

base TMU 1016 per case x 1.20 allowance = 1219 TMU allowed.

NOTES: Av. load 375 cases requires 4.7 hours peak load 600 cases requires 7.4 hour

CLERICAL WORK MEASUREMENT
TYPING APPLICATION FORM

operation: Monthly New Cases Pending List — code: DKT-CPT

agency: Ill No. Fed. District Court — unit: Docket — analyst: Kulp — date: 9/15/73

	code	data fields: Page Heading	Case Data						elem TMUs	tctl freq	total TMUs
straight typing											
good 1st line	MTY-LT-03	1/16							336	1/16	21
source add'l line	MTY-LT-04								309		
rough 1st line	MTY-LT-07		1						362	1	362
source add'l line	MTY-LT-08		2						335	12	67
non-straight typing											
key depress per stroke	BTY-KD-01								4		
carriage return	MTY-CR-02	1	1.2						12	1.3	16
continuous type/inch	BTY-CT-02								39		
index additional line	BTY-LI-02		4						4		
key lock/unlock	MTY-KL-02								8		
key shift	BTY-KS-02		8						7	8	
move to exact line	MTY-CP-02								66		
move to exact space	MTY-CP-05								33		
other elements											
get & aside source doc.	MPL-JC-18		1						86	1	86
eye travel/in (20" max)	BEL-ET-04		20						1	20	20
eye focus	BEL-EF-01		4						7	4	28
read words individually	BEL-EF-01		2						7	2	14
" " in seq normal	BRD-WS-02		8						7	8	56
" " in seq diff.	BRD-WS-04								11		
" numbers: 1st digit	BRD-NR-01		2						12	2	24
" " ea. (2-6)	BRD-NR-02		10						5	10	50
" " ea. (7+)	BRD-NR-04		2						7	2	14

set-up	code			
one sheet	TTY-SU-AA	633	1/16	39
sheet & carbons/form set	TTY-SU-			
remove paper	MTY-PR-01	82	1/16	5
set margin	MTY-MS-01	50	1	
set first tab	MTY-TS-01	65	1	
set additional tab	MTY-TS-02	37	4/24	
clear tabs:all stops cont	MTY-TC-02	56	7	27
other				
		TOTAL TMU		849

Assumes electric typewriter. Does not include make-ready other than typewriter setup.

CLERICAL WORK MEASUREMENT
TYPING APPLICATION FORM

operation: Type Minute on Docket

code:

agency: Ill. No. Fed. District Court | unit: Docket | analyst: Kulp | date: 9/15/73

	code	data fields: minute	elem TMUs	totl freq	total TMUs
straight typing					
good 'first line	MTY-LT-03		336		
source add'l line	MTY-LT-04		309		
rough 'first line	MTY-LT-07	1	362	1	362
source add'l line	MTY-LT-08		335	1	335
non-straight typing					
key depress per stroke	BTY-KD-01		4		
carriage return	MTY-CR-02		12		
continuous type/inch	BTY-CT-02		39		
index additional line	BTY-LI-02		4		
key lock/unlock	MTY-KL-02		8		
key shift	BTY-KS-02		7		
move to exact line	MTY-CP-02	1	66	1	11
move to exact space	MTY-CP-05	1	33		33
other elements					
get & aside source doc.	MPL-JC-18	1	86		
eye travel/in (20" max)	BEL-ET-04	40	1		
eye focus	BEL-EF-01	4	7		
read words individually	BEL-EF-01		7		
" " in seg normal	BRD-WS-02	20	7	20	140
" " in seg diff.	BRD-WS-04		11		
" numbers: lst digit	BRD-NR-01		12		
" " ea.(2-6)	BRD-NR-02		5		
" " ea. (7+)	BRD-NR-04		7		

set-up	code			
one sheet	TTY-SU-AA	633	1	633
sheet & carbons/form set	TTY-SU-			
remove paper	MTY-PR-01	82	1	82
set margin	MTY-MS-01	50	1/20	
set first tab	MTY-TS-01	65	1/20	9
set additional tab	MTY-TS-02	37		
clear tabs:all stops cont	MTY-TC-02	56	1/20	
other				

TOTAL TMU: 1660

Assumes electric typewriter. Does not include make-ready other than typewriter setup.

CLERICAL WORK MEASUREMENT
OPERATION ANALYSIS FORM

Correct Typing Errors — SME-CE

agency | unit | analyst | date

grp & Step	description	unit	element code	TMUs	freq	base TMUs
1	Spot Error	error	Bel-Ef-01	7	5	35
2	Back space	"	Btg-Kd-01	4	5	20
3	Pick up correction sheet	"	Mgt-Je-24	105	1	105
4	Position	"	Bpl-ES-01	45	1	45
5		"	Bpl-Es-00	43	1	43
6	Type over	"	Bpl-Ap-06	20	1	20
7	Space forward	"	Bgt-Kd-01	4	5	20
	Put back correction sheet		Bpl-Ln-24	35	1	35
						323

base TMU _____ per _____ x _____ allowance = _____ TMU allowed.

Bi

Notes: Start and end with korrectype, slip on typing table

END