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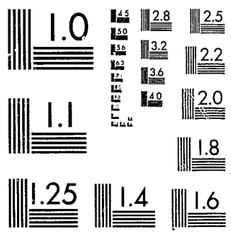

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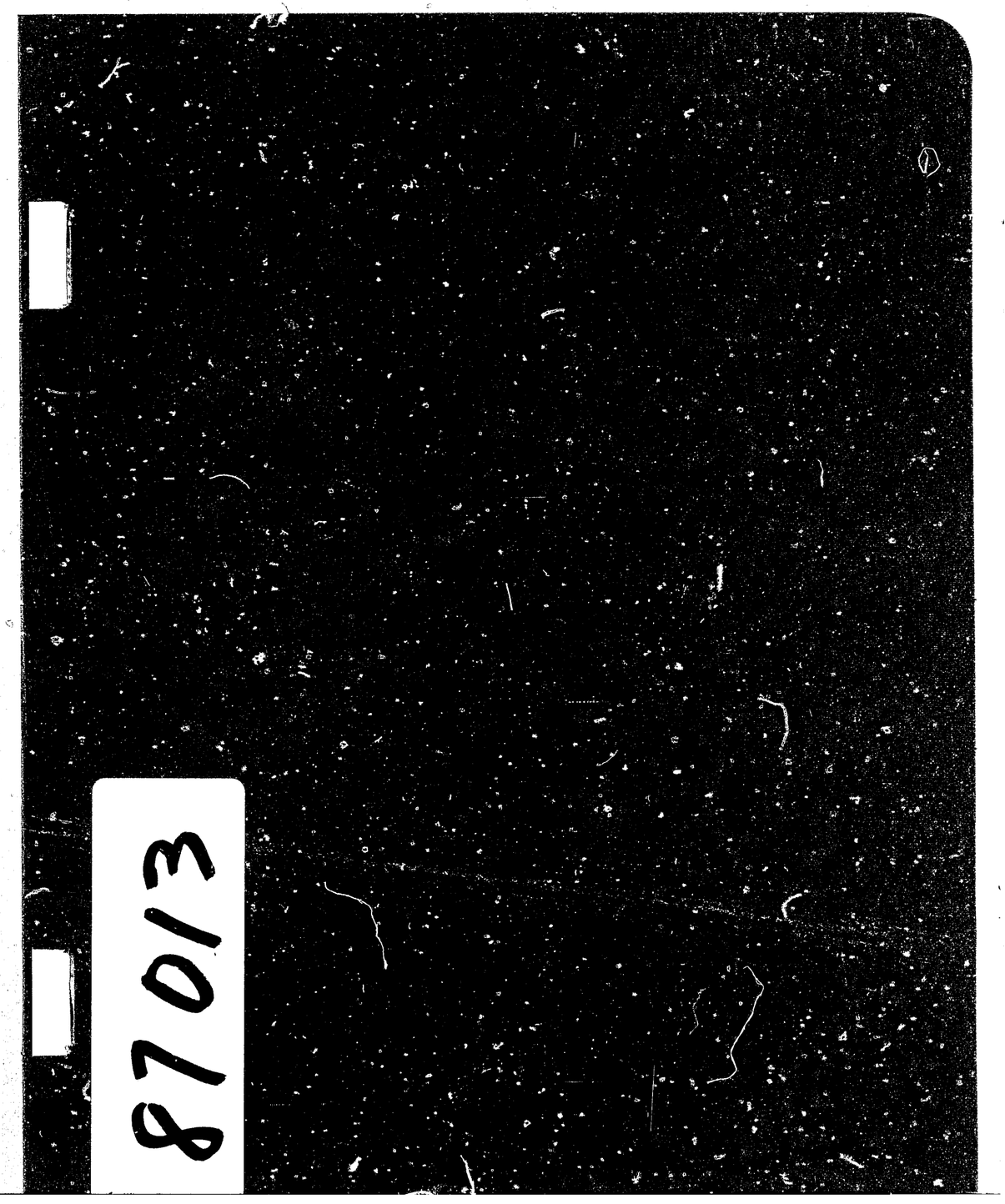

Associated Public-Safety Communications Officers, Inc.

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11 October 1979

Mr. John Ferry
National Criminal Justice Reference Service
Box 6000
Rockville, MD 20850

Dear Mr. Ferry:

Enclosed are copies of 62 advisory reports developed and furnished to the agencies indicated as part of APCO's Technical Assistance Project. This program was funded by Grant No. 78 TA AX 0036 from the Law Enforcement Assistance Administration.

Under this grant program, APCO provided short term advisory assistance in law enforcement communications to requesting agencies. APCO members across the country, who are fulltime employees of state and local governmental agencies, acted as the advisors. In most cases their reports were based on an intensive, one-or two-day visit to the agency, the total task involving not more than five man-days.

We believe these reports will provide other law enforcement agencies with useful information concerning telecommunications problems and solutions.

Sincerely,

Donal D. Kavanagh

Donal D. Kavanagh
Director of Projects

Attachments

cc: Mr. William H. Bailey
Mr. Alvin Ash
SDD/NCJISS-LEAA/DOJ
(excluding reports)

Read the APCO Bulletin published monthly and dedicated to the improvement of all forms of Public-Safety Communications.

EVALUATION OF COMMUNICATIONS
TEANECK TOWNSHIP
NEW JERSEY

PROJECT NUMBER: 7904401
CLIENT: TEANECK TOWNSHIP, NEW JERSEY
DATE OF PERFORMANCE: SEPTEMBER 19-21, 1979
DATE REPORT SUBMITTED: SEPTEMBER 28, 1979
ADVISOR: G. MAX BLOODWORTH

G. Max Bloodworth

U.S. Department of Justice
National Institute of Justice

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INTRODUCTION:

On July 19, 1979, Teaneck Township, New Jersey, requested assistance in evaluating an existing communications system and recommendations for upgrading and consolidating the several communications services in the township. This project was approved and assigned by APCO to G. M. Bloodworth, Assistant Chief Engineer, North Carolina Highway Patrol Communications Division, to be performed on an independent basis as an APCO Project 17 advisor. To reduce travel expenses, this project was scheduled to coincide with a similar project in Millburn Township, N.J. and was performed the week of September 17, 1979. This report was prepared and submitted shortly thereafter.

PROBLEMS ADDRESSED BY ADVISOR:

A small, densely populated, primarily residential township located in Bergen County, New Jersey, is experiencing communications problems. The facilities and equipment available, combined with the small area to be covered, should provide excellent communications, but somehow major problems exist. The primary difficulty appears to be in the repair and maintenance of equipment. A significant amount of radio equipment was inoperative at the time of the study, the base station antenna installation violated accepted rules of good engineering practice, and mobile antennas were of varied types and condition. The communications center was combined with the police telephone switchboard and complaint window, and served as a general gathering place for all branches of the department. Noise level in the room was high, distractions frequent, operators' attention was diverted by telephone calls, complaints, inquiries, etc. Communications control lines had an abnormally high hum level, which, combined with poor microphone technique by dispatchers, rendered communications unintelligible or at best difficult on many occasions. Despite the

fact that console and control facilities exist for a consolidated system, each of the three township communications systems (police, fire & public works) operates independent of each other. Teaneck Township is ideally situated geographically for excellent communications coverage, being only 6.3 square miles in area, with one of the highest elevations near dead center of town and controlled by the township, and a maximum distance from this point to any location in the township of only 2 miles.

The base station equipment is located in an elevator penthouse, within a few feet of motors, relay racks, and control equipment which generate a great amount of noise. Control lines to and from base equipment and control consoles are contained in the same cable with fire alarm call boxes and other circuits, resulting in a high hum pickup level. The base station antenna is mounted adjacent to a brick wall in such a manner as to completely shade coverage to the north and west. The telephone switchboard was of the obsolete patch-plug type, and required almost constant attention by the dispatcher. Dispatchers routinely attempted to transmit at least three feet away from the microphone, with resulting poor voice modulation and high noise level. A major problem concerning maintenance appears to be in the practice of annual competitive bids for maintenance contracts, with frequent turnover in service personnel. A review of the most recent service contract reveals an unreasonably low cost, and it is very difficult to understand how any degree of preventive maintenance could be performed and still return a reasonable profit. Considerable difficulty is reported in obtaining rapid service of portable units, and over half of the total inventory of portables were in the shop at the time of this survey. A county-wide mutual aid system is in the process of being installed at present, but is not operational due, apparently, to licensing and coordination problems. I am informed that this system is not compatible with the system in use by the remaining

20 counties in New Jersey, which may explain the problems in becoming operational.

COMMUNICATIONS EQUIPMENT:

Communications center equipment consists of two essentially identical Motorola consoles with facilities for control and reception of police, fire and public works departments communications. At present, only police traffic is handled except in emergencies, with each of the other departments handling its own communications. A back-up transmitter and receiver is located at the Number 1 fire station, about 1200 yeards from the police department. Main transmitter is located atop Holy Name Hospital, about 250 yards southwest of the police station. Mobile and portable equipment used by police and fire departments is primarily R.C.A. with public works department using Motorola equipment. Frequencies in use are: Police - 159.21; fire - 158.82; and DPW - 156.00. Both police and fire mobile units may operate on either frequency, to facilitate emergency communications.

GENERAL MANNER OF OPERATIONS:

Each department customarily operates its own equipment, but the three services are interconnected to provide back-up, if necessary. Little interference was noted at the time of survey, but the fire department reports occasional interference from nearby townships. The communications center consoles are not utilized to the extent available, and could provide an excellent basis for a consolidated system. Several personnel and administrative problems would need to be resolved in order to establish a smooth working consolidated system, but the equipment and facilities exist at present.

GEOGRAPHIC CONSIDERATIONS:

Teaneck Township is one of the most ideally situated communications areas that I have ever encountered. It is roughly rectangular, about 2 by 4 miles, with the highest

elevation near the center. This elevation is occupied by a school with high chimneys, ideal for antenna mounting, and is a maximum of 2 miles from the furthermost corner of the township. Ground elevation ranges from 27 to 17- feet above sea level, and should not be a factor in obtaining effective communications. Area is primarily residential, with few large buildings to block communications paths. Entire township is essentially line-of-sight from atop the high school. The close proximity to New York City limits the number of available frequencies, but at most one additional frequency would be required to update the system, and this should present no problem.

FINDINGS AND CONCLUSIONS:

In summary, the following observations and conclusions were made:

1- The present frequencies appear to be about as satisfactory as any others available, and no persuasion exists for a change in this area. If an additional frequency, suitable for duplex operation with the one presently in use, could be obtained, a mobile repeater system could be installed at very moderate cost.

2- The present transmitter location is not ideal, but is a suitable compromise if other factors prevent the use of the high school location. At present, no emergency power is available at the transmitter site, but I understand that this is due to be connected soon. With proper installation of the base station antenna, no need seems to exist for satellite receiving locations.

3- The base station antenna needs to be changed as soon as possible. It is mounted in such a manner as to prevent effective coverage of the west and northwest sides of the township, and the ground radials have been bent to facilitate this installation. The proper method of installation was discussed

with Capt. Errick, and there appears to be no reason for not making this change immediately.

4- Mobile antennas are unity-gain type, some bent and in bad repair, and should be replaced as soon as possible with high-gain antennas. Antennas with 2.5 or more db gain are available at this frequency at very moderate cost. These ideally should be mounted on the vehicle rooftop; however, satisfactory coverage can usually be obtained from trunk-lid mounting.

5- Correspondence and conversation with James Howard, Assistant Fiscal Officer for the township, indicates a sentiment toward establishment of a consolidated communications system. Most of the hardware exists for this type system at present, but administrative and personnel problems can be formidable. To be successful, a consolidated system must be operated and staffed independently of the agencies which it serves, and must be responsible to a central authority rather than to the heads of the respective departments for which it provides communications. Most systems which grow out of one department and are under the control of that department are constantly bombarded with complaints, justified or otherwise, from the other departments which it serves. This is only human nature, but unfortunately must be recognized and reckoned with. There appears to be sufficient communications equipment in use at present to justify a full-time radio technician for the township. The cost of such a full-time person would be somewhat greater than the present service contract, but the level of service and performance should improve greatly if a qualified and dedicated technician could be obtained. The township would then be in a better position to stock parts and supplies for its equipment, and down-time would be kept to a minimum. Equipment installation could also be performed by this technician, with a further overall cost reduction.

6- Communications between hand-held portable units and mobile or base units leave much to be desired. A centrally-located mobile repeater system would allow direct communications between hand-held units, mobiles, and base stations anywhere in the township. Recent tests conducted with this type of system indicate a minimum dependable radius of 5 miles with 2-watt portables, and this should be more than adequate for Teaneck Township.

7- A communications center should be one of the quietest, most inaccessible areas in the department. To allow personnel to congregate in the radio room, engage in loud and distracting conversations, etc. is detrimental to efficient communications. The dispatcher should be isolated from the general public as much as possible and separate personnel assigned to the complaint and information window. Strong consideration should be given to relocating or otherwise isolating the communications center from any and all distracting influences.

RECOMMENDATIONS:

Each item listed under "Findings and Conclusions" will be addressed separately and appropriate recommendations given.

1- If possible, one additional police frequency suitable for duplex operation with the one presently in use should be obtained. If this cannot be done due to frequency coordination considerations, a new VHF duplex pair might be obtained. The base stations and mobiles could then be converted for mobile repeater operation at moderate expense and practically no down-time. With this type of system, all new mobile units purchased in the future could be combination walkie-talkie/mobile plug-in units, with vehicular power smplifiers

and battery chargers. This would allow dependable communications between any mobile or portable unit, and also with the base station, anywhere within the township. A repeater talk-around frequency should be used for close-in operation without activating the repeater. Provision should be included in the control console for repeater disabling, to allow full supervisory control by the communications center in emergencies. The fire and DPW frequencies appear to be adequate, and due to the general nature of operation by these departments, no changes appear to be indicated. All future equipment purchased should include CTCSS (sub-audible) tone, as used in the present equipment, to prevent botherance and interference by systems operating on the same or adjacent channels.

2- If and when a new system is installed, it would be wise to relocate the base station to the Teaneck High School. This is a higher elevation, more centrally located, and has a lower overall noise level than the present site atop Holy Name Hospital. Emergency generators with automatic changeover switches should be provided at the transmitter site and communications center to allow uninterrupted communications during power failures, which most often occur during natural or man-made disasters when police communication is most vital.

3- Whether or not a new system is installed or a move to the High School site made, the base station antenna needs immediate attention. It should be raised enough to completely clear the brick wall of the elevator penthouse and the ground radials straightened to their original positions. The present installation inhibits coverage of the north and northwest areas of the Township. There appears to be adequate surplus co-axial cable to raise the antenna without splicing or extending the original cable. The only equipment required to raise

the antenna is a standard (21 ft.) joint of 1½ inch water pipe and a new wall bracket, which could be easily fabricated by the Public Works Department. This change was discussed with Capt. Errick and he agreed that it could be accomplished with little difficulty.

4- Mobile antennas are of the unity-gain type, which, although less costly, give inferior performance compared with readily available high-gain type. An antenna similar to the DB Products Co. model DB-702 or DB-7200 series** would give approximately 2.5 db gain, or almost double the effective radiated power compared with a unity-gain antenna. At an approximate cost of $35.00 each, this would be a worthwhile investment. Ideally, these antennas should be mounted on the rooftop of the vehicles, but satisfactory results can be obtained from trunk-lid mounting.

5- The hardware exists for an excellent consolidated communications system, if all affected agencies can reach an agreement on communications operation and responsibility. Consolidation, while greatly to be desired from a standpoint of personnel economy, presents many problems unless a very carefully thought-out and executed plan is utilized. The most successful systems seem to be those which have a separate administration from the departments which they serve, and are responsible to a central department not controlled by any one service. The only course which I would fully recommend would be the establishment of a "Department of Communications", directly responsible to the Township Manager, Township Council, or other similar governing body. Only in this manner could completely impartial communications service be rendered. The amount of equipment in use by the several departments within the Township seems to justify the

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** Manufacturers' names and part numbers, when given, are for reference only and do not necessarily constitute an endorsement or recommendation for any particular manufacturer's product.

creation of a full-time technician position, to service all police, fire, and DPW equipment. Considering the savings in time, installation charges, loss of service while waiting for parts, etc. this position would be cost-effective in the near future, if not immediately. Better overall service could be insured by stocking needed parts and equipment, rather than depending on outside contractors to order them only when needed. The present situation whereby over half the total number of portable units owned by the police department were out of service during a storm emergency exemplifies the need for more rapid repairs.

6- As discussed under "Recommendation #1", a mobile repeater system would greatly enhance the operation of portable units. Recent tests conducted with 2-watt portables and a central repeater system indicate a dependable coverage radius of 5 miles or more over average terrain. Police personnel in Teaneck expressed an interest in "in-out", or combination portable-mobile units, and this appears to be a very viable approach to the needs of the department, provided a mobile repeater system is available for use with these units. The continually increasing crime rates in most cities demands that a police officer be in contact with others at all times, and an adequate portable communications system has frequently been a life-saver. The cost of an adequate communications system is very low compared with the loss of life resulting from the lack of same.

7- This particular problem has long been a "sore spot", and is one of the most difficult to rectify. A police dispatcher needs no audience or distracting presence while performing his or her duties. Observation of the communications center at Teaneck revealed an almost "circus atmosphere" during the early evening and night. Strong consideration should be given to isolating this

important area from any outside distractions. The telephone switchboards in use are obsolete and demand a great deal of time that could be more profitably spent. This system could be replaced by a modern "call-director" system which would free the dispatchers for more important duties on a majority of routine calls. Microphone technique by dispatchers was extremely poor, with frequent attempts made to modulate the radio from the complaint window, 3 or more feet away from the microphone. Such operation results in low audio and excessive background noise, with resulting missed or partially understood messages. A practical solution to this problem consists of using headset type microphones, which follow the dispatcher at a proper distance from the mouth regardless of his or her location within the radio room. These units may also be interfaced with the telephone system to allow "hands free" operation of both radio and telephones. Provisions are available with the Motorola consoles now in use for plug-in operation of these microphones. (Plantronics Corp. HSO-106-1B or similar. **)

An additional recommendation, while not specifically addressed under "Findings and Conclusions", would be to replace the existing control lines between consoles and transmitters. The lines presently in use are contained in cables with other lines used for fire alarms, etc., and are extremely noisy. This results in unnecessary dispatcher fatigue as well as poor quality transmission and reception.

If Recommendation #5 concerning the hiring of a full-time radio technician cannot be followed, it would appear beneficial to reconsider the present method of obtaining contract service. Instead of a cost-per-item-only consideration, it would be wise to spell out specifications, such as minimum transmitter power, receiver sensitivity, and

maximum down-time allowable. While these tightened specifications would increase the cost of contract service, a higher level of service would be assured. The present cost figures, by even the most conservative standards, are too low to reflect the quality of service that a police and fire service is entitled to. A service contractor should make a fair profit on his time and labor, but cannot do so when forced to bid against others who are only interested in providing the least possible service for the lowest possible cost. Also, the present arrangement of renewing service contracts on an annual basis should be closely re-evaluated. A service contractor barely has time to restore a neglected system to good shape in a year, and then his interest ceases with the loss of a contract. I understand that this matter is presently being considered, and a change in this area would certainly be a step forward.

Except for the items discussed under Recommendation #7, dispatchers appear to be knowledgable and capable, record and log keeping methods and procedures adequate, and general operational practice favorable. A copy of the APCO publication, PUBLIC-SAFETY TELECOMMUNICATOR OPERATIONS, is included in this report. This is a valuable guide to screening, hiring, and training operators, and also gives several sources of additional information in this area.

END