NATIONAL BUREAU OF STANDARDS REPORT

10 656

A STUDY OF COURT REPORTING SYSTEMS

EXECUTIVE SUMMARY

Technical Analysis Division
Institute for Applied Technology
National Bureau of Standards

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[2] Located at Boulder, Colorado 80302.
[3] Located at 5285 Port Royal Road, Springfield, Virginia 22151.

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ABSTRACT

The court reporting study was concerned with tests of the feasibility of using an existing computerized translation system for the production of transcript in a courtroom environment; the development of suitable statistics on time and cost of transcript preparation with any of a number of alternative methods now in use or available; and a survey of laws pertaining to the recording of court proceedings. The Executive Summary has been prepared as a digest of the study. In particular, it distills the main features of Volume I, a compendium of information on available systems, including descriptions and the necessary quantitative data to assist court administrative personnel in modifying existing arrangements for their own jurisdictions. Details of the experimental program, survey of laws, and an annotated bibliography are contained in three additional volumes of the full report.

The major recommendations are that further research and development effort is necessary and is warranted, and that consideration might be given to using the currently available computerized system as an interim measure to relieve excessive backlogs, but subject to some compromise in existing practice.

PREFACE

The initial impetus for a court-reporting study was provided by the proposed use of the computer to translate stenotype notes to their English equivalent, offering a potentially large reduction in the time necessary to transcribe these notes manually. The use of this new technology to produce court records was seen as offering possible relief to that portion of congestion and delay in the criminal courts system attributable to backlogs in transcript production.

In order to obtain an objective evaluation of the feasibility of computer-aided transcription of stenotype notes in the criminal courts system, the National Institute of Law Enforcement and Criminal Justice, Law Enforcement Assistance Administration, Department of Justice, in conjunction with the Federal Judicial Center, sponsored this study by the Department of Commerce's National Bureau of Standards (NBS). In addition to evaluating the computer-aided transcription process, the study afforded an opportunity to survey the state-of-the-art of legal reporting in general. The study had two limited objectives: (1) identification and analysis of representative examples of criminal courtroom reporting techniques, and (2) design and execution of an experiment through which the characteristics of each reporting system could be examined. With such system attributes as time and cost documented, it

should then become possible to weigh the advantages and disadvantages of each given system for use in a particular courtroom environment.

The NBS study was conducted by the Technical Analysis Division, Institute for Applied Technology, under the general direction of Richard T. Penn, Jr. and Walter G. Leight; the Project Leader was Ernest H. Short. The full report consists of the following:

(a) Volume I - Decision Factors, by Ernest H. Short and Miles Ruthberg, summarizes the project activity, presents system descriptions, and offers a decision technique for selection of court reporting procedures. This volume is intended for general distribution.

(b) Volume II - Experimental Phase, by Nancy Kingsbury and Jenny Eldreth, describes the laboratory and courtroom phases of the experiment. This volume is designed to provide background detail for those readers particularly interested in the data gathering and analyses performed in the course of our work.

(c) Volume III - Summary of State Laws, by John Rick and Suellen Halpin, provides background on the legal requirements and constraints for court reporting throughout the United States.

(d) Volume IV - Annotated List of References.

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BACKGROUND

All courts of record use some method of recording testimony and producing the official record, but there is a substantial interest in modifying or replacing their current techniques. There has been increasing difficulty in obtaining enough qualified reporters; long delays have been experienced, due in part to backlogs in transcript production; and the costs of producing transcripts have risen considerably. As a result, there have been intensive efforts to find ways to produce the court record with savings of time or money or, preferably, both.

Due to the complexities of the record production process and various constraints which apply to court reporting within each jurisdiction, the decision to select and implement a new method of producing the court record may be complicated and difficult, as well as qualitative in many respects. Initial consideration must be given to the laws and rules of the court governing the production of the record, and also to any local factors which may bear on implementation of any decision. Then, for each available system, the total time required to produce a transcript and the attendant costs must be examined.

It must be recognized at the outset that the making of an official court record is but a single factor contributing to court delays in some jurisdictions, and that the problems attendant to court reporting are complex and highly variable from time to time and from one locale to another. The sponsors of this study considered that examination of this one facet of the overall problem of delays would be a worthwhile contribution while recognizing that subsequent analysis of court-reporting and other aspects of the administrative process of the courts will undoubtedly be required. The National Bureau of Standards (NBS) therefore conducted a study of court reporting systems; this Executive Summary is intended as a digest of the Study. In particular, it distills the major features of Volume I, which has been compiled to describe the several reporting systems currently used to produce the official court record in one or more court systems, as well as other techniques which are available. All recording methods have been described in terms of their operational characteristics, equipment and personnel needs, other cost components, and their principal advantages and disadvantages. A systematic procedure for computing the total annual cost for each reporting method has been developed as a means of quantitative measurement and objective comparison to aid in the selection process.

Most current court reporting methods require a "man in the loop." The court reporter is a highly trained individual who records the proceedings and, in some cases, participates somewhere in the transcription process, and is a scarce resource in some jurisdictions. The most efficient utilization of the court reporter's time, under conditions of scarcity, is in the recording of courtroom proceedings (i.e., using his special training), rather than involvement in follow-up activity. A computer-aided translation process, recently demonstrated under such controlled environments as the recording of conference proceedings, has the potential of reducing transcription time and freeing the reporter from most of his translation/transcription duties. This prospect of reduction in reporter time out-of-court and of time-saving for record production was, in fact, the stimulus for the present study.

The main focus of the NBS study was to evaluate the computer-aided transcription process in terms of its operational feasibility, its cost, and the time required for transcript production. The data necessary for this evaluation were gathered by experimentation. The study was also concerned with surveying the methods of court reporting in current use; indicating examples of methods which are available for use in some off-the-shelf form;

and identifying those constraints (both legal and traditional) which might affect attempts to alter or replace current methods of producing the court record.

OVERVIEW OF COURT REPORTING METHODS

All current methods of producing the court record consist of recording the proceedings by either shorthand or audio recording; translating the notes back to English if shorthand is used (this translation is usually dictated for a typist if neither the reporter nor a note reader types the transcript); and typing the transcript to produce a "clean" official record. The process is generally carried out in segments, entailing the services of one or more individuals, often highly skilled. These component operations are usually time-consuming: if conducted sequentially they contribute to long delays, but, if overlapped to save time, result in the need for more skilled participants.

Currently Used Systems

Four basic recording methods are in current usage for producing the court record -- machine shorthand (i.e., stenotype), manual shorthand, closed microphone recording (single track), and direct audio recording (single track and multi track.) A printed record is produced from the recordings in most jurisdictions; in the State of Alaska, however, the audio recording is

accepted as the official record. A more detailed discussion of each system is presented in Section II of this volume.

Stenotype

In the stenotype method the reporter reproduces phonetic sounds by striking a combination of keys (letters) on a fixed keyboard. The reporter may translate the notes and type the transcript himself, translate the notes and dictate the translation for a typist who prepares the transcript, or use the services of a skilled note-reader-typist to translate the notes and type the transcript.

The major advantages (exclusive of cost and preparation time) of the stenotype method of reporting are:

(1) The phonetic shorthand unit tends to be standardized and can be translated by others trained in stenotypy, although shortcuts and personal idiosyncrasies may often be employed.

(2) The reporter can, on request, read back earlier testimony and can also readily record any interjections during such read-back.

The major disadvantages are:

1) The recording (i.e., the notes) cannot be used as the official record since they are understandable only to those trained in stenotype.
2) The accuracy of the record is reporter dependent.
3) The capability of recording simultaneous speech is limited.
4) A translation step is necessary, requiring time spent out of court by the skilled reporter or a skilled note reader.
5) The presence of a qualified reporter is a prerequisite to proceedings of record.

Manual Shorthand

In the manual shorthand method, phonetic sounds are represented by a variety of graphic symbols. The possible routes for transcript production are essentially the same as those for stenotype, but it is not generally possible to use a note-reader since shorthand symbols vary considerably from one reporter to another.

The major advantage (exclusive of cost and preparation time) of this method is that the reporter can read back earlier testimony and also record interjections during read-back.

The principal disadvantages of the manual method of shorthand are the same as those listed above for stenotype, plus:

1) The reporter himself must transcribe his notes.
2) There is a tendency toward reporter fatigue.
3) The reporter must watch the shorthand pad rather than the speaker.

Closed Microphone Recording (Single track)

In the closed microphone method of recording*, the reporter repeats what is said into a microphone encased in an insulated "mask" arrangement which prevents the reporter from being heard. A single track recording is made and is later transcribed by either the reporter or a typist. (This method of court reporting was one of those omitted from the experimental program due to limitations of funds and courtroom space. However, closed microphone transcript preparation is analogous to the typing from a stenotype reporter's dictation from his notes.)

The major advantages (exclusive of cost and preparation time) of this recording method are:

1) The recording can be readily understood by anyone and could be used as the court record.
2) A translation step is not required for the production of the transcript.

The principal disadvantages of this method are:

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*Sometimes called "voice writing."

1) The accuracy of the record is reporter dependent.

2) The capability of recording simultaneous speech is limited.

3) Interjections during "playbacks" cannot be recorded unless extra equipment is available.

4) The presence of a qualified reporter is prerequisite to proceedings.

Audio Recording (Single track)

The single track audio recording method produces a one-track audio tape from microphones placed strategically around the courtroom. A typist then transcribes the material on the tapes.

The major advantages (exclusive of costs and record preparation time) of the single track audio recording are the same as those listed above for the closed microphone recording; however, the single track audio recording is limited by the following disadvantages:

1) Interjections made during "playbacks" cannot be recorded unless extra equipment is available.

2) There is difficulty in separating simultaneous speech.

3) A monitor is desirable; otherwise there is a problem of speaker identification.

4) There is difficulty in obtaining an optimal microphone combination to insure clear recording.

Audio Recording (Multi-track)

The multi-track audio recording system records on separate tracks the sounds picked up by microphones placed strategically around the courtroom (i.e., a separate track for each microphone). A typist then transcribes the material on the tapes.

The major advantages (exclusive of costs and record preparation time) of this method of producing the record are:

1) The recording can be used as the record.
2) There is no need for a translation step if a transcript must be prepared.
3) Simultaneous speech is generally separable.
4) Speaker identification is aided.

The principal disadvantage is that interjections made during "playbacks" cannot be recorded unless extra equipment is available.

Systems Availalbe, But Not in Use

Three of the systems available in some off-the-shelf form for production of the court record are audio/video taping, multi-track closed microphone recording, and computer-aided translation of stenotype notes. A more detailed discussion of each of these systems is presented in Chapter II of Volume I.

Audio/Video Taping

Without considering cost or record production time, an audio/video recording system offers more faithful reproduction of courtroom events than is possible from other recording methods. The recording captures not only what was said but also the manner of expression, including gestures. If a printed transcript must be produced, the addition of the video to the recording minimizes the speaker identification problems associated with the audio recording alone. However, utility of this system appears to hinge on the acceptability of the audio/video tape as the official record, and perhaps cost. Also, skilled operators would clearly be required.

Closed Microphone Recording (Multi-track)

The multi-track closed microphone system records the reporter's dictation onto one track of the tape while the actual proceedings are recorded on the other tracks. This method of recording court proceedings eliminates all the disadvantages of both single track closed microphone recording and audio recording listed above, with the exception that interjections made during "playbacks" still cannot be recorded unless extra equipment is available, and the presence of a skilled reporter is required.

Computer-Aided Transcription of Stenotype Notes

For the computer-aided transcription process, the stenotype reporter records the proceedings in his usual manner on a special stenotype machine which records the notes on paper and also on magnetic tape. The computer program attempts to match stenographic notes with entries in a general purpose main dictionary, a specialized reporter subdictionary (tailored for the stenotype notations used by each reporter) and a special glossary (entries compiled by the reporter for any unusual names or terminology which occurred during the proceedings). The resulting translation into English is printed and "edited" for errors, then a second printing produces the required "perfect" record.

This method of translating stenotype notes and printing the transcript offers a great potential for reducing transcript preparation time and the time spent out of court by the stenotype reporter. Before this potential can be fully realized, however, major difficulties must be overcome. Details of some of these problems are presented below and in the section on conclusions and recommendations. Fuller discussion may also be found in Chapter III of Volume I.

EXPERIMENTAL PROGRAM

Data necessary for determining transcript production times were gathered for representative systems for record production in a laboratory phase, followed by a courtroom phase. The systems in the experiment were: machine shorthand with two reporters typing their own transcripts and two dictating the translation of their notes for typists; the computer-aided transcription of machine shorthand, for each of the four stenotype reporters; monitored, multi-track audio recording, using one monitor/transcriber; and, in the laboratory phase only, manual shorthand, taken by a certified reporter/typist. It should be noted that all participants in the experimental program are qualified court reporters, authorized to certify transcripts in the jurisdictions in which they function.

Laboratory Phase

The laboratory phase was designed to insure the testing of the vocabulary range of the computer's main dictionary and to provide a "shakedown" for the participants and the project staff before the courtroom phase. For fifteen days the reporters recorded two presentations each morning, lasting approximately twenty to thirty minutes and consisting of both audio presentations and film presentations. (The presentation material

is listed in Appendix C of Volume II.) The reporters then transcribed their records in the afternoon, and the times required to produce these transcripts were recorded.

Courtroom Phase

In the courtroom phase the reporting systems were applied under actual operating conditions in a courtroom environment (namely, the Court of Common Pleas in Philadelphia, Pennsylvania). The first week was spent in a waiver court (i.e., where the defendant has waived his right to trial by jury). The proceedings in this courtroom were usually very short with extraneous action between cases which was not recorded. The second week consisted of recordings in a jury trial courtroom.

The reporters recorded proceedings in the mornings until approximately thirty pages of transcript were obtained, then transcribed these proceedings by their conventional methods in the afternoons. The times required to produce transcripts were again recorded. The magnetic tape notes were computer-processed to produce transcripts, which were compared in pairs to the conventional transcripts produced from the same notes.

SPECIAL PROBLEMS OF COMPUTER TRANSCRIPTION

The computer-aided transcription system is a translator, hence its efficient operation depends critically on the stenotype inputs. The translator works best when the reporter uses the standardized stenotype forms in the system's main dictionary and uses them consistently. It can also work well if any non-standard forms used by a reporter appear in his subdictionary and he uses those forms consistently. A careful screening process is therefore required to select reporters who are compatible with the computer-aided process, and some special training is required to develop the subdictionary, standardize forms, and insure consistency. Based on limited experience to date, it may be anticipated that there will be considerable variability among reporters in terms of initial compatibility and extent of training required.

First-Run Computer Transcript

The computer program translates input stenotype symbology and produces a "first run" copy, often including untranslatable material (flagged as such) and, possibly, errors. As a means of assessing the quality of the computer-produced transcript, first run copy

was compared word-for-word with the corresponding transcript produced in conventional fashion from the same stenotype notes. An "error" was counted whenever material in the conventional transcript did not appear in exactly the same form in the computer transcript.

Four main types of error now occur: "no match," "fingering," "homographic ambiguity," and "word boundary." The "no match" error refers to a valid stenotype notation for which there is no dictionary entry. (The computer in such cases prints a transliteration of the notation between asterisks, calling attention to a readily resolvable error.) The "fingering error" occurs when the wrong keys are struck; this can result in no match or, more seriously, a valid, incorrect match. The "homographic ambiguity" stems from the basic nature of the shorthand process, whereby the same set of symbols is used to represent all words which have the same phonetic sound. The word boundary problem is the most troublesome and potentially the most serious. It occurs whenever the program logic fails to recognize the end of a word. (The computer continues to combine shorthand strokes as long as valid matches can be made. When the addition of one more stroke results in a "no match",

the last longest match is printed. For example, "some red writing" is translated as "summaried writing.")

Further discussion of errors, which necessitate correction before the official record is produced, is presented in Chapter III of Volume I and in Volume II.

Editing of First-Run Computer Copy

Due to the various possible sources of error, the computer program is unlikely to produce a perfect first run copy of the reporter's stenotypy. It is therefore necessary to review the first run copy to detect and correct errors, whether or not flagged. This "editing" process can be conducted with reference to the basic stenotype notes, audio recordings (as were available during the experimental program), context and recollections of the proceedings. Unfortunately, the process used by the contractor did not take advantage of available aids. Furthermore, the manual editing techniques which were actually used are highly inefficient in the light of state-of-the-art text-editing systems. In any future operations, the reporter or note reader might participate in the review process in lieu of conventional translation of notes, with the likely results of improving quality and reducing time.

RESULTS

Study results have been based on the surveys conducted and on the experimental data collected during the laboratory and courtroom phases. The times which are cited here are representative of transcript production times under "daily copy" conditions, especially insofar as reporter participation is concerned. However, data on typing times may be subject to some variability since no special efforts were made to obtain a representative sample of typists for this program.

The results presented below highlight the observations which can be made; a more detailed presentation and discussion of the data can be found in Volume II.

(1) It takes approximately twice as long to produce a transcript from direct audio recording as from either of the machine shorthand methods. In computing costs for production of transcripts in equal time, two typists would be required for the direct audio recording system.

(2) First run computer transcript can be produced in approximately one-tenth the time required by the conventional machine shorthand methods.

(3) The editing procedures used by the contractor during the NBS tests were cumbersome, inefficient and time-consuming. In consequence, the total transcript

production time for the computer-aided process was two to four times that taken by conventional machine shorthand methods.

(4) The time required to edit transcripts varied considerably from one reporter's notes to another's. This is relatable to the compatibility of the reporter's style of writing to the computer-aided process and to the amount of training or "tuning" received. Consistent writing style, improved training and the use of more advanced editing techniques should reduce the total time for transcript production significantly.

(5) There have been few attempts to relate transcript needs to the type or rate of activity of a court or the incidence of appeals.

(6) Reporting systems are not generally tailored to fit the specific needs of a particular court.

(7) Many courts limit themselves to using a single reporting method throughout the court system.

(8) Most courts are constrained by a requirement for "clean" typed transcript.

(9) In general, advanced techniques of reproduction for additional copies are not utilized.

Figure I-1 illustrates the type of data collected during the experimental phases of the NBS study effort. It shows the time required for each stage of transcript

Sample Data for Production of Court Transcript

(All times are in minutes)

Reporter	Number of Words Produced	Time to produce by Conventional Methods		Computer First Run Time	Manual Editing Time	Key Punch Time	Computer Second Time	Total time for Computer-Aided Process
		Dictate	Type					
A*	4471	26	64	7	147	33	1+	188
B*	4550	27	70	7	101	22	1+	131
C	4079	-	76	7	262	56	1+	325
D	4318	-	78	8	137	41	1+	187
Audio Recording	5070	-	195	-	-	-	-	-

*Reporters A and B produced their transcripts by overlapping the typing with the dictating, yielding actual elapsed times of 76 and 78 minutes for A and B respectively. The corresponding production times (the sum of the Dictate and Type times) were 90 and 96 minutes.

FIGURE I-1

production for each of the participants and techniques examined. This particular sample is based on approximately one hour of testimony selectively taken during one morning of the jury trial.

Care should be exercised in interpreting the data shown in Figure I-1 in isolation and without more complete descriptions of the circumstances than are provided here. Thus, for example, primary comparisons should be made along horizontal rows; differences within columns are, in many instances, due to artifacts of the experiment. (The interested reader should consult Volume II.)

CONCLUSIONS AND RECOMMENDATIONS

Since there are no absolute standards which can be applied to the many facets of producing a court record, only general guidance can be offered to assist those court systems which recognize the need to modify or replace their present methods of court reporting. The conclusions cited below can be used in that process.

(1) The initial step is to assess transcript requirements by individual courts or types of court within a system, including estimates of the number of pages of transcript produced annually, appraisal of the "appearance" requirements for the record, legal and traditional constraints, etc.

(2) There is no single reporting method which can be viewed as a universal solution.

- Each available alternative must be examined in terms of time and cost factors to provide for satisfying court needs in economical fashion.
- There are variations in needs from one court to another and from time to time in the same court, hence combinations of reporting systems may prove to be attractive.

(3) The feasibility of computer-aided transcript preparation has been demonstrated.

(4) The currently available computer transcript system is subject to a number of deficiencies which must be corrected before its potential can be realized. In particular, computer program modifications are required to improve resolution of ambiguities; the dictionary must be expanded and reporter styles standardized in order to increase the effectiveness of the man-machine interface; and modernized, improved editing techniques must be adopted.

(5) The present computer-transcript system can be used operationally on an interim basis where transcript production backlogs are critical. Conditions for use include availability of suitable computers,

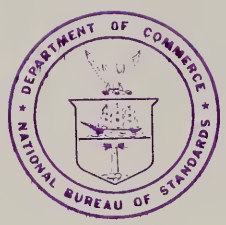
reporter personnel compatible with the system, adequate training and court willingness to compromise with the appearance (but not the accuracy) of the record.

(6) Screening is now necessary to select reporters with style compatibility to use the computer-aided system; subsequent training to use standard forms and techniques consistently is now and will continue to be required.

It is recommended that:

1) Each court system experiencing transcript production problems should review its transcript needs in detail. Since it is unlikely that any single method will provide an economical solution to existing problems, consideration should be given at the outset to a multi-system approach.
2) Further research and development efforts should be supported to remedy deficiencies of current computer transcription techniques and to enhance the capability for preparing court transcripts.
3) Consideration may be given to using a computer system as an interim measure where there are extreme transcript backlogs, subject to availability of suitable computer hardware;

selection and training of reporters; adequate funding; improved editing techniques; and judicial acceptance of certified, hand-corrected transcript, perhaps characterized by loss in neatness, but not in readability nor in accuracy.


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