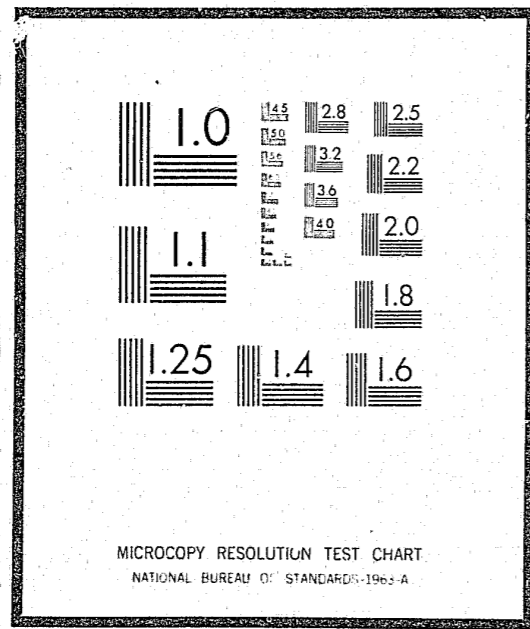


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U.S. DEPARTMENT OF JUSTICE
LAW ENFORCEMENT ASSISTANCE ADMINISTRATION
NATIONAL CRIMINAL JUSTICE REFERENCE SERVICE
WASHINGTON, D.C. 20531

5/23/77

Date filmed

APPENDIX III

Form LEAA-OLEP-159
(edition 6-1-70)

 LAW ENFORCEMENT ASSISTANCE ADMINISTRATION OFFICE OF LAW ENFORCEMENT PROGRAMS		DISCRETIONARY GRANT PROGRESS REPORT	
1. Grantee: Minnesota Governor's Commission on Crime Prevention and Control		4. Grant No. 72-DF-05-0017	5. Date of Report: <input type="checkbox"/> April 1 <input type="checkbox"/> October 1 <input checked="" type="checkbox"/> Other Final
2. Implementing Subgrantee: Hennepin County, Minnesota		6. Grant Amt. \$150,000	7. Character of Report: <input type="checkbox"/> Interim <input checked="" type="checkbox"/> Final
3. Title or Character of Project: Hennepin County Coordinated Mobile Teleprinter System		8. Covering Period: March 1, 1972 to November 30, 1974	

To: Cognizant Regional Office
Law Enforcement Assistance Administration
 State Planning Agency, State of Minnesota

Submitted herewith is the grantee's progress report for the period shown above:

Donald J. Omodt
Project Director (signature)

Donald J. Omodt, Sheriff
(Typed Name and Title)

[Commence report below and add continuation pages as required.]

383732

LOAN DOCUMENT

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DF 139

ACQUISITION

FINAL NARRATIVE REPORT
HENNEPIN COUNTY COORDINATED MOBILE TELEPRINTER SYSTEM

to

MINNESOTA GOVERNOR'S COMMISSION ON CRIME PREVENTION AND CONTROL
GRANT # 72-DF-05-0017

by

SHERIFF DONALD J. OMODT, PROJECT DIRECTOR
DR. JOHN R. DUBOIS, PROJECT COORDINATOR
HENNEPIN COUNTY, MINNESOTA

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61262

ABSTRACT

The Hennepin County (Minnesota) Sheriff's Department, under the project direction of Sheriff Donald J. Omodt and project coordination of Dr. John R. DuBois, has conducted a 33 month study on the use of mobile teleprinters in police vehicles. The project was the first large scale multijurisdictional evaluation of a mobile teleprinter system conducted in the United States.

The 28 participating police agencies demonstrated the effectiveness of a mobile teleprinter system: (1) by reducing the total time required to obtain information by patrol officers, (2) by greatly reducing the radio "air time" required to transmit information and (3) by expanding the message handling ability of a radio channel by over 400%.

Other advantages of a mobile teleprinter system that were demonstrated by the project include: greatly improved message security, selective routing of messages to only those patrol officers who have a "need to know", elimination of repeats or "fills" on message transmissions and the ability for a patrol officer to receive teleprinter messages even when the vehicle is unattended.

The project was funded by a discretionary grant from the Law Enforcement Assistance Administration of the U.S. Department of Justice and by the participating local police agencies.

BACKGROUND

This report describes a 33 month project on the use of mobile teleprinters in police patrol vehicles. The project was the first large scale, multiple jurisdictional field test and evaluation of the mobile teleprinter for law enforcement agencies in the United States. The goal of the project was to provide and to evaluate the use of a mobile teleprinter and dedicated UHF two-way radio channel for each marked patrol vehicle on full time patrol duty in Suburban Hennepin County Police Departments and the Hennepin County Sheriff's Department. To accomplish that goal, 101 mobile teleprinters were installed in marked police patrol vehicles used by the Sheriff's Department and the following municipalities: Bloomington, Richfield, Edina, St. Louis Park, Golden Valley, New Hope, Brooklyn Center, Brooklyn Park, Maple Grove, Champlin, St. Anthony, Osseo, Eden Prairie, Minnetonka, Deephaven, Excelsior, Greenwood, Tonka Bay, Shorewood, Plymouth, Wayzata, Orono, Long Lake, Maple Plain, Spring Park, Minnetrista, and Mound, Minnesota.

A mobile teleprinter is an electromechanical instrument, used in vehicles, that converts specially coded radio signals into a permanent, printed message. The mobile teleprinter system as used for police service in Hennepin County, permits police officers in their patrol vehicles, to obtain a wide variety of information that is stored in digital computers operated by the Federal Bureau of Investigation, the Minnesota Department of Motor Vehicles, and the Minnesota Bureau of Criminal Apprehension.

The project was funded in part by a \$150,000 discretionary grant from the Law Enforcement Assistance Administration of the United States Department of Justice. Participating police agencies in Hennepin County contributed matching funds equivalent to an additional \$50,000, for a project total of \$200,000.

The federal grant was approved on March 1, 1972; system planning and the bidding process took until January of 1973; the equipment was delivered in August of 1973 and equipment installation took until October 1, 1973 to complete. On that date, a one year full scale field evaluation of the mobile teleprinter system began. On November 30, 1974 the demonstration project officially ended but because of the success of the project, as will be described in this report, the use of mobile teleprinters continues in Hennepin County, Minnesota.

Specific advantages of mobile teleprinter communications over conventional voice message communications that were to be demonstrated by the project include:

1. Communications

The deciphering of a mobile teleprinter signal can only be accomplished by a compatible teleprinter. Mobile teleprinters cost in excess of \$1,000.00, in contrast to a voice transmission monitor costing less than \$100.00. The theory was that not many of the criminal element would try to decipher teleprinter signals, not only because of the high cost but also because of the sophisticated technical considerations involved with teleprinter messages. In the case of "in progress" crimes, the theory was that the teleprinter would help insure that the criminal would not be forewarned that the police were on the way.

2. Selective Signalling

Mobile teleprinters can be addressed individually, in groups, or all call. Only the officer(s) to whom the message is directed receive the message.

3. Faster Communication

Voice communication is at the rate of less than one tenth the speed of teleprinter signals. Air time should be greatly saved, resulting in greater message capability per unit of time.

4. Accurate Transmission

Because the teleprinter message is a printed hard copy, fewer errors should occur in transmission. The officer can study the content to insure accurate interpretation.

5. Unattended Reception

The officer who has been away from his vehicle for a period of time can be automatically upgraded on the events that have occurred during the time the vehicle was unattended.

6. Elimination of Repeat Messages

With a hard copy of the message, there should be no need for repeat messages.

SYSTEM DESCRIPTION AND PRODECURES

As with any successful project, existing personnel and equipment were utilized to as great an extent as possible in order to conserve funds to be spent on the truly unique aspects of the demonstration project. In this project, that meant that the bulk of the project funds were spent on the teleprinter system central processor, the dedicated teleprinter radio base and mobile equipment and the teleprinters. Strict compliance with State statutes dictated that all of the purchases made with project funds were made after competitive bidding and award to the lowest compliant bidder. The Xerox Corporation supplied all of the teleprinter equipment and the General Electric Company supplied all of the radio equipment used in the project.

Prior to project initiation, all participating police departments used one or more VHF radio channels for all of the police radio communications needs. The seven largest participating suburban departments each had their own separate VHF radio channels on which they did their own dispatching. The 20 smaller departments shared two VHF channels with and were dispatched by the Hennepin County Sheriff's Department. The two channels used by the Sheriff's Department were loaded to capacity so a UHF channel was obtained on which to operate the major portion of the teleprinter system communications. The seven large suburbs and the Sheriff's Department each had a digital computer terminal (a Univac Uniscope 100 CRT unit) that they used, prior to the project, to communicate with the police digital data files in St. Paul and throughout the United States. Therefore, to implement the project, the base station equipment required was only a central processor (to convert the electronic "language" from the Uniscope 100 CRT terminals to the type of electronic "language" that could be "understood" by the Xerox mobile teleprinters)

and a UHF base station (to transmit the teleprinter messages to the police vehicles and to receive the information inquiries by voice from the police vehicles on the Sheriff's radio network). The mobile equipment required for the project was a UHF two-way radio and a mobile teleprinter machine for each vehicle used in the project.

The manner in which the police officer obtained the information messages was as follows: The officer calls a dispatcher on a two-way radio (the dedicated UHF two-way radio channel for those police agencies that use the Sheriff's Radio dispatching facility or their own VHF dispatching channel if the officer's department does their own radio dispatching). Those with their own dispatching channel also could use the UHF channel if they chose to do so. The dispatcher answered the patrol officer and determined what information the officer desired. The dispatcher then entered the officer's information request into a digital computer terminal connected to the MINCIS (Minnesota Crime Information System) digital switching computer in St. Paul. The information request was then switched to the appropriate digital computer and the desired information obtained. The desired information was then switched back to a Central Processor located at the Sheriff's Radio Station in Golden Valley, where it was automatically coded and sent by UHF radio to the officer requesting the information; it was then automatically printed on his mobile teleprinter.

The method of message coding was set up so that a message could be directed to (1) a single mobile teleprinter, (2) all of the teleprinters operated by a single police department (or a group of the smaller departments in the same geographical area) or (3) all of the mobile teleprinters in the entire system. In that manner, the officers only receive those messages that are of interest to them.

PROJECT RESULTS

In order to evaluate the operational effectiveness of mobile teleprinters in public safety service, several parameters must be determined. The parameters that will be used to evaluate this project include message volume, average time per message and average air time saved per message because teleprinters were used.

The vast majority of information checks made on any police information system consists of (1) vehicle registration and "clear" checks, (2) drivers license checks and (3) NCIC checks (National Crime Information Center checks for interstate stolen property or missing and wanted persons). In the analysis of this project, only those three classifications of informational checks were considered. Two sample periods were selected for analysis; one period was prior to operation of the mobile teleprinter system (April 1973) and one period was, exactly one year later, after the mobile teleprinter system was fully operational and had been operational for several months (April 1974). During the sample period in 1973, 768 informational checks were handled in a seven day period; 57% were vehicle registration and clear checks, 36% were drivers license checks and 7% were NCIC checks. During the same sample period one year later using mobile teleprinters, 1371 informational checks were handled in a seven day period; 66% were vehicle registration and clear checks, 30% were drivers license checks and 4% were NCIC checks. These figures only include the informational checks that were made by the information clerks at the Hennepin County Sheriff's Radio Station; they do not include the checks made by the other seven dispatch points in the system. The average time per informational check for the purpose of this project is defined as the time elapsed between when the police officer requests the information from his vehicle and when he has received the information requested. Included in this time is: (1) the time it takes for the officer to tell the clerk what information is desired, (2) the time it takes

for the clerk to "tell" the digital computer what information is desired, (3) the time it takes for the digital computer to find the desired information and (4) the time it takes to get the information back to the police officer in the vehicle. The first three times will be the same for either the manual system used by most police departments or the mobile teleprinter automated system used in this project. The fourth time, the time it takes to get the desired information back to the police officer, will be the major difference between the two types of systems. Based on the average of samples made in April, 1973 and April, 1974, the average time per information check using the mobile teleprinter system was 53.15 seconds and the average time per check using the manual system was 137.4 seconds for a net saving of 84.25 seconds per check. It should be noted that the net saving of 84.25 seconds per check is totally a saving in transmitter "air time". For the purpose of this analysis, the non transmitter "air" time per information check (times "2" and "3", above) shall be assumed to be 30 seconds, then the total air time per information check using the mobile teleprinter system is 23.15 seconds and the air time per message using a manual system is 107.4 seconds. Therefore, for a mobile teleprinter system, the absolute maximum number of informational checks per radio channel per day is 3732 and for a manual system, the absolute maximum number of informational checks per radio channel per day is 804. Therefore, by using a mobile teleprinter system such as the Hennepin County Coordinated Mobile Teleprinter System, the information capacity of a radio channel can be increased by 464%.

In summary, the use of the mobile teleprinter system resulted in a 61.3% decrease in average time required for an informational check. The air time required per informational check has been reduced by 78.4% and the message handling capability of the radio channel has been increased by 464%.

So much for the project results that can be measured quantitatively. Other qualitative measures shall be reported here to give insight to others who contemplate some type of mobile teleprinter system.

The two system components that must be used for every informational check are the central processor and the UHF base transmitter. The central processor was too expensive (approximately \$10,000) for the project to afford a standby unit and local service was available from the Xerox Corporation, so it was decided to operate the system until the central processor failed and then suspend operations until the central processor could be fixed. It is interesting to note that during the entire operational phase of the project, not a single failure of the central processor was experienced. The UHF base transmitter was duplicated; a 70 watt General Electric transmitter was installed as a standby for the main 250 watt General Electric transmitter. Engineering records for the project indicate that during the course of the project, the main transmitter logged a total of 1631.8 hours of air time and the standby transmitter logged only 3.8 hours. These figures indicate that the main UHF transmitter had an availability of 99.8% and it should be noted that some of the time logged for the standby transmitter was for routine equipment tests.

Engineering records for the project were also maintained on the mobile teleprinters. On a yearly basis, the 106 mobile teleprinters available for the project required 7.88 service calls per unit with an average service time of .63 hours per teleprinter per call. This contrasts to service on two-way radio mobile units at the same facility of 3.13 service calls per year per unit with an average service time of .95 hours per radio per call. In other words the service required for the mobile teleprinter units is approximately twice that required by a modern two-way radio mobile unit.

It is beyond the scope of this report to provide a comprehensive technical evaluation of system coverage and propagation results, but in general terms, the UHF base station located in Golden Valley, Minnesota near the center of Hennepin County provided a useable teleprinter signal over the entire 625 square miles of the County. The antenna location at the 300 foot level of an existing radio tower provided a satisfactory teleprinter signal wherever a useable voice signal was received on the UHF radio.

To assist in the project evaluation and to help determine the future use of the teleprinters in Hennepin County, a questionnaire was prepared and sent out to all project participants: dispatchers, patrolmen and senior officers. A copy of the questionnaire is attached to this report.

A summary of the 298 returned questionnaires follows: 82% rated the overall mobile teleprinter system good or excellent; 15% rated the system fair and only 2% rated the system poor. Only 10% indicated that the information requested was not provided faster than by the previous method using voice radio. 94% of the system users indicated that obtaining the desired information in printed form eliminated confusion and 97% indicated that the printed message reduced radio "air" time. 49% of the respondents indicated that the greatest advantage of the system was the fact that information was obtained in printed form as an accurate record for retention. 27% rated speed of response as the greatest system asset. 14% rated message security as the greatest system benefit. 6% liked the greater detail that was available in the requested information. 30% of the respondents rated digital computer "down time" as the most undesirable feature of the system. (Actually, digital computer "down time" is not a fault of the system as the project participants have no control over "down time" on the State and Federal digital computers; "down time" for the mobile teleprinter system itself was extremely low - less than 0.1% of the time). 18% of the respondents did not list any undesirable

features of the system. 17% rated teleprinter size, mounting and malfunction as undesirable features of the system. 11% indicated that they believed that they were getting too much information on their mobile printers. 37% of the respondents had no suggestions to improve the system. 17% wanted a two-way digital system. 16% wanted less "down time" on the State and Federal digital computers. 16% wanted the mobile teleprinters to be smaller and easier to mount. 81% of the respondents indicated that they wanted to continue with the mobile teleprinter system exactly as it has been operating. An additional 10% indicated that they wanted to continue with the mobile teleprinter system with some changes in the system operation such as more dispatchers, less digital computer down time, smaller size teleprinters and less delay in sending out crimes-in-process-messages.

A second questionnaire was sent out by the project coordinators to all chiefs of police who use the mobile teleprinter system. The purpose of the second questionnaire was to get an indication of how the chiefs felt toward continuation of the mobile teleprinter system and what level of participation did they desire for the next year. Of the 28 departments participating in the system, only one department (Brooklyn Center) indicated that they did not want to continue with the system. One police department (Medina) that was not participating in the system, indicated that they did want to participate. In addition, 9 of the participating police agencies indicated that they wanted to add additional mobile teleprinters.

PROJECT CONCLUSIONS

Based on the results of the 33 month experimental project, including an extensive 12 month full scale field evaluation phase, the mobile teleprinter has proven itself to be a very useful addition to the equipment in a police patrol vehicle. The mobile teleprinter system was well accepted and heavily used by the patrol officers involved with the system. Acceptance by the participating police chiefs and senior officers was equally good.

The project has demonstrated that the use of mobile teleprinters can cut down on the total time required to obtain informational checks by over 60% and the radio air time for the checks can be reduced by over 75%. As a result, the volume of informational messages on a radio channel can be increased by more than four times through the use of a mobile teleprinter system.

Although other factors may have contributed to the result, the project also demonstrated that patrol officers will make greater use of the informational radio channel if they know that the response will be fast, accurate and provide them with a printed record. During a one week period in the experimental phase of the project, the total number of officers' requests on the informational radio channel was up 78% over the same period one year earlier when mobile teleprinters were not being used.

Other anticipated benefits of the mobile teleprinter system were also demonstrated by the project. All messages pertaining to crimes in progress, such as burglary alarms, holdup alarms, bomb threats, etc. were only sent over the mobile teleprinter system. This not only greatly reduced the likelihood that participating criminals would be alerted that the police were "on the way", but it also eliminated the media representatives and the general public from showing up on the scene of a crime in progress. During the entire experimental phase of

the project, there were no reported instances of criminals, the media or the general public being forewarned of crimes in progress.

The project also demonstrated that a mobile teleprinter system greatly reduced the need for "fill-ins" and "repeats" on messages. The system was so error free and coverage so dependable that teleprinter messages virtually never had to be repeated. The only exception was where a mobile teleprinter ran out of paper or toner (ink) during receipt of a message.

EVALUATION QUESTIONNAIRE - MOBILE TELEPRINTER PROJECT

September 1974

The purpose of this questionnaire is to get your response to the Mobile Teleprinter Project that has been in operation since October, 1973. An analysis of the completed questionnaires will determine the future of the project.

1. Are you a radio dispatcher? _____ Patrol officer? _____ Rank? _____
2. Have you used the Mobile Teleprinter System? _____
3. How do you rate the teleprinter system overall?
Excellent _____ Good _____ Fair _____ Poor _____
4. Is the information received faster than previous methods?
Yes _____ No _____
5. Does having a request for information come back in a printed form eliminate confusion? Yes _____ No _____
6. Does having a request for information come back in a printed form save air time? Yes _____ No _____
7. What features of the system do you find to be most beneficial? _____

8. What features of the system do you find undesirable? _____

9. What suggestions do you have to improve the system? _____

10. Do you use the Mobile Teleprinter System on all or most traffic violation "stops"? _____ Why or why not? _____
11. Do you favor continuing the project as it has been operating? _____

12. Do you favor continuing the project with some modifications in operation? _____ What modifications? _____
13. Do you believe that your job performance would improve or deteriorate if the project is terminated and the teleprinters removed? _____
14. Do you make your inquiries through the Sheriff's dispatcher? _____
15. Police Department _____

If you have any additional comments regarding the Mobile Teleprinter Project, please use the space below. Thank you for your assistance in this very important facet of the project.

END

7 11-11-11