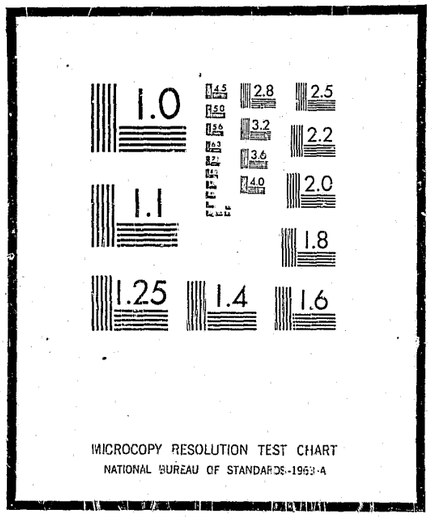

INSTALLATION, TEST AND EVALUATION OF A LARGE-SCALE BURGLAR ALARM SYSTEM FOR A MUNICIPAL POLICE DEPARTMENT

INTERIM REPORT OF GRANT NO. NI 70-009
SUBMITTED BY
CEDAR RAPIDS POLICE DEPARTMENT
CEDAR RAPIDS, IOWA

The fact that the National Institute of Law Enforcement and Criminal Justice furnished financial support to the activity described in this publication does not necessarily indicate the concurrence of the Institute in the statements or conclusions contained herein.

NATIONAL INSTITUTE OF LAW ENFORCEMENT AND CRIMINAL JUSTICE
LAW ENFORCEMENT ASSISTANCE ADMINISTRATION
U. S. DEPARTMENT OF JUSTICE

DECEMBER 1971

FOREWORD

This is a preliminary project report. A detailed analysis of the data using computer techniques and statistical analysis will follow. However, because of the considerable interest in this project, this briefer report is being made at this time.

It is apparent that burglar alarms are effective and that they need not be complex systems. At the same time it was learned that there are certain limitations, for example burglars do spot them and either avoid the location, which is good, or the alarm device, which is not good.

The problem of false alarms was also studied. This definitely is not an unsurmountable problem. During this project there was a continuing decrease in false alarms and this decrease can be continued. Most important, the police officers did not complain about false alarms for they were catching burglars.

It is planned to continue this study for another year. The data will then be re-examined for it is believed that a two year experimental period will allow much more reliable analysis and a greater opportunity to discover new problems and to spot trends.

TABLE OF CONTENTS

INTRODUCTION

Burglary is the most frequently occurring of the major crimes. The only serious crime approaching it in frequency is larceny over $50, while the burglary rate is double the auto theft rate and from 6 to over 100 times the rate of other serious crimes. In 1969 a burglary occurred every sixteen seconds. Even then, only a part of the burglaries (as is true in the case of other crimes) are reported to the police. Various surveys indicate that from 42% to 66% are not reported. As with other crimes even this rate of occurrence is increasing regularly and dramatically.

While burglary is at the top of the list based on rate of occurrence, it is very close to the bottom of rates of clearance at 18%. Only larceny over $50 and auto theft have a lower rate of clearance and they are tied at 17% or just one point lower.

At the same time, there are apparently more possible methods for preventing burglary or capturing the offenders than are available to combat any other crime. This project is a study of one of those methods, the use of burglar alarms in non-residential locations.

Nation-wide forty-four percent of all burglaries were non-residential. The reported loss at these locations was 257 million dollars in 1969. This does not include the damage done by the burglar and in many cases the cost of the repair of this damage will exceed the value of the property stolen. Nor does

it include the intangibles associated with every crime, the indirect costs such as insurance, time spent in making reports, restoration of the disruption caused by the criminal and a series of similar factors. It would be conservative to say that the total loss to business place burglars exceeds a billion dollars a year.

Most studies of crime prevention are mainly concerned with reducing the number of crimes and the apprehension of the offender is accepted as a good way to do this. The apprehension of the offender serves another most important function. Study after study has shown that the largest numbers of offenders are quite young. Many of them have not yet established a firm pattern of criminal behavior. The sooner they are captured the sooner they can be exposed to our various methods of correction and re-habilitation. While it is realized that society has long neglected correctional agencies and methods, and while we have much to learn about the best way to do that job, if the young burglar is not caught we have no chance at all in doing anything with him.

DEVELOPMENT OF THE PROJECT

The efficiency of almost any kind of an organization is highly dependent upon the system of communication in use. This is particularly true in the case of the police. A burglar alarm is basically a method of communication whereby the burglar notifies the police that he has broken in. This notification usually occurs before anything has been stolen. If a similar system of communication was available to allow the offender to notify the police that he was about to complete a rape, a murder or even a larceny, crime reduction would be greatly simplified. While hold-up alarms are in use, there is an important difference between them and burglar alarms, for in the case of the hold-up alarm, the message is sent by the victim and usually after the crime has been completed.

Experience has shown that burglar alarms are effective. The reports of the Underwriters Laboratories show a system failure in only about one percent of the cases involving systems approved by them. There is little doubt that system failure nationally is higher than that as the alarms meeting the Underwriters Laboratories standards are of high quality. On the other hand, while the system failed less than one percent of the time, captures occurred in only 28% of the cases where the alarm was silent on the premises but signalled at either a police station or a private alarm system station. This rate, of course is definitely better than the burglary clearance rate of 18%, but caution must be used

in interpreting this data for the burglary clearance rate includes admissions by burglars of burglaries other than the one in which they were caught. In all probability the burglars captured by the alarms in the Underwriters data admitted a number of offenses so that the clearance rate would be much higher than the capture rate.

Other data on the effectiveness of alarms is almost non-existent. The various burglar alarm companies are reluctant to release information about their systems, assuming that they collect the data. However, observation by police officers does show that a considerable number of burglars are caught following an alarm, including those attacking a location where they would be difficult to detect by any other method. As a result, the effectiveness of alarm systems showed definite promise as an area of study, not only to discover the effectiveness of the system, but to gather experience on the problems related to the operation.

Prior to the grant application, data on the last 500 non-residential burglaries in Cedar Rapids was recorded on the form shown in Appendix I and summarized. After the study was underway these 500 were expanded to 668 to give a complete four year experience covering the period immediately prior to the study. The results gave a basic picture of what was happening in Cedar Rapids non-residential burglaries. While some of the results were much as expected, other findings came as a surprise. For example, only 7.6% of the burglaries occurred within the central business district while 21% occurred on the edge of the central business district and 38% occurred in isolated businesses (defined as 3 or less business places in a group).

Filling stations, taverns, grocery stores, restaurants, wholesalers and offices led in numbers of burglaries. This is in contrast to the locations considered as "high risk" such as banks, jewelers, furriers or loan companies for these were all far down on the list. It is believed that because they are considered high risk locations the owners do protect them well and the burglars realize this so avoid them.

Most of the victims were small business places. Fifty nine percent had less than 5 employees and only fifteen percent had over 15 employees.

In 77% of the cases entry was through a door or window and in 97% of the cases, this was on the first floor. As a result, first floor doors and windows appeared logical points to locate alarm devices. A judgment was made on the basis of apparent skill of the burglar, and in 55% of the cases, this was rated as poor.

Seventy two percent of the time the burglary was discovered by the owner or an employee. The police discovered the burglary in only 10% of the cases. At the time this data was gathered, there were fewer than fifty alarms in use and an alarm was the method of discovery in only 4 out of the 668 cases. However, the alarm system did function each time.

Money was by far the most common item stolen, occurring in 53% of the cases with cigarettes a poor second at 10%.

The burglars captured were quite young with only 7 individuals over 25 years of age while 41% were 17 or younger. It is not possible on the basis of the data to tell anything about the burglars not captured. It might be that the older burglars

are able to avoid capture with more success. However, those young burglars captured were not inexperienced for only 4% had no previous police record and 52% had over 6 previous arrests.

From this data it appears that the average burglary in Cedar Rapids occurs when a teen-ager with previous arrests breaks into a small, isolated business place through a door or window located on the first floor. In doing this he does a little less than $20 in damage and steals about $100 in money or merchandise. However, as with all averages, these figures do not tell the whole story for in one case the damage was over $5,000 and in 9% of the cases the amount stolen was over $500 while in three cases the loss was over $5,000.

The average value of property stolen was about $100. If average losses only are used, it appears that it might be cheaper to have the burglaries than it would be to put in alarm systems. However, this would be a false conclusion for a number of reasons. First, the curve for losses is definitely skewed so that while the median loss is just over $20, the average is much higher. Unfortunately, because the amount of loss was grouped an arithmetic average is not possible, but each of the four losses of over $5,000 is at least equal to 250 median losses. In any case, as pointed out previously, the total loss nation-wide to non-residential burglars is over a billion dollars.

Second, no one knows how many burglaries are prevented by the presence of alarm systems. It is a general belief that many are and this is borne out by conversations with burglars as to why they chose one victim instead of another.

Again, as pointed out previously, if we are to have the opportunity to correct an offender, we must first catch him. The data to date indicates that alarms are effective in doing this.

Finally, there is the very real consideration that any sort of crime and any amount of crime is against the public interest, that criminal activity has no part in our society. There is not only the direct harm to the victim and the related fear of harm, but the very real harm to the offender, captured or not. Crime is totally unproductive and in spite of the fact that there is no income tax or other deduction from a burglars take home pay, this is an unpleasant, usually unprofitable, and often dangerous way to live.

PROJECT PLAN

On the basis of the prior study, application was made to the Office of Law Enforcement Assistance (now the Law Enforcement Assistance Administration) for a grant to place alarm systems wired to the police station in 350 locations, to operate and maintain them for a one year period, and to study the results. All costs were paid by the project so that there was no charge to the selected locations. The grant was approved and the original plan was for a one year period for installation of systems and a one year period of operation ending April 30, 1970. However, because of delay in awarding the contract for installation and maintenance, the grant was extended until December 31, 1970.

Upon approval of the grant the Cedar Rapids Police Department established the position of Alarm Supervisor and a three man consultant committee of University of Iowa staff members was established. One member of the committee was Director of the Bureau of Police Science, one a specialist in experimental design and statistics, and one from the Department of Sociology. The sociologist dropped from the committee because of lack of interest.

The alarm system of the Atlanta Police Department was visited for this is the only large scale system owned by a police department and was comparable to the system considered for it is a low cost, unsophisticated, and successful system covering 400 locations. On the basis of this experience and other study, specifications were drawn and interested bidders invited to a pre-bid conference.

Forms for bidding and specifications had been sent to 21 companies that had indicated an interest. On June 27, 1968, 19 representatives from 11 companies attended the conference in Cedar Rapids. The specifications were reviewed in detail both from the technical and legal requirements. As a result of this conference it was believed necessary to modify the specifications. This decision resulted in part from the very recent development and Underwriters approval of at least one advanced system that would allow 100 signals to be transmitted over one pair of telephone wires. This system has the advantage of greatly reducing the telephone line charge.

A second pre-bid conference was held on July 25, 1968. Fifteen representatives from 11 companies attended. The re-write of the specifications was apparently satisfactory. A copy of these specifications is in Appendix II.

Specifications for alarm systems are not easy to write. While the Underwriters Laboratories has approved a great many sorts of alarm devices, and systems, considerable satisfactory equipment has not been approved for a number of reasons. In some cases it may be very new and not yet submitted for examination; again, the manufacturer may not have wished to spend the cost of approval until he was certain of the market for his device; finally, a total system is not approved until it has been inspected in place for even the best equipment is ineffective unless properly positioned and installed. However, standards were set in the specifications in such a manner that the people at the pre-bid conference agreed they were properly informed of what would be required.

The office of the city attorney for Cedar Rapids was involved in this process, was present at the pre-bid conferences and approved the procedure as complying with the state law and city ordinances. Bids were received by the City Council and opened at a regular meeting on July 31, 1968. There were 9 bids from 5 companies. All but two of the bids were for a direct wire system rather than a combined signal system. The bids ranged from $896 a location to $185.60. The two bids for the combined signal were considered too high for the advantage gained and the bid was awarded to the Wells Fargo Division of Baker Industries for $185.60. This bid was apparently a cost figure for shortly after the bid had been accepted an inquiry was received relative to the penalty for withdrawing the bid. This was based on a differences in points of view between the operational people who wanted the contract on the basis of the advantages in being involved in a large scale study and the accounting people who wanted to make a profit.

SYSTEM DESIGN

When burglary is discussed, most people, and this usually includes police officers, talk about the highly skilled burglar who selects victims with great care, cases the place, enters, usually opens a safe in a workmanlike manner, and gets a lot of loot. This is not a typical burglar. The apparent skill in over half of the burglaries studied was rated as poor and only a small part of one percent earned an excellent rating. This conclusion is borne out in any conversation with an experienced burglary investigator. As a result, the alarms systems specified were relatively simple. It was not believed that a sophisticated system was needed to catch by far the highest percent of burglars. There was another very practical reason to select the simplest possible system that could be effective. Study to this time had shown that most victims were small business men who were not in a financial position to either purchase or maintain an expensive system, certainly not the type visualized by the bidder with his $896 bid. Experience has shown that this philosophy has been sound. Even a few quite skilled burglars have been captured, in one case at a location with only a single detection device installed. There have been no failures based on attack of the system to defeat it and the total failure rate has been low as the data will show.

Only the simplest, lowest cost detection devices were specified. There were magnetic switches (where moving a magnet away from the switch when a door or window is opened activates the

system; plunger switches (as turns on the light in a refrigerator); vibration switches that detect pounding or any major movement; pull-apart cords for overhead doors or similar locations where the other types of switches would not be practical. These devices were wired in series (like the old Christmas tree lights where when one went out they all went out) to a control box. The control box served two functions. First, it allowed checking the system before it was activated to make certain that all protected openings were closed so that a false alarm would not result. Second, it allowed the signal at the police station to show if the break in the system had occurred in the premises or in the telephone line (a break in the telephone line could be caused by a burglar cutting it.) The systems were activated by turning a high security key on the outside of the building after everyone had left. The system operates on 110 volt current reduced to low voltage by a transformer. Standby batteries were not used to supply current during the times the 110 volt service failed. This decision was based on reducing costs including the original costs of the batteries, housing and the circuitry needed and the replacement cost of batteries. For the purposes of this experimental project, this is believed to be a sound decision. However, false alarms did result from power failure. Usually these failures were area-wide and during a storm. Further study is needed to determine if the security value of these batteries is worth the cost. During this study no burglars took advantage of power failures.

However, this might well be because they did not realize that the systems were inoperative at that time.

Hold-up buttons were installed at all locations. They not only serve the purpose of rapid notification of a hold-up, but also are a convenient method of checking the system. These were wired so that they were active whether or not the burglar alarm system was in operation. The contractor voluntarily added a highly useful feature to these buttons even though not required to by the specifications. These buttons must be re-set with a key. This was done because in many instances the button is pushed by employees or customers as a prank, they want to see how long it takes the police to arrive, or they want a little excitement. With the key operation the police know the button has been pushed and the people in the premises can't say that they didn't know what caused the alarm, thus avoiding several wasted hours of trouble-shooting trying to find the cause.

There was considerable discussion relative to the installation of hold-up buttons. The possibility that someone would be injured trying to activate the alarm was a major point. However, this risk was believed minimal with proper instruction to wait until it could be done with no risk. The advantages seen are that this is a rapid and accurate method of notifying the police. The President's Commission has shown that there is a very definite relation between response time and success in capture. Dialing the call, and in some cases even looking up the number of the police, takes much more time than just pushing a

button and time is a very real factor in hold-ups. The accuracy of the report is also a factor. In one case the police dispatcher received a call saying, "They are holding up Safeway Number 6." The caller then hung up. It took the dispatcher less than a minute to find out where "Number 6" was located, but this was unnecessary delay. As a matter of interest there was an unanticipated benefit from a hold-up button. An alarm was received from a tavern after closing hours and a burglar captured inside. However, there was no evidence of any of the alarm devices having been activated. Upon further examination, the police discovered that the intruder had unknowingly pushed the hold-up button while rummaging around under the bar.

Windows were not taped except in one special case. Experience had shown that in the locations selected this sort of a procedure was not necessary and window tape involves a cost factor in both installation and maintenance. Vibration switches were installed on some windows. While not as positive as tape, they are quite successful in detecting window breakage and maintenance is minimal and cost low.

No sophisticated devices such as the various radar systems, super-sonic or audible sound, capacitance relays, or photo cells were used. There were two reasons for this decision. First was cost. Any one of these devices costs as much as the complete systems selected, and in most cases, more. Second, reliability, excessive false alarms, and maintenance can also be a definite problem. This does not mean that there is not a definite

application for these sorts of devices. In some sorts of locations as for example, warehouses, where there are few interior doors that might be trapped, and especially where there is specific merchandise, like cigarettes that might be the target, they are of definite value. They are also highly useful in high value locations likely to be attacked by skilled thieves. At the same time, there is a proliferation of these sorts of devices and it seems like everyone with a soldering iron has put one or more on the market. As a result, the quality varies from Underwriters Approved to junk. Study of the application of this sort of equipment and the development of reliable, low cost devices is needed.

INSTALLATION

Locations were all selected from the 668 non-residential businesses and schools that had had a burglary in the prior four years. This, in part, is responsible for the high degree of captures when this group is compared to the sorts of locations usually having alarms. For example, even before the FDI requirement, most banks had alarm systems as did the better jewelry stores, major furriers and similar businesses. There is no record of a bank burglary in Cedar Rapids for these are substantial buildings with highest quality vaults. Few burglars will tackle this sort of a location, and certainly not the typical school-dropout who has turned to crime.

In so far as possible, locations where alarms were installed were matched with similar location not receiving alarms. This matching was on the basis of kind of business, type of location, size of the business, and prior burglary experience. The alarmed group then served as the experimental group and the matching group as the control. Matches were possible in over 200 cases so that a statistically reliable sample was possible.

Each location selected for an alarm installation was visited by the Police Alarm Supervisor, the project was explained, and a contract signed. A copy of this contract is Appendix III. The control group was not contacted and members of this group do not know that they have been serving as controls. There were a few cases where the location selected did not want an alarm system installed, even though there would have been no cost involved.

The usual reason given was that they did not want the inconvenience of turning the system off and on. No strong effort was made to convince these cases. They were then made a part of the control group and their matching location a part of the experimental group. Most locations were most happy to cooperate and even those who said that they believed that they had no real burglary hazard were anxious to cooperate.

Actual placement of the detection devices was determined by the police officer assigned to the project and the alarm installation supervisor employed by the contractor. The type of device used varied with the application and the difficulty of installation. In so far as possible, plunger switches were used instead of magnetic switches for the plunger switches are less visible. Because many of the locations were relatively small, even the limited budget allowed quite complete coverage. In other cases, complete coverage of all possible openings was not practical. In these cases a judgment as to the location was arrived at. Experience has shown that this has worked out quite well. For example, in a lumber yard, only one detection device was installed; on the door leading into the room where the safe was kept. An experienced burglar entered the building through the roof, then opened the door to the room containing the safe and just had his tools unpacked when the police arrived. In another case, the owner of the business did not want a device placed on the door to the washroom so that the door could be left open to keep this essential room warm. In less than two

weeks, a burglar had entered through this unprotected door and now this point is protected.

When possible at least one interior door was alarmed. In many locations there is a door where there is a high probability that the intruder will open it, as in the case of the lumber yard. In many small businesses the burglar will break in through a rear window into the storage area, then go to the display room where much of the merchandise is kept. Again, he will enter offices and similar separate rooms. In other cases, he may have been locked in the building at closing time, either because he intended it that way or, as occurs most usually in taverns, because he was either not fully conscious or asleep and was not noticed when the place was locked for the night. This practice of placing an alarm on an interior door has proven to be highly effective. It should be noted that this need not be a full door, but a gate leading in back of counters can be used with equal success.

Schools presented a different problem. There are two sorts of attacks on schools; first by the juvenile, most often a student at that school, who enters for the major purpose of vandalism; second, by the burglar who is after money or property of value. Because it would have taken an excessive number of devices to protect the whole school, only such locations as the office, the cafeteria, the musical instrument storage room, the shops and the business education rooms were protected. While vandalism and thefts have occurred in the unprotected areas, the alarms installed have not

failed to function.

The wiring used was of high quality. The supervisor assigned by the contractor was well experienced and insofar as practical, concealed the wiring. Conduit was used in a number of cases, even though it had not been a part of the contract. This skill in installation is extremely important. High quality devices must be used, but their value can be greatly reduced through poor selection of locations and failure to follow approved practices.

The alarm board in the police dispatch center was custom built for this project. Four hundred and fifty alarm positions were placed on a control panel measuring 59-7/8" wide, 36" high, and 6-7/16" in depth. The panel matches the other equipment in the dispatch center. The additional positions were installed for future alarms so that all alarms installed by anyone and coming into the station are standard. This panel is only a reporting system. The actual alarm relays and associated equipment is installed in a secure room just below the dispatch center. In addition to this room being secure, alarm devices have been installed on the cabinets containing this equipment. Other alarm companied have been required to make their equipment compatible with the alarm panel and are allowed to install equipment in the secure room. However, before any alarms are wired into the police station, the equipment used and the installation at the protected premises must be approved by the police. This is a point often overlooked. Some police stations have allowed any sort of equipment to be

installed and in many cases there is a wide variety of methods of showing an alarm signal. It is not at all unusual to see ten or more entirely different alarm systems in a police station with a wide variety of methods for showing alarms, trouble on the line or other notifications, and an even wider variety of methods of silencing the alarm and restoring it to service. It is not unusual to find home-made devices installed in police stations. Obviously this lack of standardization and quality control has done much to delay police response and to generally give alarm systems a bad name.

When a signal is received in the police dispatch center an audible signal and a light come on. The light is flashing and if flashing red, the alarm has originated in the premises. If amber, in the telephone line. The lights are numbered and the dispatcher locates the alarm location on a file wheel. He can then silence the alarm and put the light on a steady color without moving from his position. When the alarm is restored, he can turn out the light without leaving his position. A button on the panel allows all lights to be tested and this is done each day.

TELEPHONE LINES

All alarms are wired to the police station using telephone lines. The charge for these lines is always a major cost in any alarm system for it recurs each month. It had been hoped originally that the state of the art would have been such that a system using a method of combining a number of signals on one line would have been low enough in cost to be considered. This did not prove to be the case. The old "McCullough" loop that has been in service for many years was even considered, but not specified for there are too many opportunities for failure.

Telephone line charges are based on the distance (usually in quarter miles) from the protected premises to a telephone exchange and then to the police station. Because of the design of the telephone cables, this system of running the wire from the premises to the exchange and then to the station is necessary, but it does result in some rather unusual charges. For example, a location just across the street from the police station may require a mile or two of connecting line.

Because a cost figure was essential before the exact locations were selected, the telephone company agreed to a flat monthly rate of $8.50 a location, regardless of the distance involved. Following a conference in which the public service and experimental nature of this project was outlined, the telephone company re-studied their rates and agreed to a $5.50 figure. There was also a $10 hook-up charge. A 500 pair cable was run from the exchange to police headquarters.

Installation was not started until December 1st, 1968, because of the illness of a key employee of the contractor. Once started, installations continued at a regular rate and were completed by September 1st, 1969. Some of the alarms were hooked to the station as soon as completed, but because of a delay in completing the cable to the station and because the budget did not allow line charges for over a year, the system was not completely activated until January 1, 1970. The year from January 1st, 1970 to December 31st, 1970, was used as the experimental period.

STUDY RESULTS

The following data is based on an experimental period of one year, 1970. During this time there were from 342 to 350 alarms in operation under this experiment. It was not possible to keep all 350 alarms in operation because of locations going out of business, major remodeling projects and similar circumstances. When an alarm was discontinued, the equipment was installed in a similar location as soon as possible.

EXPERIMENTAL VERSUS THE CONTROL GROUP

It was possible to complete matches for 142 locations. That is, alarms were located in one location and this point was then matched with a similar point on the basis of previous burglary experience, type of business, size of business and type of location. While the original number of matches was higher, the number with a full year's experience was reduced because of going out of business or similar reasons on the part of the location in the experimental group or the control group. In any case, the total of 142 matches is definitely high enough to allow statistically reliable conclusions.

Table 1 shows what happened.

TABLE 1

EXPERIMENTAL		CONTROL	
Burglaries	Captures	Burglaries	Captures
46	12	36	1

Thus, there were captures in 26% of the burglaries in the alarmed group but in only 3% of the non-alarmed group. The

"capture" figure is the number of cases with a capture, not the number of individuals. (The number of individuals averaged out in both groups to about two per case.) In other words the capture rate for the control group was only 11% of the rate for the experimental group, or to put it another way, there were over 9 times as many cases solved with alarms than there were where there was no alarm.

There is another significant factor in Table 1. Forty percent of the burglaries in the experimental group and 36% in the control group were schools. At the same time there were only 13 schools out of the 142 locations in each group, or 9%. In other words, schools were chosen as the victim from four to four and a half times as often as their numbers would indicate.

It is obvious that schools present a special problem. In the first place, because of their size and construction it was impossible to protect even a fair percent of possible points of entry. As a result, only the office area, the cafeteria, band rooms, shops, business education rooms with their office machines and similar locations were protected. Second, schools have a vandalism problem. As pointed out in other sections of the report it is often difficult to determine if a broken window is a burglary attempt or only vandalism. The Cedar Rapids Police Department classified all such cases as burglary, unless there was definite evidence to point out vandalism. Of course if there is an entry after the breaking, the case does become burglary even though the intent was only vandalism on the interior of the building.

Because schools are apparently a special sort of target for burglaries, analysis of the data will separate schools for special

analysis in the final report as well as considering them a part of the entire project.

There is some indication in this data that burglars are spotting the alarms. For example, in the schools, alarmed locations were rarely entered. The same is true of other sorts of locations where people spend considerable time so have the opportunity to see the alarm devices. In restaurants there were only two burglaries at locations with alarms, but 8 at locations with alarms. In filling stations there were 5 locations with alarms but 11 without.

CLEARANCES WITH ALARMS COMPARED TO CLEARANCES WITHOUT ALARMS

There were 302 non-residential burglaries in Cedar Rapids in 1970. There are approximately 3,000 non-residential locations in the city. An exact count is most difficult for the number not only fluctuates from day to day, but the classification of a location as a business is not easy. However, using the classified phone book and similar sources the total of 3,000 is believed to be relatively accurate.

TABLE 2

	Clearance at 238 Locations Without Alarms Under the Experiment	Clearance at 66 Locations With Alarms Under the Experiment
Cleared by Capture	36	19
Cleared by Admission or discovery of Stolen Property	4	2
Clearance Rate	17%	31%

One point should be noted immediately. The Cedar Rapids Police Department is extremely conservative in recording clearances. First, because of fear of harm to the case they avoid any interrogation not directly related to that specific crime. Second, they do not clear cases on the basis of similar modus operandi or

"hunches" even though they strongly suspect many more cases could be cleared. This is a somewhat unusual situation and points out one of the deficiencies in crime reporting as well as one of the effects of the Miranda decision. In other words, the clearances shown are very direct clearances with definite proof and totally uninflated. In spite of this their clearance rate of 17% for cases without alarms is near the national average.

The clearance rate because of the alarms requires some explanation. Because schools are very often subject to burglars, it was decided to install alarms in a number of those locations. It was realized that because of the size of school buildings it would not be possible to protect any more than key locations. It is uncertain as to whether or not this was a wise decision.

The data in Table 2 makes another interesting point. Of the 2650 locations without alarms under the experiment, 9% had burglaries while in the 350 with alarms, 19% had burglaries. It appears that previous burglary experience (and this is how the 350 alarmed locations were selected) is a good predictor of future burglary experience.

BURGLARY EXPERIENCE WITH EXPERIMENTAL ALARMS

It might be well at this point to define burglary as used in this study. Burglary is generally defined as "breaking and entering with the intent to commit a crime." However, in this study any breaking, even if there was no evidence of entry or the commission of a crime, was classified as a burglary unless there was definite evidence to show the breaking was only vandalism. This

very strict definition was used because of the difficulty in determining which cases were burglary attempts and which were vandalism or even accidental breaking. In all probability, this definition is too strict as shown by the fact that in over one-third of the cases classified as burglary there was no loss to theft. One other reason for this decision should be mentioned. The police know that at least one group is using the method of breaking, then getting out of sight and watching to see if the police arrive. If the police arrive shortly, the burglars know an alarm is present and leave. If the police do not arrive, they go ahead and complete the burglary. To combat this tactic the police, insofar as possible, delay going directly to the scene but rather to a location where they can hopefully observe without being detected.

Table 3 shows the burglary experience at the 66 locations attacked and where alarms were present under this study.

TABLE 3

Total Burglary Experience At
Location With Alarms Under the Study

Cases with captures		19
Cases with no capture		
Entry at an unprotected point	35	
Alarm but no capture	8	
Alarm not turned on or connected	3	
Defeated	1	47
		66

With 66 burglary attempts and 19 captures, there is then a 29% capture rate. However, there were also 19 cases with a breaking and no loss by theft. Six of these cases occurred when the police answered an alarm and there was no time for theft. It is reasonable to believe that the remaining cases can well be

vandalism, especially since such a high percent occurred at schools. This classification would increase the rate by another 29% for a total rate of either capture or no loss of 58%.

There is another way of looking at the data. There were 27 cases where there was a burglar and the police received an alarm. In 19 cases they made a capture and in 5 more there was no loss. In other words, when the police received the alarm they either made a capture or prevented a loss in 24 out of 27 or 90% of the cases.

From the above data it is apparent that failures in the system were the result of the alarm not being received rather than in police response. There are several reasons for this failure that are apparent at this time. First, these are basic, low cost systems with no attempt to protect every possible point of entry. For example, display windows were not protected and five entries were made through these windows. Second, a number of schools were included and only key points were protected in these locations. Third, referring back to Table 1, the control group without alarms had 1.9 times as many burglaries as the experimental group with the alarms. It is apparent that locations with alarms are spotted and avoided. It is similarly highly possible that the alarms are not noted, but methods of avoiding them planned allowing an entry through an unprotected point or into an unprotected section of the premises.

ALARMS WITHOUT CAPTURE

There were 8 alarms following burglaries that did not result in captures. In 5 of these cases while there was no capture, there was nothing taken. All three of the remaining cases were at filling stations and in each case the theft was of money from an unlocked

location. While response time was a minute or less, the burglar was apparently familiar with the location, would break in through a protected point, open a totally unsecured drawer and leave in a matter of seconds. Almost any attempt on the part of the victim to protect his money would have either prevented the crime in the first place or delayed the offender long enough so that he would have been caught.

ENTRY AT UNPROTECTED POINT

Of the 35 entries at unprotected points, 21 of the locations were schools. As mentioned above, only key points, with possible high loss, in schools were protected because of the excessive number of possible entry points. In 11 school burglaries, there was no loss; in 4 the loss was under $30, in 4 the loss was between $100 and $150; and in one the loss was $230 and the highest loss was $427.

There were 14 entries at unprotected points in business places. In four cases entry was gained by breaking a display window. Display windows were not protected because of the cost of both installation and maintenance of foil on the windows. Three of these locations were taverns and 3 filling stations. One grocery was hit twice by breaking a display window but both cases were cleared by an observant officer noting a suspicious person in the vicinity. The other cases were a saddle shop, a junk yard, a variety store and a hardware store. With only four cases of successful entry through a display window, the value of placing foil or some sort of a device on these windows is questioned.

While the numbers are too small to have any reliability the

fact that taverns and filling stations each had three entries at unprotected points might be accounted for by familiarity with the location on the part of a customer, employee, or ex-employee. Both sorts of locations are characterized by hangers-on and relatively transient types of employees.

OWNER FAILURE

There were only four cases of alarm failure because the owner had either not turned it on or had temporarily disconnected it. As a result, this is not believed to be a significant problem.

ALARM DEFEATED

There was only one such case. Here the intruder took the glass out of a front door and entered. It is not known if this was an intentional attempt to defeat an alarm or if the glass was taken out simply because it was an easy and quiet way to enter, but it was treated as a defeat.

ALARM EQUIPMENT FAILURE

There were no cases of alarm equipment failure. Subsequent discussion will show that six percent of the false alarms were caused by either the power supply or the wiring being disrupted in some manner usually accidental. A common cause was fuses blowing due to overloads on the circuit. However, none of these occurred at the time of entry by a burglar. This does not mean that alarm equipment failure does not occur, but there have been few instances of the devices themselves failing and these failures have been discovered by the person operating the alarm or the service personnel in routine tests.

PRIVATE ALARM SYSTEMS

There was an average of 65 private alarms connected to the

police station during the year. There was only one clearance from these alarms and no undetected entries. One reason for this is that the bulk of these private alarms are located in banks, jewelry stores, furriers and other high value locations that were not attacked because of apparent security. The false alarm rate was excessive, however, and will be discussed in a later section. In two cases with local alarms (a bell or similar device on the outside of the premises but with no connection to the police station), there were no captures.

FALSE ALARMS

When you say "burglar alarm" to a policeman, he will respond with "false alarm." This is understandable for by far the greatest number of alarms received are false. This is borne out by the experience with alarm systems in operation in Cedar Rapids not a part of this project. During 1970 the number of such systems varied between 60 and 70. In the first three months of the year there were 161 false alarms from these systems for a rate of 92%. (This rate was determined by multiplying the locations with alarms by 3, the number of months, giving a total of 195 and comparing this to the 161 false alarms received during this period. The experience became worse during the year. In the last three months there was an average of 69 locations in operation, times three this is 207. There were 215 false alarms for a rate of 108%.

In contrast the rate for the alarms under the experiment was 79% for the first three months, but dropped to 52% for the last three. The higher rate for the first three months was the result of total unfamiliarity with the equipment. As the personnel in the locations became more familiar with the equipment, the rate dropped and shows signs of leveling off. No strong effort was made to reduce this rate although the police did explain proper operation and the problems caused by false alarms at every point where a false alarm occurred. During the next year, more analysis will be made by type of location and similar factors in order to reduce this number still further.

There is no well accepted definition of "false alarm." In

this study every alarm received at police headquarters not originated by a burglar or following a hold-up was recorded as a false alarm. Apparently some alarm companies use a somewhat more moderate definition so that experience will look better.

The police do make a judgment when an alarm signal is received. If they believe that it is a false alarm (because of the time of the alarm, type of location and similar factors) they still respond, but usually with only one unit. If they believe that it may be an actual alarm, the response is all out. Experience has shown that this method has been quite satisfactory as shown by only 9 actual alarms with no capture and all of these had been treated as actual alarms.

CAUSES OF FALSE ALARMS

The actual cause of a false alarm is often difficult to determine. Many are judgment situations. For example, a brief reduction in voltage caused by a drain in the line when a piece of heavy equipment comes on may trigger the alarm as will brief interruptions in the power supply outside of the premises. Persons responsible for actuating or turning off the system are sometimes less than honest in admitting an error. However, it is believed that the data gathered is reasonably accurate, and certainly close enough to point up the major causes.

Table 4 summarizes the results.

TABLE 4
FALSE ALARM CAUSES

"Accidental" or Careless	Unknown	Power out	Electrician or Phone Co. working on Lines	Failure in Alarm System	Weather
76%	13%	2.5%	1%	6%	1.5%

The "accidental" or careless classification is all the result of human error; an employee entered without turning off the system or activated it without checking to make sure all devices were in the closed position; the hold-up button was carelessly pushed; or some similar reason. Very probably a high percent of the "Unknown" causes were also human error without firm evidence that such an error occurred. They could have also been very short term power losses, work on the lines or a number of other things.

The "Power Out" classification was probably under-reported for there were times during electrical storms when large numbers of alarms were received, so many that it was not possible to record them. However, the burglars have not yet learned this and no attemps occurred during such times. As mentioned previously, the cost-benefit of independent power supplies should be studied.

Electrical work or phone repairment caused only a insignificant number of false alarms. The phone company does have the alarm lines marked so that they ordinarily are not disturbed. Electrical work resulting in an alarm was usually within the premises and was mainly carelessness on the part of the electrician or failure to inform him of what occurs when power is cut.

Failure in the alarm system includes failures in the power supply within the building, lines cut either accidentally or in remodeling, voltage drops because of other equipment in the building and similar factors. There were no failures of the actual alarm equipment causing false alarms although equipment has failed due to such things as water leaks, pull-apart cords improperly handled and similar factors.

The weather factor listed was high winds or driving rains usually forcing protected openings open to a point where an alarm would occur. More care in installation might improve this record, but it is not possible to estimate the stresses in many locations.

TIMES OF FALSE ALARMS

False alarms were tabulated by hour of the day. The most surprising thing about the data was that they were relatively uniformly distributed. There was a definite peak with 27% of the cases occurring between 6 AM and 9 AM, opening time. There was a minor peak at 2 AM, tavern closing time, but there is no other apparent pattern.

SUMMARY AND CONCLUSIONS

1. Burglar alarms are effective in catching burglars. When the police received an alarm there was either a capture or no loss by theft in 90% of the cases.
2. In a number of cases the alarm was not transmitted because entry was through an unprotected point. In spite of this, the clearance rate for arrests resulting from alarms was 31%, over 50% above the national rate for non-residential locations.
3. Cases where there was no loss by theft combined with cases with a capture at alarmed locations totals 58%.
4. Burglars look for alarms. This is shown by the high rate of entry at unprotected points.
5. There was only one case where there was a possible attempt to defeat the system. (by removing a pane of glass and entering.)
6. There were only three cases of failure because the alarm was not turned on or disconnected.
7. Past burglary experience is a good predictor of future burglaries. The locations selected for alarms because of past burglary experience had a burglary rate of 19% as compared to 9% for all other non-business locations in the city.
8. Burglary equipment does not need to be complex or expensive for only the simplest devices located at a limited number of possible points of entry were used in this study. Care in design and installation is of equal importance.
9. False alarms can be reduced to an acceptable figure. During the first year of operation the false alarm rate for alarms

under this experiment dropped from 79% to 52% and probably can be reduced further. The police patrol force has accepted this rate very well for they are catching burglars.

10. More police control is needed of false alarms from commercial installations. The alarm rate for those sorts of locations was 108% for the last three months of the year as compared to 52% for the police operated system.
11. More study is needed of the problem of intrusion through unprotected points. Some of this is chance but it is felt that much is the result of an employee, and ex-employee, a customer or a hanger-on observing the system.
12. A low cost, reliable system of detection for an area is needed, as for example a capacitance relay with a fair range. This would allow detection of an intruder in the interior if he avoided perimeter protection. It would be especially useful for locations with wide open interiors such as warehouses or where entry was made through a roof or wall.
13. More research is needed. This study was the first of a kind and asks as many questions as it answers. For example, in the three filling stations where a loss by theft occurred in spite of rapid police response, how much physical protection, such as a lock on the cash drawer, would have been needed to allow a capture?
14. Burglar alarms are a police communication system. As a result the police must be in a position to set standards for installation and operation of alarms.

APPENDIX I

CEDAR RAPIDS BURGLARY ANALYSIS

1. Serial number _____

2. Year 1 2 3 4 5 6 7 8 9 0

3. Month 1 2 3 4 5 6 7 8 9 10 11 12

4. Date reported (1-31) ____

5. Day of week reported

Sun	1
Mon	2
Tues	3
Wed	4
Thurs	5
Fri	6
Sat	7

6. Time reported to nearest hour ___AM

7. Time reported to nearest hour ___PM

8. Day of burglary

Sun	1
Mon	2
Tues	3
Wed	4
Thurs	5
Fri	6
Sat	7
Over-night	8
Over weekend	9
Unknown	0

9. Time to nearest hour ___ AM

10. Time to nearest hour ___ PM

Address

_____

11. Type of location

Central business dist.	1
Edge of CBD	2
Outlying bus. dist.	3
If on a highway	4
Shopping center	5
If on a highway	6
Isolated (not over 3)	7
If on a highway	8

12. Kind of business

Retail	1
Wholesale	2
Office	3
MD or dent.	4
Warehouse	5
Shop	6
Factory	7
Bank	8
Loan Co.	9
Other	10

Type other

_____

13. If Retail

Filling station	1
Tavern	2
Grocery	3
Drugs	4
Sporting goods	5
Restaurant	6
Lumber	7
Furniture	8
Radio and TV	9
Jewelry	10
Shoes	11
Auto agency	12
Auto parts	13
Department	14
Mens clothing	15
Womens clothing	16
Fur	17
Variety	18
Photographic	19
Other	20

Type of other

_____

14. Size of business

Less than 5 employ.	1
5 - 15	2
over 15	3

15. Location of break-in

Basement	1
First floor	2
Second floor	3
Above second floor	4
Roof	5
Unknown	6

16. Method of entry

Breaking or prying door	1
Breaking or prying window	2
Breaking door lock	3
Other attack on lock	4
Stayed inside	5
Breaking except door or window	6
Cut opening	7
Ventilation or air condition	8
Other	9
Unknown	10

Describe other

_____

_____

17. If above first floor used

Ladder	1
Fire escape	2
Adjoining bldg.	3
Unknown	4
Other	5

Describe other

_____ _____

18. Apparent skill in breaking

Excellent	1
Good	2
Poor	3
Unknown	4

19. Safe attacked

Yes	1
No	2
No safe	3

20. Quality of safe

Excellent	1
Good	2
Poor	3
Unknown	4

21. Place of safe attack

Original location	1
Premises but moved	2
Carried out	3

22. Safe opened

Yes	1
No	2
Unknown	3

23. Method of safe attack

Batter (unskilled)	1
Peel or pry	2
Punch	3
Drill	4
Cut	5
Blow	6
Unknown	7
Unlocked	8

24. Apparent skill of safe attack

Excellent	1
Good	2
Poor	3
Unknown	4

25. Vehicle used

Yes	1
No	2
Unknown	3

26. Volume or weight stolen

One man-one trip	1
More than one man-trip	2
Heavy or large	3

27. Discovered by

Police	1
Alarm	2
Owner	3
Other	4
Unknown	5

28. Alarm system present

No	1
Alarm to station	2
Alarm under experiment	3
Local alarm	4

29. Did alarm function Yes 1 / No 2

30. If alarm failed, reason

Not turned on	1
Disconnected	2
Circuit broken, premises	3
Component failed	4
Phone line failed	5
Phone line cut	6
Power failed	7
Equip. at station failed	8
Unknown	9

31. Attempt to defeat alarm

No	1
Yes, success	2
Yes, unsuccess.	3
Unknown	4

Damage in addition to theft

				Amount	
32.	Records	No - 0	Yes - 1	_____	32
33.	Merchandise	0	1	_____	33
34.	Fixtures	0	1	_____	34
35.	Safe	0	1	_____	35
36.	Building	0	1	_____	36
37.	Equipment	0	1	_____	37
38.	Other	0	1	_____	38
	Describe other			_____	Total

_____

Stolen

39.	Money	No - 0	Yes - 1	_____	39
40.	Checks drawn	0	1	_____	40
41.	Val. papers	0	1	_____	41
42.	Beer	0	1	_____	42
43.	Liquor	0	1	_____	43
44.	Cigarettes	0	1	_____	44
45.	Candy	0	1	_____	45
46.	Pop	0	1	_____	46
47.	Radio and TV	0	1	_____	47
48.	Guns	0	1	_____	48
49.	Sport goods	0	1	_____	49
50.	Jewelry	0	1	_____	50
51.	Clothing, men	0	1	_____	51
52.	Clothing, women	0	1	_____	52
53.	Food	0	1	_____	53
54.	Auto parts	0	1	_____	54
55.	Tires	0	1	_____	55
56.	Tools	0	1	_____	56
57.	Other	0	1	_____	57
	List other			_____	Total

_____
_____
_____
_____

58. **Total** damage

Up to 20	1
21 to 100	2
101 to 500	3
501 to 1000	4
1001 to 2500	5
2501 to 5000	6
over 5000	7

59. Total stolen

Up to 20	1
21 to 100	2
101 to 500	3
501 to 1000	4
1001 to 2500	5
2501 to 5000	6
over 5000	7

60. Total damage and stolen

Up to 20	1
21 to 100	2
101 to 500	3
501 to 1000	4
1001 to 2500	5
2501 to 5000	6
over 5000	7

61. Location and time first offender arrested

At the scene	1
Vicinity within one hour	2
Vicinity one to eight hours	3
Vicinity over eight hours	4
Elsewhere within one hour	5
Elsewhere one to eight hours	6
Elsewhere over eight hours	7
No arrest	8

62. Was any offender

Present employee of victim	1
Past employee	2
Never an employee	3
Unknown	4

63. Number arrested _____
(write in number including 0 if none)

64. Number charged burglary _____

65. Number lesser charge _____

66. Number no charge _____

67. Number guilty pleas _____

68. Number found guilty _____

69. Number acquited _____

70. Number no disposition _____

71. Involved #1

M. under 15	1
15-17	2
18-21	3
22-25	4
26-45	5
over 45	6
F. under 15	7
15-17	8
18-21	9
22-25	10
26-45	11
over 45	12

72. Record #1

No arrests	1
One arrest	2
2-5	3
6-15	4
over 15	5
Unknown	6

73. Residence #1

Cedar Rapids	1
Linn County	2
Iowa	3
Other	4
Unknown	5

74. Employment #1

Unemployed	1
Employed	2
Student	3
Unknown	4

75. Involved #2

M. under 15	1
15-17	2
18-21	3
22-25	4
26-45	5
over 45	6
F. under 15	7
15-17	8
18-21	9
22-25	10
26-45	11
over 45	12

76. Record #2

No arrests	1
One arrest	2
2-5	3
6-15	4
over 15	5
Unknown	6

77. Residence #2

Cedar Rapids	1
Linn County	2
Iowa	3
Other	4
Unknown	5

78. Employment #2

Unemployed	1
Employed	2
Student	3
Unknown	4

79. Involved #3

M. under 15	1
15-17	2
18-21	3
22-25	4
26-45	5
over 45	6
F. under 15	7
15-17	8
18-21	9
22-25	10
26-45	11
over 45	12

80. Record #3

No arrests	1
One arrest	2
2-5	3
6-15	4
over 15	5
Unknown	6

81. Residence #3

Cedar Rapids	1
Linn County	2
Iowa	3
Other	4
Unknown	5

82. Employment #3

Unemployed	1
Employed	2
Student	3
Unknown	4

83. Involved #4

M. under 15	1
15-17	2
18-21	3
22-25	4
26-45	5
over 45	6
F. under 15	7
15-17	8
18-21	9
22-25	10
26-45	11
over 45	12

84. Record #4

No arrests	1
One arrest	2
2-5	3
6-15	4
over 15	5
Unknown	6

85. Residence #4

Cedar Rapids	1
Linn County	2
Iowa	3
Other	4
Unknown	5

86. Employment #4

Unemployed	1
Employed	2
Student	3
Unknown	4

87. Involved #5

M. under 15	1
15-17	2
18-21	3
22-25	4
26-45	5
over 45	6
F. under 15	7
15-17	8
18-21	9
22-25	10
26-45	11
over 45	12

88. Record #5

No arrests	1
One arrest	2
2-5	3
6-15	4
over 15	5
Unknown	6

89. Residence #5

Cedar Rapids	1
Linn County	2
Iowa	3
Other	4
Unknown	5

90. Employment #5

Unemployed	1
Employed	2
Student	3
Unknown	4

91. Involved #6

M. under 15	1
15-17	2
18-21	3
22-25	4
26-45	5
over 45	6
F. under 15	7
15-17	8
18-21	9
22-25	10
26-45	11
over 45	12

92. Record #6

No arrests	1
One arrest	2
2-5	3
6-15	4
over 15	5
Unknown	6

93. Residence #6

Cedar Rapids	1
Linn County	2
Iowa	3
Other	4
Unknown	5

94. Employment #6

Unemployed	1
Employed	2
Student	3
Unknown	4

APPENDIX II

CITY OF CEDAR RAPIDS IOWA
POLICE DEPARTMENT

Police Alarm Notification System for the project entitled "Evaluation of the Effects of a Large Scale Burglar Alarm System" to be carried out under Grant Number 337 from the Office of Law Enforcement Assistance.

I. SCOPE OF WORK

1.1 To provide and install a burglar alarm system in conjunction with the research project under Grant Number 337.

II. GENERAL

2.1 It is the intent of these specifications to provide a complete burglar alarm system of the highest professional caliber ringing in at police headquarters. A system shall be provided that will be reliable and designed to meet the requirements of the city for many years.

2.2 All equipment shall reflect the latest advances in the state of the art and be consistent with good engineering practices.

2.3 All equipment and materials shall be new, and shall be equal to the best of their respective kinds, free of corrosion, scratches or such other defects as to present an other than new appearance.

2.4 All bidders must include only equipment which is of

current design and manufacture.

2.5 Bids shall be for the entire facilities as specified including complete installation. Partial bids will not be acceptable and shall be rejected.

2.6 The contractor shall be prepared to demonstrate to the satisfaction of a duly appointed representative of the city, that the equipment meets all of the specifications. The city reserves the right to inspect the equipment prior to or during installation.

2.7 All equipment shall conform to the requirements of the Northwestern Bell Telephone Company - Cedar Rapids, Iowa branch.

2.8 All equipment or components shall meet the standards of the Underwriters Laboratories or the Underwriters Laboratories of Canada or a testing or rating agency approved by the City of Cedar Rapids. Such testing or rating shall be at the expense of the bidder. Inclusion of more than a limited number of components in the design not meeting the standards of the Underwriters or another similar recognized organization will be considered in awarding the contract.

2.9 Design and construction shall be consistent with good engineering practice, and shall be executed in a neat and workmanlike manner. All connections shall be made with approved mechanical connectors or soldered with hot solder.

2.10 Notwithstanding the details presented in these specifications it is the responsibility of the contractor to verify the completeness of the material lists and suitability of devices to meet the intent of the specification. Any additional equipment required, even if not specifically mentioned herein, shall be provided by the contractor without claim for additional payment; it being understood that a complete, operating system, satisfactory to the City of Cedar Rapids, is required in all cases. This section shall not be taken to mean that additional detection devices beyond the average number shown in 13.8 shall be required without additional payment to the contractor.

2.11 Information submitted with the bid shall include certification of conformance to Section X., "Qualifications of Bidders."

2.12 INSURANCE

The following insurance shall be maintained by the contractor during the execution and until such time as the contract is complete:

Workman's Compensation - As Required by the State of Ia.	
Comprehensive Public Liability	$500/1,000,000.00
Property Damage	$25/50,000.00
Comprehensive Automobile Liability	$500/1,000,000.00
Property Damage	$500,000.00

Blanket Contractual (Hold Harmless) Protection. Fire, Theft, Vandalism; for the full value of all materials and equipment until formal acceptance of completed work.

That the City of Cedar Rapids shall be named as an additional insured on all liability coverage. Certificates of all insurance shall be approved by City of Cedar Rapids.

III. PROPOSAL

3.1 To assist in the bid evaluation, bidders shall prepare panel sketches showing the intended function for each operating control and mechanical layout of equipment as proposed by the bidder.

3.2 Awards will be based on an analysis of the following criteria; technical and esthetic qualities of the proposal, reliability, bidders ability and facilities to produce the equipment called for, performance on similar installations or contracts, manufacturer's local service back-up, and evaluation of the bidder's proper understanding of the user's needs. The contract shall be awarded the lowest responsible bidder best meeting the above criteria. The city may at its discretion, reject any and all bids.

IV. BID SURETY

4.1 Each bid shall be accompanied by a bid surety in the form of a Deposit of cash or Certified Check payable to the city, in the amount of (10%) ten per cent of the sum total of the bid. Bid surety is forfeited to the owner if the contractor fails to execute a contract within ten (10) days after notification of award of contract to him, or if bidder fails to furnish the Performance and Payment Bond and proper insurance

certificates required to the city within an additional ten (10) days. Unsuccessful bidders will receive a full refund of the above deposit. Refund of the deposit to successful bidders will be contingent upon compliance with all requirements set forth.

V. PERFORMANCE AND PAYMENT BOND

5.1 The successful bidder shall, at no additional cost to the city, furnish a Performance and Payment Bond in the amount of one hundred (100) per cent of the total contract price. Such bond shall be issued from a reliable surety, licensed to do business in the State and acceptable to the city.

VI. PERMITS

6.1 The contractor shall give all notices required by, and comply with, all applicable laws, ordinances, statutes, regulations and codes. The City of Cedar Rapids will not require an installation permit, but reserves the right of inspection for compliance with the state law or City Codes at no cost to the contractor.

VII. INSTRUCTION MANUALS

7.1 The bidder shall provide complete instruction manuals for the equipment supplied. There must accompany the manual a material guide which shall contain the replacement part numbers and description of all components used. If this information is included in an instruction section of any of the equipment, it will not be necessary to duplicate the list, but such material lists shall appear in only these two places.

7.2 In order to provide a complete manual containing all schematics, and operating instructions, the contractor shall prepare all of the above information in book form with no drawings larger than the page size of the book. This manual shall contain an index of all schematics, charts, and diagrams to insure that pages have not been removed, or if lost or mutilated sufficient information is contained in the index to permit re-ordering as required.

7.3 The contractor must maintain a file of all manual information such that he is in a position to replace the manual in whole or part for a period consistent with the length of time that the equipment provided is in actual service.

7.4 In addition to schematics, etc., the manual shall contain theory of operation for all active devices in sufficient detail to facilitate servicing. This copy will be kept at police headquarters.

VIII. PARTS

8.1 The bidder shall maintain a stock of replacement parts for each item included in this equipment, and shall be in a position to replace such part or parts as may be required for a period of at least 10 years. If one of the items has become no longer available, it shall be the responsibility of the contractor to provide a device that will appropriately replace the unit if replacement units are ordered. Comparable electronic parts, used

in the equipment supplied, must be stocked with sufficient number to satisfy serious requirements.

IX. MAINTENANCE

9.1 The bidders must state in the formal bid the name and capabilities of the service station which will maintain the equipment and provide any and all warranty service. Maintenance shall be prompt and on a (24) twenty-four hour basis in the case of emergencies. If this station is not wholly owned by the bidder, a copy of the agreement between the bidder and the service facility shall be submitted with the bid. This agreement shall clearly show the nature and duration of the agreement.

9.2 The bidder himself is offering a maintenance contract covering all equipment supplied, after the initial warranty period, if requested to do so. However, ultimate control and responsibility must remain with the bidder to assure total system responsibility and maximum owner satisfaction.

X. QUALIFICATIONS OF BIDDERS

10.1 The firm submitting the bid shall meet the following qualifications:

A. Successful Bidders shall be bonded.

XI. INFORMATION TO BE SUBMITTED BY BID

11.1 The firms submitting the bid shall include with their bid the following:

A. Panel sketches as described in (III, 3.1)

B. Description of Service Facilities as described in (IX, 9.1)

C. Certificate of Insurance as described in (II, 2.12)

D. Bid Check as described in (IV, 4.1)

E. Copy of service facility agreement as described in (IX, 9.1)

XII. As set forth in Chapter 73, Item 73.1, Section 2, of the Iowa Code:

12.1 "State, county, and municipalities not only have authority to enter into a valid agreement with Federal government that the grant from the United States government will be used to aid in financing the construction of public works but the grant must be used in accordance with the conditions under which it was granted, and preference must be given to Iowa materials and products."

12.2 That the contractor shall comply with all regulations and requirements of the Department of Justice - Office of Law Enforcement Assistance, and all other agencies of the United States and the laws and regulations of the United States for purposes of obtaining and fulfilling all requirements in connection with the project. That said project will be performed and completed in accordance with all such requirements and regulations, and by such times and dates specified in connection therewith.

12.3 (a) The city retains ultimate control and responsibility for the contractor's activity.

(b) This contract with contractor is subject to approval of the Office of Law Enforcement Assistance,

Division of the United States Department of Justice.

(c) All rules, regulations, conditions and requirements relating to and connected with the Grant by the Federal Government are incorporated into and made a part hereof and the contractor shall comply with all such rules, regulations, conditions and requirements.

(d) All payments to contractor are subject to approval of the Office of Law Enforcement Assistance, Division of the United States Department of Justice. Contract expenditures are subject to audit in the same manner and with the same comprehensiveness as other expenditures of grant funds. The contractor shall maintain separate records (or separately identifiable records) permitting expenditure of grant funds to be readily documented for audit.

(e) Sub-granting of LEAA funds is not permissible.

XIII. EQUIPMENT INSTALLATION AND OPERATION

13.1 Installations shall be designed by experienced persons familiar with burglar alarm operations.

13.2 All installations shall give an audible and visible alarm in police headquarters and shall have no audible or visible alarm at the protected establishment.

13.3 The alarm notification in the police department shall be compact, with 6 square inches of wall space or less used for each reporting position installed at location designated by city. Space is available in room below the notification point for the alarm supporting equipment such as power supply.

13.4 All work shall be done in a workmanlike manner and in finished structures, wiring shall be concealed as well as possible.

13.5 Design, equipment, and installation shall be such as to insure the best possible level of security for the system so as to prevent or detect tampering in an attempt to make the system ineffective in the detection of an intruder.

13.6 It shall be bidders' responsibility to make all examinations of the city to understand the specifications of the requirements of the city for the work and no adjustment will be made for non-inspection.

13.7 Equipment at the protected premises will include magnetic switches; vibrating switches, or similar devices to detect pounding; traps; door plungers or similar switches; and switches for special applications, such as overhead doors. A high security locking switch to activate the system from the exterior of the premises or a similar point will also be a part of the circuit. However, a device, system or design feature that will accomplish the purpose of the locking switch will be acceptable provided this system does not require an alarm to be transmitted. A hold-up alarm device will be required at most locations. This device may be a part of a test system. In any case, provisions must be made in the design for a simple and rapid test of the entire premises and the method of transmission of

the alarm to police headquarters as well as test of the alarm notification system in police headquarters.

13.8 Number of Units and Designs at Premises

A variety of premises will be involved so alarm systems may vary from a single device to the full range of devices. It is the aim of this project to give adequate, practical protection, not to protect against any possible intrusion. The proposal should be based on an average of 7 (seven) magnetic switches at each location; A holdup alarm capability at each location; A overhead door or similar problem at one out of each four locations and two vibrator switches at each location; and a key switch or other system as detailed in 13.7 in each location. If another type of switch is indicated for best sucurity it may be substituted for any device named above. Changes may occur as the individual buildings are surveyed, but costs will not be in excess of these requirements without additional compensation.

13.9 Systems shall utilize leased wires for inter-connection of police department with protected establishment.

13.10 Temperature rise of all transformers shall be no more than 25°C.

13.11 Voltages within the premises shall not exceed 50 and total electrical load on any wiring or device shall not exceed Underwriter Specifications.

13.12 Loop voltages shall be well filtered DC or batteries

with automatic charging device. However, other sources of current will be acceptable if it is demonstrated such source is essential and equal or superior to that required above.

13.13 All pilot lamps shall be of the replaceable type and shall draw less than 100 ma.

13.14 The bidder shall specify any delay in signal transmission in excess of five seconds that occurs regularly because of the design of the system. Both the maximum possible delay and the average delay shall be specified. Delay is taken to mean the time from detection of an intruder by a device in the premises until a signal indicating the location of the premises is received in a form that can be readily interpreted by personnel in the police dispatch center.

13.15 That the contractor shall comply with reasonable requirements of the city as to times of installations at various private properties. Every effort will be made to determine hours of installation convenient to both the contractor and owner or operator of the premises. Time for installation will not be scheduled outside of regular work day or work week except at the request of the contractor and upon agreement by the owner or operator of the premises. That the contractor shall save the city harmless from all claims of property owners made in connection with the installation of the equipment.

13.16 That the entire installation shall be completed by 10 months from acceptance of contract.

13.17 That it shall be the responsibility of the contractor to make all necessary coordination with telephone company relating to installations.

13.18 That the contractor shall be responsible for warranty and guarantee of performance and all necessary maintenance in connection with the warrantee and guarantee for period of 2 years from date of completion of work acceptance by city.

13.19 The contractor shall be paid 90% of work on monthly billing by contractor approved by city, and balance upon satisfactory demonstration of performance to the city. The 2 year warranty and guarantee will commence at such time as satisfactory demonstration of performance is made to the city, and the balance of contract price is paid.

XIV. FORM OF SIGNAL TRANSMISSION

14.1 Separate bids will be taken on complete systems using each of two forms of signal transmission:

A. Direct wire transmission.

B. Combined signal transmission.

A bidder may enter a bid on either or both types of system. Only one type will be selected and installed.

14.2 Direct wire transmission is taken to mean a system in which one pair of telephone wires is needed for transmission from the protected premises to the telephone exchange and is taken to include loops.

14.3 Combined signal transmission is taken to mean a system

in which an electronic signal may be transmitted over the same telephone wires used by more than one premise or where more than one signal generated within the same premise may be transmitted over the same telephone pair and includes a system at police headquarters to discriminate between the signals and notify as to the specific point or device originating the equipment.

APPENDIX III

No. _____

Linn County
Cedar Rapids, Iowa

THIS AGREEMENT made this _____day of _____, 1969,

between _____, Lessor and

_____, Lessee.

1. Lessor agrees to furnish, install and maintain an automatic detection system from July 1, 1969 to June 30, 1970, on the premises of Lessee located at _____, City of Cedar Rapids, Iowa.

2. This system will report into the alarm board maintained in the Police Headquarters Communications Center.

3. This installation will be made as follows:

____Hold-up button	_____Vibration switch
____Door switches	_____Heat detectors
____Pick proof switch lock	

4. In case of failure of the system to properly operate, the Lessee agrees that there is to be no right of action against the City of Cedar Rapids or any of its employees for damages resulting therefrom, and in consideration of Lessor installing said equipment Lessee waives and discharges and disclaims all claims or causes of action for damages or right to such claims and causes arising out of or in any way connected with such equipment or the use thereof.

5. It is agreed that the system remains the property of the City of Cedar Rapids until June 30, 1970, and will thereafter continue to be the property of the City and under the control of the City and may be removed from the Lessee's premises by the City unless the City and the Lessee enter into a subsequent agreement providing for the ownership, use, and control thereof.

6. It is further agreed, that the Lessor can disconnect the system at Police Headquarters and remove said equipment from the premises at any time the Lessor determines that there is an excess of unnecessary alarms caused through carelessness.

7. That the Lessee will be responsible for all repairs and maintenance which the Lessor determines was necessitated by failure of Lessee to exercise due care for the equipment.

8. That Lessee will carry Lessor as an additional insured on Lessee's liability insurance policy for said burglar alarm equipment on Lessee's premises and furnish Lessor evidence from the insurance company or agent that such insurance is continually in effect.

This the _____ day of _____, 1969.

_____
Lessee

APPROVED FOR THE CITY OF CEDAR RAPIDS, IOWA, this the _____ day of _____, 1969.

City of Cedar Rapids, Iowa

By _____
Lessor

*U.S. GOVERNMENT PRINTING OFFICE: 1973 514-413/193 1-3

END