

# LAW ENFORCEMENT TELECOMMUNICATIONS: PROBLEMS AND RECOMMENDATIONS

A REPORT ON LAW ENFORCEMENT COMMUNICATIONS PROBLEMS  
AND RECOMMENDED SOLUTIONS DEVELOPED DURING APCO'S  
ASSISTANCE PROGRAM ENTITLED PROJECT 17

BY

THE ASSOCIATED PUBLIC-SAFETY COMMUNICATIONS OFFICERS, INC.



## PROJECT SEVENTEEN

BRUCE M. KARR  
MANAGER, PROJECT 17

DONAL D. KAVANAGH  
DIRECTOR OF PROJECTS

PREPARED UNDER GRANT NO. 78 TA AX 0036

FROM THE

LAW ENFORCEMENT ASSISTANCE ADMINISTRATION  
UNITED STATES DEPARTMENT OF JUSTICE

63242

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AND DO NOT NECESSARILY REPRESENT THE OFFICIAL POSITION OR POLICIES  
OF THE UNITED STATES DEPARTMENT OF JUSTICE.**

## EXECUTIVE SUMMARY

This report is a product of the Associated Public-Safety Communications Officers, Inc. (APCO)'s Project 17, a program to provide communications-related technical assistance to state and local law enforcement agencies. This program, funded by the Law Enforcement Assistance Administration (LEAA) under Grant No. 78 TA AX 0036, provides technical advisory services by those volunteer members of APCO particularly skilled in communications management, planning, programming and funding. It is a unique program to make the talents of the non-commercial APCO membership available to help solve communications problems of individual state and local law enforcement agencies.

A major objective of this program, in addition to providing technical assistance to requesting agencies, is identification of common problem causes so that solutions having widespread, beneficial effects can be developed. The following report groups problems encountered by the APCO advisors into ten categories and recommends actions to be taken to reduce the likelihood of such problems occurring in other agencies.

The report is based on experiences gained during the performance of 55 technical assistance tasks. The formal reports submitted by the technical assistance advisors to their clients were analyzed and ten generalized problem categories identified. Each of these categories are discussed and recommended solutions presented.

A statistical analysis is presented at the beginning of each problem category discussion, citing the frequency with which each of these problems was encountered during the period covered by the report. Problems are also categorized by the size of the agencies affected - either small, medium or large. This statistical analysis and accompanying problem discussions yield considerable insight into the overall status of law enforcement communications systems. While the number of agencies involved in the project may be small compared to the total number of law enforcement agencies in the country, they comprise a highly representative cross-section.

The problems most frequently encountered involve difficulties relating to system design, spectrum management, and dispatcher training. System design difficulties were often the result of improper relationships between operational objectives and technical capabilities. While the law enforcement officials clearly perceived their needs, they were often unfamiliar with the technical means to satisfy these needs or the ramifications of their technology-related decisions. Problems of spectrum management are heavily dependent upon the availability of frequencies within compatible frequency bands. While alleviation of this problem on a long-term basis must look to the eventual availability of more frequencies (possibly at 800 MHz), a continuing need exists to improve use of the frequencies now available by fuller use of the services of APCO frequency coordinators. The third most frequently encountered problem, dispatcher training, is a function of available resources, dispatcher turnover rate, and the existence of adequate training facilities.

These three problem areas can usually be related to a lack of familiarity with, or understanding of, basic communications systems operations, capabilities and concepts on the part of senior and middle management law enforcement personnel. In most small agencies, and in many larger ones,

senior law enforcement personnel are called upon to make major policy decisions affecting communications systems organizational concepts, staffing, procurement policies, programs, dispatcher qualifications, management structures, and related functions that comprise a communications system. In many agencies the senior law enforcement official makes all communications-related decisions. A lack of familiarity by senior policy-making personnel with communications concepts is frequently found to be the root cause of inefficient communications systems operation.

A summary recommendation of this report is, therefore, that a course of instruction be prepared for presentation to all middle management and senior law enforcement officials to provide them with an understanding of the basic concepts of communications systems organization, management, and regulatory control. This course should be made available as part of the career development program of all law enforcement officials.

## ACKNOWLEDGMENTS

This Report on Law Enforcement Telecommunications Problems and Recommendations is the product of the many dedicated individuals who served on APCO's Project 17, the Technical Assistance Program. This program, by making the communications expertise of the APCO membership available to various state and local law enforcement agencies, has made a significant contribution to the delivery of efficient and effective public safety services to the American public.

Special recognition should go to those APCO members who served as advisors under this project. Their skills, experience and professional knowledge made major improvements in numerous law enforcement communications systems throughout the country. Their outstanding competence brought great credit upon themselves as individuals. It also enhanced the stature of the Association as a whole and reflected highly upon the professionalism of each of its members.

Each of the members of the Technical Assistance Advisory Committee contributed significantly to the success of this project. Their advice, guidance and detailed contributions to this report deserve the gratitude of the entire membership.

The APCO Board of Officers, in addition to their many other responsibilities as officers of the Association, deserve the credit for the accomplishments of this project. Their guidance, judgment and initiative were the major factors that determined its success.

And of most importance perhaps, the appreciation of all of the law enforcement community should be extended to Mr. William H. Bailey, Program Monitor of the Law Enforcement Assistance Administration, whose foresight conceived this project and whose determination and perseverance brought it to fruition. Such initiative is in the finest traditions of federal service.

Special thanks are offered to Mrs. Peggy Webster, Project Secretary. Her skill, devotion and personality made the end product possible and its preparation enjoyable.

All of the members of APCO have contributed much to this project, both directly and indirectly. Their participation in this Association, high level of professional skills, and enthusiastic support have made this project possible. The entire law enforcement community and the members of the public who benefit from their services owe them their deepest appreciation.

LEAA

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SDD/NCJISS  
U.S. Department of Justice

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## LAW ENFORCEMENT TELECOMMUNICATIONS

### PROBLEMS AND RECOMMENDATIONS FOR THE FUTURE

#### I. INTRODUCTION

##### A. GENERAL

Effective telecommunications are vital to every element of a law enforcement agency's organization. It is fundamental to such functions as citizen access, command and control, interagency coordination, and support information systems. The proper use of this rapidly developing technology demands specialized engineering and management skills not always available in state and local law enforcement agencies. This lack of specialized skills, coupled with the high cost and the vital role of telecommunications, has created many new problems for these agencies.

The Associated Public-Safety Communications Officers, Inc., working with the Law Enforcement Assistance Administration, recognized this deficiency and conceived APCO's Project 17 to contribute to its solution. Under this LEAA-funded program, APCO's members are made available on an individual, volunteer basis, to help those law enforcement agencies who request communications-related assistance. In this way, the experience in management, procurement, frequency coordination, training, and similar problems of the experienced APCO membership can be applied to problems of those agencies in need of help.

A principal product of this Technical Assistance Project has been the identification, on a national basis, of the types of communications-related problems most often encountered by local agencies. This identification has permitted the categorization of these problems so that common solutions, applicable to the widest possible number of agencies, can be identified.

This Report describes the Technical Assistance Program and how it is conducted. It includes representative findings of advisors to illustrate the different types of problems. The Report lists the major categories of communications problems of law enforcement agencies and presents recommendations that will contribute to the solution of these problems.

##### B. A BROADER VIEW FOR THE LEAA

Millions of dollars have been invested over the past ten years by the LEAA in grant programs for law enforcement telecommunications. Much of this money has gone for new, innovative systems. While evaluation of these programs by the LEAA has addressed the effects of these innovations, very little information has been made generally available about day-to-day communications problems that hinder an agency's ability to perform its mission.

Some of the routine type problems are not easily discernable. Some are problems of relationships with political bodies or other agencies and do not lend themselves to solution by "innovative" programs. Some require the independent perspective of an "outside" advisor to be fully recognized. APCO's Project 17 has provided the LEAA with an in-depth look at the significant telecommunications problems facing agencies across the country.

The technical assistance advisors' reports (now available through the National Criminal Justice Reference Service (NCJRS) provide the LEAA, state planners and local managers with information upon which to base courses of action to reduce, preclude, or mitigate similar problems in the future.

C. THE APCO RESOURCE

In supporting APCO's Project 17, the LEAA recognized that there were many instances of telecommunications problems facing one law enforcement agency having already been solved by other agencies. If personnel from one agency could help another, tax dollars could be saved by not "re-inventing the wheel" repeating past mistakes. The logical resource to provide this transfer of telecommunications technology was APCO.

The Associated Public-Safety Communications Officers, Inc. (APCO) is a not-for-profit, voluntary Association of communications specialists, supervisors and administrators employed by tax-supported public safety agencies. It has been in existence 45 years, and its membership is nationwide. For 25 years it has been designated by the Federal Communications Commission (FCC) as the agency responsible for coordination of law enforcement and local government frequency assignments and license applications.

The experience and skills of the APCO membership in the fields of frequency coordination, system planning, engineering, procurement, and public safety communications system operation is a national resource of significant value. A program employing these skills on a national basis facilitates the dissemination of new technologies and contributes to the standardization of methods. The effectiveness of law enforcement communications systems procurement, design and operation has been significantly improved as a result.

D. THE APCO GOALS AND THE ADVISOR

The APCO technical advisors are responsive to the needs of the requesting agency. Their efforts are guided by the APCO advisor's general belief in the basic principles of public safety telecommunications as expressed in the three national communications goals of the Association. These goals are:

GOAL #1

EVERY CITIZEN SHOULD HAVE AVAILABLE A MEANS OF READILY ACCESSING PUBLIC SAFETY EMERGENCY RESOURCES FROM HOME, PUBLIC PLACE, AND VEHICLE WHILE IN MOTION ON PUBLIC STREETS AND HIGHWAYS.

GOAL #2

EVERY PUBLIC SAFETY EMPLOYEE ENGAGED IN HIGH RISK ACTIVITIES SHOULD HAVE THE CAPABILITY TO INTERCOMMUNICATE IN HIS AND IN LIKE SYSTEMS OF HIS COMMUNITY, AND ON AN EMERGENCY BASIS WITH SUCH SYSTEMS IN CONTIGUOUS COMMUNITIES.

GOAL #3

EVERY LAW ENFORCEMENT OFFICER SHOULD, IN ACCORDANCE WITH ESTABLISHED SECURITY REQUIREMENTS AND IN THE PROPER DISCHARGE OF HIS DUTIES, HAVE THE CAPABILITY TO IMMEDIATELY ACCESS CRIMINAL JUSTICE AND RELATED DATA WHEREVER STORED WITHIN THE UNITED STATES.

E. THE EXPANSION EFFECT OF TECHNICAL ASSISTANCE

The Technical Assistance program has an expansion effect. Communications for law enforcement is not confined by the political boundaries of the various jurisdictions. Each technical assistance provided to one agency affects several others. Radio waves propagate for many miles and adjacent agencies are benefited by improved frequency assignments. More efficient use of hard wire telephone networks, improved data systems procedures, or better spectrum utilization by one agency significantly improves the level of performance and resources available to its neighbors.

This ripple effect was examined and several conclusions reached. First, each technical assistance task affected an average of five agencies, including the primary one who requested technical assistance. Second, other types of agencies (non-law enforcement) can be affected. These include fire and ambulance agencies who work directly with or depend on the law enforcement agency and peripheral agencies such as drug enforcement, marshals, the data networks, FBI, and other public safety agencies in the region. Thus, more than 400 agencies were affected by this technical assistance program.

## II. TECHNICAL ASSISTANCE and the APCO ADVISOR

### A. APCO (LEAA) PROGRAM POLICIES

The basic policies adopted by the APCO Board of Officers under which the Technical Assistance Project is conducted are:

- an advisor will not be used within his home state;
- commercial APCO members (consultants or vendors) will not be used as advisors;
- detailed engineering or system design will not be performed; however, APCO will recommend the use of outside consultants or other appropriate engineering assistance;
- APCO will not accept a task inappropriate for it to perform in terms of the purposes of the Association.

### B. SELECTION OF THE ADVISOR

The key to APCO's ability to perform technical assistance is the quality and quantity of advisors available to provide assistance. The advisor resource pool was initially formed from names submitted by Chapters of the Association and by the Board of Officers. This initial listing was modified and increased by solicitations of the membership in the form of a questionnaire which asked for the potential advisor's experience and specialities. The advisor questionnaire (Appendix B) contains nearly 125 elements of information that are used in selecting the right advisor for the right assignment.

Information about the advisor is contained in eight (8) groupings:

- 1) basic data: name, addresses, telephone numbers, social security number, APCO experience;
- 2) current employment: job title, sworn/unsworn, type of agency, number of persons in agency, size of community served;
- 3) availability: general statement or specific dates;
- 4) formal education;
- 5) areas of administrative competence: years of experience at the various levels of government;
- 6) areas of service: functions performed in various public safety services such as police, fire, EMS, etc.;
- 7) areas of technical competence: specific technical application pertinent to law enforcement, public safety telecommunications;
- 8) a short, one-page resumé, for use by the project office (and usually provided to the assisted agency).

The names of potential advisors are submitted to the APCO Board of Officers and, on approval, added to the advisor pool.

The assignment of an advisor to a task involves comparison of the task requirements, as expressed by the requesting agency, with the advisor file to select potential candidate names.

Candidate selection is based on several characteristics: technical ability; agency type and size match; region of the country; avail-

ability within the desired time frame; and level of experience.

Where practical, the advisor is chosen from an agency similar to the one being served - sheriffs for sheriff agencies, city police for city police, consolidated system managers for consolidated systems, state police for state police agencies. The difference between city police, county sheriff and state police in their view of law enforcement is the reason for this agency type-to-type match practice.

Consideration of the regional aspects of law enforcement practices is incorporated in the advisor selection process. A western county sheriff and an eastern sheriff differ somewhat in their mission and approach to law enforcement. The regional telecommunications needs also differ.

None of the above considerations outweighs the importance of the technical competence of the advisor to serve the assisted agency. The precedence or weighting of the factors is varied to suit the task.

#### Tasking the Advisor

Because of the voluntary nature of the APCO advisor and his limited time away from his normal work, the basic limitation on APCO technical assistance is that tasks should not require more than five (5) days, including travel. This requires that the advisor be given very specific assignments that can be accomplished in the time available.

Task assignments are discussed with the advisor and a formal set of assignment instructions are issued. (See Appendix C.) Dates for performance are set and the advisor given a manual (Appendix D) and necessary report forms. The advisor then contacts the agency directly and arranges for a visit.

When travel is involved in a task, prior approval from the LEAA is necessary. Travel authorization is requested on a standard form and approval received before the advisor is formally committed to the task.

The following is extracted from the *Technical Assistance Guideline Manual*, Section II (see Appendix D):

"C. The advisor is cautioned to be an ADVISOR and to not attempt to direct actions or make decisions properly those of the client.

"D. The advisor is a representative of APCO and the LEAA to the community he is advising (as well as his home agency). His conduct, tact and professionalism will reflect accordingly on those he represents.

#### "E. The Advisor's responsibility

"(1) The advisor is responsible for the accuracy of the information he provides and the soundness of the judgments he renders. He is not responsible for the results of his guidance. The quality of his efforts will reflect upon his professionalism. His reports to the client agency should be helpful and understandable. His reports to APCO should be comprehensive, perceptive and timely.

He should display initiative in trying to identify the cause of problems. He should also note, as appropriate, problems not identified by the client and include such problems in his report to APCO.

"(2) The APCO advisor is not a responsible official of the client community. He should insure that the contents of his report to the client have been discussed with and agreed to by the client prior to submission. In the event such agreement is not possible, the advisor should contact the project office prior to submission of his report.

"(3) The advisor is not responsible for systems design. He cannot be held liable for the results of his advice. He is responsible, however, to assure that his advice is cogent and mature. Should an advisor find a problem to be beyond his capabilities, he is responsible to advise the APCO project office.

"(4) The project office of APCO is the controller for all advisor efforts."

### C. ADVISOR REPORTS

Advisors are required to submit reports to the Project Office:

- the formal report to the client agency, forwarded through the Project Office;
- the travel reports for reimbursement of expenses;
- a narrative report for the Project Office which describes the task performance;
- a problem categorization report which assists in the data collection effort necessary for this Problems Report.

1) A detailed explanation of the formal report to the client format is contained in Appendix D, *Technical Assistance Guideline Manual*. Some key excerpts are:

"The content of this report will be a function of the problems addressed. It should be concise and factual. It should include, as a minimum:

- (1) a summary of the problem addressed;
- (2) a discussion of the factors that may affect or relate to the problem;
- (3) a solution to the problem. If more than one possible solution exists, the report should describe the various alternate solutions and their potential ramifications;
- (4) the advisor's recommendation(s) with appropriate justification.
- (5) Report format (sample report form - see Appendix B, Manual)
  - (a) Title page - identifies document, task assignment number, advisor, client, dates of performance, date report submitted, and signature of the advisor.
  - (b) Introduction - contains a statement of the problem to be solved, name of client assisted, and appropriate background of assignment.
  - (c) Problem addressed by advisor - a detailed presentation of the problem, why (if) it may be different than task assigned, internal/external influences on the problem.
  - (d) Problem analysis - significant elements of the problem and method used in developing solution.
  - (e) Findings (conclusions) - a precise listing of the results of the analysis.
  - (f) Recommendations - contains (as necessary) general recommendations, specific recommendations (action plan if necessary).
  - (g) Appendices - as necessary."

- 2) The travel reports for reimbursement of expenses are standard APCO approved forms.
- 3) The narrative report is a trip narrative used to accompany the travel expense report, listing places visited, persons seen and other details not in the formal report.
- 4) The critical police communications report is requested as an optional submission. This report is to provide an unofficial, in-house commentary on specific problems beyond the scope of the task assignment but of sufficient significance that the APCO Project Office should be aware of their existence.

The advisor is not required but is encouraged to submit such a report. The advisor should note whether the information is for in-house consumption only or whether it can be used in connection with Project 17 or other APCO efforts.

- 5) The problem categorization report is to assist the advisor and the project management in collection of the data for this final project report. (See Appendix D.)

#### D. PROJECT MANAGEMENT STRUCTURE

- 1) APCO, Inc., a not-for-profit corporation, consists of a Board of Officers, elected annually; a National Executive Committee, elected representatives from each of the 36 APCO Chapters; a National Headquarters, Executive Director, Staff, Project Staff; and the members of the Association.

The Technical Assistance program, Project 17 of the APCO Project Series, is managed for day-to-day operations by a full-time Project Manager under the supervision of the APCO Director of Projects.

- 2) An ad hoc volunteer committee (Technical Assistance Advisory Committee) (TAAC) meets periodically to make policy recommendations to the Board of Officers concerning the project. Its members are selected from the senior ranks of law enforcement and public safety officials having strong technical and managerial backgrounds.
- 3) Advisor skills in providing technical assistance have been enhanced by two advisor workshops held in conjunction with the regularly scheduled APCO Regional Conferences. These workshops, at no cost to the project or to the government, provided a forum for the advisors to discuss their techniques and problem solutions as well as gaining familiarity with the project management procedures and reporting forms.
- 4) Task request procedures required that requests for technical assistance include the following actions:
  - a) an official request from a duly constituted public safety/ local government agency identifying the agency, a local contact, the type of service or assistance requested, time frame for performance, and the signature(s) of responsible official(s);
  - b) the approval by the LEAA Program Monitor for APCO to proceed on the task for the requesting agency. This approval is obtained by telephone with follow-up confirmation in writing (APCO Form 17.1 - see Appendix C).
  - c) APCO Project 17 management must log and assign a task number

to the approved request (APCO Form 17.2 - Appendix D).

- 5) All tasks require approval by the APCO Project Office and the LEAA. Requests for technical assistance arrive at the Project Office in several ways:
- a) from the LEAA -
    - an official notification of task by the LEAA Program Monitor -
      - requires no further coordination or approval from the Monitor;
      - logged and assigned task number for APCO approval and action;
  - b) request from a SPA or LEAA group sent direct to APCO without the LEAA Program Monitor's official approval -
    - requires Monitor's approval;
    - logged but not assigned task number;
    - referred to Monitor for approval and return for APCO approval and action;
  - c) from agencies requesting assistance -
    - requires LEAA Program Monitor approval;
    - request logged but not assigned task number. Copy forwarded to LEAA Program Monitor for his action;
    - Monitor's favorable actions and APCO approval begin APCO's task number assignment and action;
    - Monitor's rejection places request in no-action file. The applicant is notified by APCO Project Office of this decision;
  - d) from APCO Chapters -
    - requires official request from client agency and LEAA Program Monitor;
    - request logged but not assigned task number. Sent back to Chapter with instructions on process completion;
    - favorable action by Program Monitor and APCO Project Office begins APCO action.
- 6) The APCO advisor is assigned to a given task using Form 17.3 (Appendix C) - Task Assignment and Administrative Instructions. This document contains the specific instructions to the advisor for Task completion. The copy has sample items illustrated to assist the Project Office in providing complete data. If Form 17.3 lacks sufficient room for all of the pertinent information, additional pages may be used. The format should be followed for all assignments.

A copy of the LEAA Task Approval (Form 17.1) accompanies the advisor assignment directive when sent to the advisor.

### III. LAW ENFORCEMENT TELECOMMUNICATIONS PROBLEM AREAS

#### A. GENERAL

##### 1. The Law Enforcement Telecommunications System

This report presents a summary of law enforcement telecommunications problems encountered during the first nine months of APCO's Project 17. Appreciation of these problems requires an understanding of law enforcement communications systems and the functions they perform. The extent and complexity of these functions may vary from agency to agency, the means by which they are accomplished may change, but the functions themselves are common to all systems.

The definitions of these functions presented below were developed by APCO for the LEAA in APCO's Project 13A.

- a) "Law enforcement telecommunications systems are defined as equipment, organizations and procedures associated with the performance of the following functions:
- PUBLIC ACCESS - the means by which the public reaches a law enforcement agency, including the process of complaint information recording.
  - COMMAND and CONTROL SUPPORT - mobile dispatch communications, associated information transfer processing, and point-to-point intra-agency communications.
  - DATA SYSTEMS ACCESS - the interface with international, national, state, regional and local information systems facilities.
  - INTERAGENCY COORDINATION - the communications capability that supports coordination among law enforcement agencies internationally, nationally, statewide, regionally and locally, including those agencies that interface with law enforcement agencies.
- b) "Law Enforcement Telecommunications Systems Elements:  
Any law enforcement telecommunications system associated with the performance of the above four functions is composed of one or more of the following law enforcement telecommunications system elements:
- RADIO NETWORKS - provide radio communications, including those data processing provisions needed to permit access to criminal justice data files. This element would also include spectrum management activities adopted by regions or states for frequency allocation and utilization.
  - DEDICATED WIRE NETWORKS - provide dedicated law enforcement point-to-point communications.
  - DISPATCH CENTER INFORMATION PROCESSING EQUIPMENT - provides information processing capability supporting complaint information recording, dispatch and information exchanges between dispatch center and field officers.
  - TERMINAL EQUIPMENT - provides public access, data systems access, and sensor capability (video equipment, alarms, etc.) that function as an integral part of a law enforcement telecommunications system.
  - LAW ENFORCEMENT TELECOMMUNICATIONS PERSONNEL - staff that functions primarily as a part of or provides services to a law enforcement telecommunications system."

## 2. Agency Classifications

- a) For the purposes of this Report, agencies are classified according to the size of the population served. A Sheriff serving a population of 35,000 will have about the same size communications system as a city police department serving 35,000 people. Consolidated systems, where several agencies have gone into a centralized serving system, will usually reflect the size of the total population served in their sophistication.

State agencies do not fit the population classification as readily. In one state there may be a drug enforcement agency, in another a liquor control agency. Some have state police agencies and others only state highway patrols. This disparity between agency size and the population served is ignored for statistical purposes in this Report, and all state agencies are classed as VERY LARGE.

- b) The Classifications used in this report are:

VERY LARGE - includes agencies serving populations of more than 500,000 and all state agencies;

LARGE - agencies serving populations of 100,000 to 500,000;

MEDIUM - agencies serving populations of 50,000 to 100,000;

SMALL - agencies serving populations under 50,000.

- c) Communications Sophistication

Experience with a variety of law enforcement telecommunications systems serving all sizes of communities permits generalizations about the classifications.

- VERY LARGE agencies usually have sophisticated telecommunications systems. They normally have technical personnel, engineering management, maintenance staffs, analytical support, and some form of training capability permanently assigned to the organization.
- The LARGE class agencies usually have an assigned telecommunications staff, some engineering capability, technical management, and maintenance support. This capability may be on a part time or contract basis.
- The MEDIUM class agencies normally have an organizational dispatching staff, a supervisor, and perhaps a technical "engineer" or manager. They may have a maintenance staff but often contract for service.
- SMALL class agencies may have an organizational dispatch staff of one or two people, performing other duties when needed. They normally contract for maintenance service. They rely heavily upon the equipment vendor to provide technical guidance.

State agencies encountered in this project have characteristics representative of SMALL, LARGE and VERY LARGE classes. They are all placed under the VERY LARGE class for statistical purposes in this Report.

### 3. Problem Category Description

- a) Telecommunications problems confronting law enforcement agencies follow similar patterns. These patterns have been grouped into ten categories for the purposes of this Report. In the discussions associated with each category, examples of problems encountered during the project are presented to illustrate the nature of the problem and suggest solutions.

Many agency requests for assistance reflected several categories of problems. Usually, one or more problems have common roots. For example, lack of management understanding of communications problems can result in faulty procurements, inadequate training, and improper system configuration. Therefore, the following discussion, while treating each problem category individually, will frequently cite the same request for assistance as an example.

- b) The problem categories of this Report and the topics they include are:
- System Configuration: telecommunications requirements, designs, propagation and coverage, interference, compatibility, facility features, arrangements, redundancy, reliability, interconnecting circuits, frequency band selection.
  - Operations and Training: telecommunications operational procedures, standard operating procedures, system discipline, security, agency coordination, computer aided dispatch, field force and communications center personnel training, personnel selection, dispatcher certification, workloads, and center organization.
  - Frequencies: frequency assignments and allocation, frequency coordination, new or additional frequencies, sharing and co-channel users, frequency band restrictions.
  - Administration and Management: management and administration of telecommunications within a law enforcement agency, resource allocation, program planning, non-communications personnel education, personnel selection, Training and retention, and the management of the communication system itself.
  - Policy/Political: interagency problems - sheriff and police, interservice problems, police and fire, governing body policies, regional consolidations.
  - Procurement: procurement processes, practices, specification evaluations, source selection, and vendor relations.
  - Maintenance: in-house and contract maintenance, technician selection, training and retention, service facilities, equipment warranties, vendor responsibilities, etc.
  - Funding: problems involving methods of cost allocation for communications services, funding support by governing bodies, grants and grant requests.
  - New Technology: development and implementation of systems for the 800 MHz band, utilizing orbiting satellites, optical fibre transmission, single sideband for land mobile.
  - FCC Rules and Regulations: licensing of stations and per-

sonnel, improper operation, rule violations, modification to the Rules and Regulations.

c) It should be noted that the same agency and/or problem may be addressed under more than one problem category.

d) Statistical Presentation

In the following sections describing problem categories, data collected from the advisor reports was converted into percentages of the occasions in which a particular problem appeared for each size agency. For example:

- SMALL class agencies : 42 %  
indicates that in 42% of the tasks performed for SMALL class agencies, this problem category appeared.
- OVERALL : 42 %  
indicates this problem appeared in 42% of the total performed for all classes of agencies.

These figures are presented at the beginning of each problem category.

B. PROBLEM PRESENTATIONS

The following is a discussion of the various problem categories presented in this Report. These discussions present descriptions of the types of problems and some of the broader ramifications of these problems.

1. System Configuration

- a) The system configuration category is concerned with problems relating to the development of telecommunications requirements, system design, engineering, coverage and propagation, selection of the radio frequency band, interference, equipment compatibility, facilities and features, system integrity, reliability, interconnection, backup power, technical specifications, and installation.
- b) Problems in this category appeared in 73% of the technical assistance tasks. The statistical analysis indicates the following:

Percent of times problems in this category appeared

OVERALL	: 73 %
SMALL class agencies	: 79 %
MEDIUM class agencies	: 86 %
LARGE class agencies	: 64 %
VERY LARGE class agencies	: 63 %

- c) More than 80% of agencies serving populations under 100,000 are affected. In the smaller agencies there is insufficient staffing to provide a "qualified" communications manager or engineer. Communications systems or equipments are conceived and purchased to fill a specific agency need, often without the benefit of technical study or knowledge of long-term needs or alternate means of accomplishing communications goals.

In the smaller agency the equipment vendor often becomes the

communications "engineer". This can result in the problem being changed to fit an available equipment solution. While the vendor community has provided a service of immeasurable value over the years in helping smaller agencies solve communications problems, these solutions are not always the most cost effective. Of more significance, many present day problems are not readily solved by equipment-oriented solutions.

Instances have been found where portables were added to an existing mobile-only system without proper technical study. The result was poor coverage, channel contention, and battery charging problems. These additional subjects should be considered before implementation as part of a proper planning function.

In a major city a new mobile radio system was installed to provide automatic identification and status information. This feature caused a delay of 500-750 milliseconds (1/2 to 3/4 seconds). The officer had to wait to talk approximately 1/2 to 3/4 second after pressing the transmit button before he could be heard. This seemingly insurmountable operational change required a training program before the acceptance by field personnel. Proper system design and planning could have provided warning that this "extra" training would be required.

In another example, a "last minute" decision to implement portable radios as part of the system was made. The system, however, was originally designed to support mobile radios having a much higher power output than the portable radios. The system included sufficient voting receivers to support the "high" power mobiles but not the larger number necessary for "low" power portables. This problem, coupled with the use of the "old" city-owned cable plant (retained rather than replaced due to cost) resulted in a poorly operating radio system. The communications department of the city was blamed for poor portable operation although they had advised that the system was not designed for portables and would require extensive work before portables would operate properly.

The overall communications posture in this city was further aggravated by a shortage of in-house maintenance and engineering personnel. The city communications department was operating at about one-half of its authorized strength. The additional workload required for the new system installation, in addition to the normal city maintenance requirements, was more than could be handled by the understaffed department, increasing the dissatisfaction. Adequate engineering, planning and design would have incorporated solutions to these obstacles. (This will be discussed more fully under the Maintenance Category.)

Another medium sized city purchased a new 800 MHz system for its police department. The move to 800 MHz was dictated by available frequencies. The 800 MHz mobiles had a digital status capability (similar to that described above) designed to work with a future computer aided dispatch (CAD) system. The 800 MHz portables ordered were not supplied by the vendor who later substituted 150 MHz portables in a vehicular repeater combination. As a further expedient, the foot patrolmen retained use of low band (40 MHz) portables.

The law enforcement manager received many complaints as a result of this situation. Foot patrol could not talk with mobiles and the 750 ms delay required for transmission of

digital status caused lost voice messages. The new system hardware proved unreliable, and the police union sued the city, citing, among other complaints, a non-ionizing radiation hazard to the officers when using the mobiles. The technical assistance advisor suggested courses of action to reduce several of these problems -- problems that would not have arisen with communications-aware or knowledgeable management. (The non-ionizing radiation hazard is discussed more fully under the Frequency Problem Category.)

d) Conclusions

Problems relating to system configuration appeared in more than 70% of all the technical assistance tasks. 86% of the MEDIUM sized agencies were affected by problems of this nature.

The SMALLER agencies lack technically qualified staffs and must rely on equipment vendors or the contract service organizations. As a result, comprehensive communications planning is often minimal. Equipment solutions are offered to most problems. While the vendor community plays a vital role in small agency system configurations, those maintenance, management, training and similar non-hardware related problems go unresolved.

The LARGER agencies usually have access to more competent technical staff. However, they are now routinely faced with problems of replacing older systems with newly developed or modernized equipment that is a significant change. These technical improvements often accompany changes to organizational and operational structures or the consolidation of services and agencies. Decision makers require technical understanding to properly evaluate policy options and make sound decisions on operational requirements.

Comprehensive planning is needed to introduce new or improved systems. The planning aspects of today's law enforcement telecommunications is fundamental to all management processes. Systems configuration, design and engineering are but one facet of the planning function.

Training in the basic concepts of communications systems is not included in the career development education of law enforcement officials. As a result, officials are called upon to make policy decisions regarding their communications systems' requirements, configuration, procurements or capabilities without proper foundation or understanding of how such systems work or the ramifications of their decisions.

2. Operations and Training

- a) The operations and training problems relate to: standard operating procedure (SOP), systems discipline, security, agency consolidation, computer aided dispatching (CAD), field force and communication personnel training, personnel selection, dispatcher certification, workload, and communications center organization.
- b) Problems in this category appeared in 55% of the technical assistance tasks. Statistical analysis indicates the following:

Percent of times problems in this category appeared

OVERALL

: 55 %

SMALL class agencies	: 67 %
MEDIUM class agencies	: 57 %
LARGE class agencies	: 57 %
VERY LARGE class agencies	: 27 %

- c) Operations and training are closely keyed to the management and systems configuration (design and engineering) category, since operational procedures must reflect the capabilities of the communications function.

#### Operational Procedures

In many cases advisors found that the existing formalized operating procedures did not fit the system, or did not even exist. Poor system discipline was often the result. Dispatchers can seldom perform well when they lack procedural guidance. Training of dispatchers and field forces is difficult without documented procedures. In almost every case where new systems or techniques had been employed, related training of dispatching and field personnel had not been accomplished. Written instructions should be available for guidance and training of the communications section personnel and for the police field force users of the system.

Consolidated communications service organizations have the most critical need for careful thought-out agreement between the agencies served. When different services such as fire and/or EMS are involved with police in one center, formalized consensus at the top policy level is mandatory.

Policies and procedures, once written, can always be changed. Policies and procedures unwritten are debatable and difficult to change.

#### Training

Communications training of personnel is a major problem in the law enforcement/public safety service.

Communications training for police officers is often provided at the bare minimum during recruit training, with some on-the-job (OJT) training as the officer begins his first patrol activities. If he is lucky (or "unlucky", depending on his departmental view), he may be temporarily assigned as a dispatcher. In some rare instances he may be temporarily assigned to the communications section for education. Few of these actions contribute significantly to his knowledge of communications operations or management. The officer will seldom receive more communications education as he progresses as a supervisor, manager or administrator. Should he be assigned as the communications supervisor, he will lack the knowledge necessary to manage this critical departmental function.

There are few places where the officer can gain a more than superficial knowledge of the communications function. APCO provides training materials for basic training of communications. Local APCO Chapters provide supervisors with the opportunity to meet with their peers to exchange information and to visit their agencies. The APCO BULLETIN provides items of interest to communicators and the law enforcement community. Equally important, it informs law enforcement communications personnel about the latest happenings in the FCC and elsewhere that can impact their agencies.

This subject will be discussed more fully as Education under

the Administrative and Management section.

### The Role of the Dispatcher

The dispatcher (communicator) occupies a position of trust and responsibility in his/her department. He controls or directs the efforts of several (1-50) police field units for almost 90% of their time. He responds to their requests for information, service or assistance. An error in vehicle registration information or license check can result in an officer unknowingly approaching armed offenders during what appears to be a routine traffic stop. Should the dispatcher not promptly and properly respond to a call for help, an officer might suffer injury or death. Should the dispatcher fail to advise the officer that his backup is an unmarked detective unit from another agency (sheriff) on a burglary in progress call, he could precipitate a very serious situation. Each time a unit is in hot pursuit, the dispatcher is with him, coordinating with other agencies or units, and marshalling the available resources.

One advisor put forth this thought to the agency he assisted:

"If an officer were to have a 5% error rate in the pursuit of his duties, he would be in trouble once every three days, based on an average of six reports filed daily. A dispatcher with the same 5% error rate, handling 100 calls per shift, would make five errors daily. This rate of error is not consistent with the standards of your police agency or its communications service. Even if the error rate were 1%, the officer would be in trouble once every 17 days, and the dispatcher once each day.

"Perhaps your agency can accept an error by the officer every 17 days, but a life-threatening situation created by the dispatcher is not acceptable to anyone."

Dispatcher/communicator training is a continuing need in most law enforcement agencies. In their view, two levels of training are necessary: basic telecommunicator training common to police dispatchers across a region; and the specific agency-related training, including familiarity with the system, the agency, its government, the community, and the local geography, to list but a few subjects.

Few opportunities for dispatcher training exist. The majority of these courses are conducted by the local APCO Chapters, often in conjunction with the State Police Standards and Training Division (PST). Unfortunately, working dispatchers in smaller departments are usually unable to obtain relief from work schedules, or travel expenses, to attend these courses. Smaller agencies are particularly susceptible to these problems.

Oregon uses a traveling school funded by the State, manned by APCO members, that goes to the more remote areas of the State and conducts training on site. This eliminates the need for dispatchers to be absent from the departments. This is practiced also in Kansas, and just beginning in Tennessee.

Training requires procedures, subject matter, lesson plans, and trained instructors. Much of this basic material is available through National APCO. 70,000 copies of its publication, the PUBLIC SAFETY COMMUNICATIONS STANDARD OPERATING PROCEDURE MANUAL, (developed under an LEAA grant) have been distributed. Additionally, the APCO Lifeline Program, including a film, tapes and workbook training course, is available.

Because each state has differing requirements for records access procedures and data use, such items are best treated by the individual state.

### Records

The records function is a key factor in dispatcher operations. Dispatching center operations can be inhibited by the lack of easy access to the department records. In many of the smaller agencies a request for want or warrant information requires the dispatcher to go to the records section, or files, and manually look up the data. Accessibility is limited by the lack of personnel to provide separate records-keeping and dispatch functions. In the LARGE class agencies, accessibility to the dispatcher is usually via a telephone or intercom circuit, direct to records.

Where agencies have combined into a central dispatch operation, local wants and warrants, usually maintained by each department, are not always available. This usually happens during off-hours, in the case of a SMALL agency that is open only 8 hours a day.

Centralizing local wants/warrants can be beneficial to all concerned. However, the maintenance and upkeep of these remote, centralized records can pose an inordinate cost to the agency.

Rapid dispatcher access to centralized state or regional records, vehicle registration, license information and major files is of great importance. This access can usually be provided by teletype or data terminal in the communications center. When hard copy is desired, it can be provided on a terminal in the central records division of the department.

Access to the computerized criminal history (CCH) information via the dispatcher is necessary to the police function. Access restrictions to this data may be established by state regulations limiting this access to sworn officers. Accordingly, many departments swear in their dispatchers and communications personnel. Combined or consolidated systems, serving police and fire, may suffer some flexibility in personnel assignment and training due to local interpretations of these restrictions. In one state, the two existing consolidated centers were designated criminal justice agencies by Executive Order of the Governor in order to access the necessary criminal justice data and records system.

### Shared Frequencies

Standardized procedures and coordinated identifications are needed in systems where several agencies share the same radio frequency, within each other's range but that normally do not work together in a common system. SMALL agencies whose early needs were satisfied by a shared frequency have often grown into a much expanded system as units have been added. These agencies, sharing the same frequency, now share the same unit identification numbers only because that was the way they got started. Their street and location names may be similar. They may or may not use a variety of brevity codes, such as the APCO "ten code". These different codes often are chosen only to reflect the independent nature of the individual agencies.

Frequency solutions are not always possible. Each system

could, however, add continuous tone coded squelch systems (CTCSS) so they do not hear the other. More importantly, they could develop standardized procedures and coordinate unit identifiers so that no two units have the same ID.

d) Conclusions

There is a significant need to establish and document communications policies and goals. These goals and policies must be set by the agency head or governing body. They should be published as written procedures (SOPs) to provide authority and direction to communications functions. Written SOPs are required for communications and field operations personnel.

In many agencies the role of the dispatcher/communicator should be evaluated and personnel policies and practices changed to better reflect dispatcher function.

3. Frequency Problems

- a) The Frequency Problem category is concerned with problems relating to: frequency assignments, frequency block allocations, frequency coordination, the need for new or additional frequencies, sharing and co-channel users, frequency band restrictions, non-ionizing radiation hazard standards, radio frequency interference (RFI).
- b) Problems in the frequency category appeared in 46% of the technical assistance tasks. Statistical analysis indicates the following:

Percent of times problems in this category appeared

OVERALL	: 46.4 %
SMALL class agencies	: 54.1 %
MEDIUM class agencies	: 42.8 %
LARGE class agencies	: 28.5 %
VERY LARGE class agencies	: 54.5 %

- c) This category ranked third in the number of problem appearances, indicating that severe situations exist in the area of frequency assignments and frequency management.

Frequency authorizations (one or more) are required for the operation of all radio systems. Frequencies available for law enforcement are arranged in four groupings -- low band, 30-50 MHz; high band, 150-155 MHz; UHF band, 450-470 MHz; and a newly authorized 800 MHz band. These band groupings apply nationwide. Equipment designed for operation on one band will not operate in another band.

Discrete frequency assignments (licenses) within the frequency band groups are made by the FCC based on coordination by a local frequency coordination committee (APCO local Chapters). This frequency coordination, an advisory function, is required by the FCC prior to its issuing a license. The purpose is to minimize the potential for interference among users in a given geographical region. APCO has been designated by the FCC to perform this function for the police services for more than 25 years. The frequency coordination mechanism consists of a committee of police users from the local area which recommends a frequency to the FCC for assignment "which will result in the least amount of interference to stations operating in that area".

APCO's FREQUENCY COORDINATION MANUAL published in 1971 has served as a guide to many spectrum users. The material is now being revised to assure currency with FCC Rules and Regulations. This new FREQUENCY COORDINATION SYSTEM MANUAL will be published as soon as permitted by APCO's limited resources.

Each of the frequency bands have different propagation characteristics. The lower frequency band provides typically longer ranges suitable for use in open, rolling, rural countryside. The upper bands are more suitable to urban environments. The lower band is most susceptible to long distance (skip) communications of sometimes more than 1,000 miles. Consequently, care must be exercised in the design of systems utilizing this band to minimize this type of interference.

FCC Rules and Regulations place restrictions on frequencies available near the borders of Canada and Mexico, near locations having certain television channels, and near major areas of population (cities of 250,000 or more).

There are a limited number of frequencies available in each band for assignment to the police services. These frequencies are reusable across the country as defined by (1) the limits of wave propagation, and (2) the FCC Rules and Regulations. These limits are generally determined by the amounts of co-channel interference that can be tolerated by system users, or by user agreement as to operational requirements, cooperative use, or other criteria. The Frequency Coordinating Committee in each local area, whose task is to provide assignment recommendations to the FCC, recognize these restrictions.

Police have traditionally used discrete frequencies to separate their operations into groupings of responsibilities and geographical requirements. For example, Dispatcher A communicates with District 1 units on frequency 1; Dispatcher B and District 2 units use frequency 2; detectives use frequency 3, etc. Because the radio equipment designed for use on one band is not usable on another band, and the lack of available frequencies in the band in use, many police agencies are limited in their ability to expand their operations to additional new frequencies in a different band without major new capital investments.

One California (city) department was planning just such a move and the related expenditures needed to get away from extensive co-channel interference from a user some 150 miles distant. At times the interference was strong enough to block the city patrolmen's portable radios. This created severe nuisance problems to the users and placed its officers in jeopardy. The city had no technical staff to look to for help. The APCO technical assistance advisor, after consultation with the police (APCO) frequency coordinator, found that the interfering user was in the process of changing frequencies to another band and would soon be vacating the frequency. This major expenditure for new equipment was cancelled with a significant savings of tax dollars.

In this case the city department managers were unaware of how frequencies are obtained or how users can be protected from interference through the efforts of the local APCO Chapters and its frequency coordination function. Had the city officials been more knowledgeable about communications, the interference problem could have been resolved much earlier.

Another instance of frequency-related problems was resolved when the APCO technical advisor discovered several unused 450 MHz frequency pairs licensed to a small eastern city. The city's regular system operated in the 150 MHz band and had no plans to move to 450 MHz. The licenses for the city had been obtained directly from the FCC without notification to the police frequency coordinator. The licenses were returned to the Commission, and the frequency coordinator was able to recommend their use by other agencies.

In some cases the smaller agencies find themselves becoming more crowded on a frequency that they have long used. Over the years they, and others with whom they share the frequency, have added more portables, or more mobiles. Perhaps new agencies have been assigned to the frequency. Relief by changing to an unused frequency in the same band is not always possible as all of the frequencies may have been assigned. Movement to newer, less fully occupied bands, is prohibited by the cost considerations of new equipment.

Several options for relief in such cases may be available, but each must be carefully considered before one or more are chosen. These include moving to an entirely new frequency band with attendant requirements for the purchase of new radio equipments. Here, the potential of not being in a band which is equipment-compatible with other local agencies or city services exists. Joining with other co-channel and nearby law enforcement agencies in a consolidated system where available frequencies are pooled and command/control is performed by one communications center for all participants is often a desirable solution. Sometimes changing operational procedures to become more efficient in the use of the radio air time provides the answer.

One MEDIUM sized agency in the more heavily populated north-east area elected to change frequency bands from the 40 MHz band to obtain relief from its crowded channels. They purchased a system for the newly opened 800 MHz band. Portable and mobile radios were necessary for the department's operation. The mobiles and base equipment were supplied as ordered. However, the vendor substituted 150 MHz portable radios for the 800 MHz portables. Since 800 MHz portables were not available, the system did not provide the overall performance desired. "Foot patrolmen" continued to use the existing 40 MHz portables, "cruisers" used a combination of 800 MHz mobiles and 150 MHz portables. Direct radio communications between foot patrolmen and the cruiser units was not possible and officer safety was threatened.

Claims were made in the local newspapers that there was a severe non-ionizing radiation hazard to personnel operating the 800 MHz radios. Later, the hazard potential claim was extended to the 150 MHz portables. Police personnel were reluctant to use the 800 MHz radios for fear of radiation harm, and officer safety was compromised due to lack of foot patrol-to-cruiser communications.

The APCO advisor was instrumental in assisting the city, the police department and its members, and the vendor, in arriving at a course of action to resolve the conflicts.

The "harmful" non-ionizing radiation hazard issue, particularly as it applies to the development of the "new" 800 MHz band, will reappear with increasing frequency as more agencies con-

template a move to 800 MHz for the operational benefits that may be obtained. Hearings and investigations will soon be conducted at the federal level under the auspices of the National Telecommunications Information Administration (NTIA) to determine if the current U.S. standards for exposure limits should be changed. Should more narrow limits of exposure be promulgated (by the Occupational Safety and Health Agency (OSHA), the Department of Health, the Environmental Protection Agency (EPA) and the American National Standards Institute (ANSI)), the use of portable radios in the public safety services could be prohibited. This would be a severe blow to the current practice of police radio communications, as portable radios are the mainstay of the dismounted officer, and many police systems are configured to make maximum use of their benefits.

The large agencies, in the major metropolitan areas, also suffer from frequency-related problems. The problems caused by the limitations of frequencies available are exacerbated by the huge quantity of users in all radio services vying for them. Frequencies (in the lower three bands) have been allocated in blocks for police, fire, business, forest industries, railroads, motor transport, and utilities, to name but a few of the recognized services.

In the newly authorized 800 MHz band frequencies are not assigned in blocks for the various categories of users. The FCC policy is to assign frequencies on a first-come, first-served basis. In the relatively short time that these frequencies have been available, all conventional channels have been assigned in the metropolitan areas of Los Angeles, Chicago and New York. (Some frequencies have been reserved by the FCC for later use.) The private business users have been able to react rapidly to the availability of these frequencies with speed that is impossible by local governments using budgeted public funds. Hence, they are among the "first to be served."

APCO, in support of the needs of public safety communications, has filed 23 petitions or comments on petitions to the FCC since January 1978. In addition, APCO made three formal submissions to the Congress in these matters. The APCO President, Counsel and Executive Director appeared before the Congress on three other occasions, testifying for the communications needs of law enforcement and public safety. As the largest representative body of public safety spectrum users, it will continue to assure that spectrum-related regulations reflect the requirements of the public safety users.

d) Conclusions

Frequency problems appeared in nearly one-half of the advisory tasks. SMALL and VERY LARGE classes experienced these problems most often.

These problems are characteristic of the agency level of communications sophistication. The VERY LARGE agencies need a large number of suitable frequencies. SMALL agencies also must find relative relief. Most of the SMALL and MEDIUM class agencies are unaware of how to obtain new frequencies or to best utilize their current frequencies. Many agency supervisors are unaware of the role that APCO and its Frequency Coordination Committees play in the frequency regulatory, allocation and assignment process.

This unawareness of how frequencies must or should be utilized

results in situations where agencies have unused frequencies on hand, where misunderstandings exist between co-channel users, where changes in one agency directly disrupt another many miles away, and where frequency band changes may solve one problem but create several more in its place.

Agency administrators often ignore this key aspect of law enforcement telecommunications management due to its seeming technical and regulatory complexity. The SMALL class agencies are most affected by this lack of management knowledge. The LARGER agencies are usually able to rely on a staff function for guidance.

The harmful effects of non-ionizing radiation are being studied in forthcoming hearings by various regulatory agencies. The potential for tightening or reducing exposure limits exists. A lowering of the limits could seriously affect the operation of portable, and possibly mobile, radios by law enforcement agencies.

#### 4. Management and Administration

- a) The Management and Administration category is concerned with problems relating to: the execution by agency managers of broad policy; resource allocation; program planning; personnel education and training functions; guidance and direction to the telecommunication function; agency operations; and it also includes the management of the telecommunication function.
- b) Problems in the Management and Administrative category appeared in 38% of the technical assistance tasks. Statistical analysis indicates the following:

##### Percent of time problems in this category appeared

OVERALL	: 38 %
SMALL class agencies	: 25 %
MEDIUM class agencies	: 43 %
LARGE class agencies	: 57 %
VERY LARGE class agencies	: 36 %

- c) A number of the tasks reflected a need for improved management and administration of the communications functions. In one combined system serving several departments, the communications system manager reported to four different agency heads and was the focal point on two different Tables of Organization (TO):
  - one TO governed administration, where the communications manager reported to the building administrator and was at the same level as building maintenance, vehicle maintenance, photo lab and police records;
  - a second TO placed the communications for operations under the sheriff one year and under the police chief the next year. This second structure was necessary to maintain the criminal justice control of an entity accessing criminal justice files.

This structure has an hourglass shape. At the top are the governing board, the civil service commission, police chief and sheriff. Directions are funneled through subordinates to the communications supervisor for execution by his division. The communications supervisor is responsible to these "bosses"

for the technical, operational and planning functions of the communications service group. This supervisor was overloaded with responsibility without commensurate authority. Morale and performance were low. The hourglass structure, diffused chain of command, and inability of the management to establish goals and policies, created a very confused and poorly performing communications system.

In another instance, an agency's communications was under the police chief (for administration). Operationally, it functions under the police watch commander, sheriff watch commander, and duty fire chief (all three).

- Operating procedures were passed verbally to one of the communicators who is directed to pass them on to others.
- Two-way communications, up and down, between the communicators and management, was non-existent. Planning, short and long-term, was not shared with the communications section.
- There were no written policies or procedures. The watch commanders established "procedures" on a day-to-day, ad hoc basis.

In one LARGE class combined system serving city, fire, police, county, sheriff, emergency services, the following advisor comments were provided. They are reproduced here to illustrate how a policy matter can affect the entire communications operation.

#### "MAJOR PROBLEMS IDENTIFIED AND DISCUSSION

1. The Advisory Board has not taken a joint positive position in establishing the policy requirements and procedure standards.

The Advisory Board, especially the user department members, should have worked together to establish the minimum requirements for the Dispatch Center, i.e., establishing the qualifications needed for the Center's employees, the response time for dispatching calls for services, standard operating procedures and items to be included in the operating procedures manuals.

2. An Adequate training program was not provided prior to operating the new Center.

The fact that a formal training program was not developed and implemented before start-up of the new Center has created many of the problems. The employees did not receive standardized instructions regarding methods, policies and procedures.

3. A formal Training Program does not exist.

Because of a lack of direction from the Advisory Board, dispatcher dissatisfaction and shortage of staff, a training program has not been developed. A training program is the major pre-requisite to developing an efficient Dispatching Center.

4. Qualified dispatcher positions cannot be recruited because salaries are not competitive in the local job market."

In another community three agencies - city police, county sheriff, and city fire - each operate their own communications services in three separate and distinct centers in the same

public safety building. Coupled with this is a single public safety emergency telephone number (911) serving the city and the county. The 911 incoming emergency calls are usually answered by city police and, if for the sheriff or fire service, transferred to their communications center. Sworn officers who answer these 911 calls are usually assigned on a random basis by the patrol commander, often as a disciplinary measure. The dispatcher/radio operators are a mix of sworn and unsworn personnel assigned more or less on a permanent basis. Management had not provided the policy guidance necessary for training or operations. Training was primarily OJT and there were significant duplications of equipments and personnel.

This community had requested a study to indicate the feasibility of consolidating the dispatching operations. The main finding by the advisor was the lack of, and need for, comprehensive management of the communications function at all levels and agencies of government within the city and county.

The complexity of law enforcement communications systems is increasing as agencies expand to support growing communities. LEAA funds have provided more and better equipments. New agencies are created to serve new communities. More emphasis is placed on the radio as the policemen's personal tool. Information systems demand greater communications capabilities. Yet there is a noticeable lack of a corresponding effort to provide senior police personnel with the knowledge needed to develop these concepts into a communications supporting structure, or to effectively employ communications in their service.

Communications as a field for police officer specialization has not been given the emphasis needed to insure communications management competencies at the various levels of the law enforcement hierarchy. Many police agencies must make-do with on-the-job trained supervisors because no other training was available. This make-do coping with department communications needs is not adequate for today's modern law enforcement systems.

This first year of telecommunications technical assistance indicates that the older methods of providing communications "expertise" within a police department are inadequate. Communications specialists and line officers alike require better grounding in the skills and technology necessary to develop, operate and maintain this basic law enforcement command and support function. This is true for the smallest as well as the largest departments in the country.

There are several levels of communications education needed among the law enforcement hierarchy. They are:

- (1) the chief administrative officer who manages the agency. As the chief officer, he directs the planning, support and administrative activities of the department. Communications systems will be planned, designed and implemented in response to his decisions. The planning, the purchase of equipments and components, and their operation will be under his policy direction. He must have a broad concept of the capabilities and limitations of communications systems and their regulatory environment to fulfill these policy responsibilities.
- (2) The middle manager of the law enforcement communications

systems. He directs the day-to-day operations; develops the needs for the future; then plans, specifies and implements these systems. He is responsible for the supervision and training of the communications personnel of the division. He is responsible for interface with adjacent agencies, maintenance of the equipments, filings before the FCC, development of the standards and procedures necessary for system operation, and management of the system under the policy guidance established by the administrator.

- (3) The staff and senior management of the agency who utilize the communications system daily, yet may not be directly involved with its management. They are concerned with other matters, long- and short-term planning, data/records systems, interagency coordination, field operations, and departmental organization, all of which affect or are affected by the functioning of the communications service and consequently require an appreciation of the capabilities and limitations of the departmental telecommunications function.

The training needed by the law enforcement middle manager, whether he be specialist or line, is generally not available. This can be attributed to some extent to the law enforcement community's ignorance of what such training should consist of, to the educators who do not perceive the need, and to associations such as APCO who have lacked the resources needed to develop such course material. Whatever the cause, APCO's Technical Assistance Problems Report has identified the need for this education.

d) Conclusions

There is a need to develop a comprehensive Law Enforcement Telecommunications Management Training (LETMT) program for utilization by departments, community colleges, training academies, and institutions of higher learning, to prepare the law enforcement middle manager for his communications-related responsibilities.

Policy and Political

- a) The Policy and Political category is concerned with problems relating to: interagency and interjurisdictional boundaries and responsibilities; interservice - police, fire and other services; the governing bodies of consolidated communications systems, an elected Board of Commissioners who establish policy.
- b) Problems in the Policy and Political category appeared in 37% of the technical assistance tasks. Statistical analysis indicates the following:

Percent of times problems in this category appeared

OVERALL	: 37 %
SMALL class agencies	: 29 %
MEDIUM class agencies	: 28 %
LARGE class agencies	: 64 %
VERY LARGE class agencies	: 27 %

- c) Policy and political considerations affect the LARGE class (100 - 500,000 population) agencies more than other size classifications. Many of these LARGE communities have grown

significantly over the past decade. New communities have grown up around them and metropolitan type concepts for handling problems have become necessary. Joint planning and coordinating bodies are considering ways to improve efficiency, reduce costs for police service, and build for the future.

These new methods of attacking the communities' law enforcement problems involve consolidation of the police services, consolidated communications systems, multi-agency dispatching, and the 911 universal emergency telephone number. Some include combining all of the public safety services such as fire, rescue, emergency medical, police and sheriff into one servicing telecommunications center.

Many of these policy related problems involve: restructuring the radio system to serve added agencies; initiating the planning for 911; adjusting jurisdictional boundaries; determining the need for system improvements, decision-making affecting the consolidation of police and fire dispatching services into a joint or combined operation.

Major policy decisions must be made by these communities before changes can take place. These decisions require the effort of several governing bodies. Consequently, 37% of the technical assistance tasks involved advisory recommendations to these policy-making bodies.

In several instances (10) the APCO advisor provided the agencies concerned with sample memoranda of understanding to be used when consolidating systems and agencies into one serving system. Samples of this memoranda are available through the APCO National Office. Coupled with the memoranda were step-by-step recommendations for proceeding with the consolidations.

Many (55%) of the problems reported earlier under the Operations and Training problem category were the result of inadequate or non-existent policy decisions. Major policies (funding allocations, personnel qualification criteria, inter-agency support concepts, for example) set the goals and standards for telecommunications services that are fundamental to its management activities. They are the basis for programs to be funded each year. They also establish personnel practices to be followed by the agency. In many ways, these policies (or their absence) determine the standards of efficiency and cost effectiveness of the system. Such policy decisions are usually made at the highest level of the department. They should be made by individuals familiar with the fundamentals of the system they are supervising.

Consolidation of agencies or departments of a community requires firm, coordinated policy decisions. On several occasions the advisors found departments searching diligently for reasons not to join with others in consolidation. (The negative is used to reflect the situation as found.) Such policies were frequently the result of parochial ignorance rather than realistic evaluation of the public's needs.

Where soundly based, affirmative policy decisions are lacking, the programs are invariably ineffective and foundering.

d) Conclusions

The Policy Problems category reflect a variety of political views across the United States. It is the views of elected

officials that determine public safety agencies' program emphasis. These elected and appointed officials allocate the resources to public safety programs and consequently determine the capabilities of the law enforcement telecommunications system. Policies established by these officials will be implemented at the department level. For example, they may direct telecommunications consolidation, or establish boundaries of service. They have a fundamental effect on the quality of the telecommunications system. 37% of the tasks indicated problems in the Policy category related to the establishing of broad policy made by those responsible for public safety telecommunications management.

When law enforcement managers become more sophisticated about communications, they can better present their telecommunications needs to the policy makers. This, in turn, will contribute to the development of more competent policy for law enforcement telecommunications.

6. Procurement Problems

- a) The Procurement Problems category is concerned with problems relating to procurement processes, practices; use of specifications; evaluations, methods, source selections, state contract purchases; vendor relationships.
- b) Problems in the Procurement category appeared in 25% of the technical assistance tasks. Statistical analysis indicates the following:

Percent of times problems in this category appeared

OVERALL	: 25 %
SMALL class agencies	: 20 %
MEDIUM class agencies	: 43 %
LARGE class agencies	: 29 %
VERY LARGE agencies	: 18 %

- c) Procurement is a significant problem in the MEDIUM sized communities. Although it would appear to be directly connected to the system's configuration, engineering and design category, this is seldom true except where faulty technical specifications have been used in the procurement process. This discussion of problems is aimed at the procurement practice itself.

The SMALL class communities, who usually depend on the equipment vendor to provide their engineering, have fewer problems than the MEDIUM class agencies. Of the LARGE and VERY LARGE sized communities, where a technically qualified communications and purchasing staff is normally available, more than 25% of the problems reported were related to procurement. The explanation of this incongruity is relatively simple.

The SMALL agency conducts procurements for relatively unsophisticated equipments or systems. These are normally "off the shelf" and the specifications used are simple. The procurement process is also simple, i.e., so many pieces of equipment selected from a vendor's catalogue, installed at such-and-such location. There is often no schedule, testing or critical evaluation performed. No community technical staff is available to participate in the procurement action.

The SMALL agencies' (20%) problems in this area generally

stem from the equipment's failure to meet the (poorly defined) objective or with follow-on support by the vendor. Such agencies often express a lack of knowledge about where and how to obtain "outside" engineering and procurement help.

The MEDIUM sized agencies often reflect the changing concepts of public safety/law enforcement service. They have grown from smaller agencies and have become involved in systems modernization, consolidations, or other advances requiring more sophisticated systems-type procurements. Their experience is based on earlier, simple equipment procurements, engineered by a vendor. As MEDIUM sized agencies, they are too small to have a technically competent communications staff on which to rely.

One MEDIUM to LARGE sized agency looked for alternatives to a contracted consultant's report calling for a procurement involving more than \$1.5 million. The APCO advisor, on reviewing this proposed action, was able to reduce the procurement cost by \$670,000.

Another LARGE city agency procured a modification to their radio system to attain unclear objectives. The procurement action did not address all the necessary considerations such as schedule, performance desired, or testing and evaluation. The city was not pleased with the results, and the officer users were "unhappy" with their equipments. Because the procurement was faulty, there was little hope that a truly satisfactory solution could be attained.

Unclear objectives, faulty specifications, and a lack of detailed system performance and acceptance criteria resulted in this disappointing procurement action. The APCO advisor was able to obtain a satisfactory resolution of these problems through negotiations.

In the smaller agencies the equipment specifications are often written for the agency or provided by a vendor. The agency then combines these technical specifications with their standard (sewer and streets) "boiler plate". The specifications from the vendor can (even unintentionally) contain restrictive phrases or proprietary features of one vendor's equipment line. The department that uses them may find that it has changed its objectives to fit the equipment solution provided.

Many larger agencies operate in a similar manner, unless they have a technical staff which can develop its own technical specifications. The advantages of an in-house technical staff are several. They can prepare detailed specifications and conduct test and acceptance programs of the final product.

One procurement method that appears too seldom and is particularly appropriate for the higher technology systems, although it is not limited to these alone, is called the "Request for Proposal" (RFP). It is particularly useful in situations where the system operational requirements are well defined and study of system alternatives has shown that more than one combination of hardware or software could provide an acceptable solution.

Cost negotiations may be conducted after the technical solution has been selected. The LARGE agencies may have sufficient technical staffs to properly document the operational requirements needed to use the RFP method.

A frequent problem with law enforcement procurements is lack of well-defined objectives, coupled with a lack of follow-through on the agencies' part. Once the equipment is on hand, it is rarely tested to insure its compliance with the technical description. If it were not to be tested for compliance, why specify or demand compliance?

Some of the agencies observed do not understand the relationship that should exist between the purchaser and the supplier. In some respects their procurement package contains so many restrictions and protective clauses that the suppliers refuse to bid. In these cases the bidding requires more legal effort and covering insurance than the contract would be worth.

The use of consultants for assistance in communications procurements has helped many agencies in obtaining the desired results. The role of the consultant and the several reasons for their use are:

- savings of time and money (unavailable staff);
- independent view;
- specialized advice, imaginative solutions;
- technical expertise.

The consultant should have the technical talent not readily available within the agency. He usually has a depth of experience and can devote his full time and energy toward solution of the total procurement problem.

APCO's Project 13 report and companion document, *PLANNING GUIDELINES FOR LAW ENFORCEMENT TELECOMMUNICATIONS*, describe procurement practices and procedures appropriate for law enforcement communications systems procurement. In its latest project, P-16, the procurement of high technology systems is even more fully described. These publications should be utilized by public safety agencies. Coupled with these is the requirement for improved awareness of specialized communications procurement requirements by law enforcement managers.

d) Conclusions

SMALL and MEDIUM sized agencies need help with procurements. They do not have the technical staff necessary for program definition and implementation and often do not know where to obtain such help. LARGE and VERY LARGE agencies are also susceptible to faulty procurement actions. These procurement problems stem from unclear objectives, faulty specifications, poor vendor selection processes, and lack of scheduling, testing and evaluation.

Law enforcement management frequently does not have an adequate knowledge of the specialized procurement practices appropriate to the implementation of high technology systems.

7. Maintenance Problems

- a) The maintenance category is concerned with problems relating to: in-house or contract maintenance of telecommunications systems and equipments; technician selection, licensing, training and retention; service facilities; test equipments; equipment warranties; and vendor responsibilities.

- b) Maintenance problems appeared in 25% of the technical assistance tasks. Statistical analysis indicates the following:

Percent of times problems in this category appeared

OVERALL	: 25 %
SMALL class agencies	: 38 %
MEDIUM class agencies	: 14 %
LARGE class agencies	: 14 %
VERY LARGE class agencies	: 18 %

- c) SMALL class agencies face serious problems in the maintenance category. Generally, the communities they serve are too small to support an in-house maintenance capability or a community mobile radio repair facility. Their maintenance service is by contract, and the year-to-year costs may vary significantly. The service they receive varies in quality and responsiveness due to the contractor's need to serve a number of other businesses. Small communities do not have the resources needed to participate in competitions for maintenance contracts.

The maintenance contractor is generally aligned with one of the major equipment vendors. This restricts the perceived ability of a community to rely on competitive pricing and often leads to narrow, non-competitive procurements. "Other brand" equipment vendors are reluctant to break the local arrangement if they do not have a local service and repair shop. The cost of capital investment for service equipment and high technician salaries inhibits both the local business entrepreneur and a local government's consideration of establishing communications service capabilities.

In LARGE and VERY LARGE agencies with an in-house service facility, the problems are centered more on personnel. The rapid expansion of business communications systems has created a shortage of trained mobile radio technicians. These "business" radio service companies are competing very successfully for the local government's trained technician personnel. Their success is due to higher salaries and working conditions based on an eight-hour business day without the "24-hour" on-call requirements of a public safety agency.

Comments received from several law enforcement system service managers related the attitude of many of their technicians and applicants. As one put it, ". . . these kids today want salary now. They are not interested in the long-term retirement benefits, health plans and other fringe benefits that we provide." The comments voiced here were echoed by others across the country.

In some areas larger agencies provide maintenance support to those who do not have a capability. This is particularly helpful to the more remote, small agency which may have a large state police, forestry, or similar service shop nearby. In one case of technical assistance provided to a county, the recommendation included investigation of pooling of the local, state, and federal governmental maintenance needs in the area to see if the state or a private contractor could provide adequate maintenance service to all. The skilled technician remains a necessity. He must still identify trouble location and perform component replacement. He will continue repairing and replacing 10% of the microphone cables per month, and there is still a large number of "older" equipments in use throughout the country.

Law enforcement managers must consider the inherent, long-term maintenance requirements when implementing new systems, equipments and techniques. The maintenance function will remain a significant concern of law enforcement communications. Law enforcement agencies of all sizes and the communities they support need to develop awareness of this potential erosion of service and plan ahead to counteract its effects.

d) Conclusions

Maintenance and repair of law enforcement communications systems is an area of major concern to agencies of all sizes. Lack of adequate maintenance facilities can inhibit the competitive procurement process.

Smaller and remote agencies have a significant maintenance problem. They are not always able to obtain a service contractor, nor do they have the support necessary to establish an in-house maintenance capability of their own. Communications service costs are rising more rapidly than many communities are able to support.

Lack of adequate maintenance results in SMALL agencies experiencing long, out-of-service times. Because of this, they must consider redundant base station equipments and spare mobile units as a means of providing necessary reliability.

Small and more remote agencies should investigate pooling of their needs with others to provide an attractive business opportunity for contract maintenance services.

The LEAA should carefully consider maintenance plans and programs as a part of every equipment or system grant application.

8. Funding Problems

a) The Funding category is concerned with problems relating to: methods of cost allocations among consolidated system users, funding support by governing bodies, grants from the LEAA or state sources.

b) Funding problems appeared in 23% of the technical assistance tasks. Statistical analysis indicates the following:

Percent of times problems in this category appeared

OVERALL	: 23 %
SMALL class agencies	: 20 %
MEDIUM class agencies	: 14 %
LARGE class agencies	: 21 %
VERY LARGE class agencies	: 36 %

c) Although funding problems appeared in many instances, they were primarily related to the agency's ability to obtain funding for changes and improvements recommended by the advisors.

In several instances the advisors provided the agencies with suggestions as to where they might locate sources of funding; in others, they provided details of programs the advisor had successfully funded.

The advisory reports were used in numerous cases to validate requests for funds to the governing bodies. These reports

from an "outside source" helped local officials render judgments regarding the need for or appropriateness of fund requests.

d) Conclusions

The Technical Assistance Project served three important needs of the agencies.

- . It provided estimates of the funds needed for changes and modifications to existing systems.
- . It provided information as to the potential funding sources.
- . It provided a validation to the governing bodies of the necessity of various programs for improvement of their communications systems.

New Technology Problems

- a) The New Technology category is concerned with problems relating to: the development and implementation of radio systems for the 800 MHz band; utilizing orbital satellites as radio relay points; optical fibre transmission; single-side band for land mobile service; and other new approaches.
- b) New Technology problems appeared in 9% of the technical assistance tasks. Statistical analysis indicates the following:

Percent of times problems in this category appeared

OVERALL	: 9 %
SMALL class agencies	: 4 %
MEDIUM class agencies	: 14 %
LARGE class agencies	: 0 %
VERY LARGE class agencies	: 27 %

c) Secure Communications

Several applications of new technology have created problems for law enforcement agencies. They range from those involving new techniques to old techniques in new applications.

One of these, discussed earlier under system configuration, involves the need for encoding or encrypting voice to provide security of the radio transmission. We will refer to this whole grouping of devices as "scramblers". The purpose of the scrambler is to disguise or hide the message content from an unauthorized person. In application, it might be used to hide force deployment and intentions from a team of burglars.

Methods of providing this transmission security vary. There are several degrees of sophistication (and security) available. Generally, the more secure the system, the more it costs. Some of the cheaper devices make the originator sound like "Donald Duck".

Lack of appreciation of the operational restrictions of these systems can cause problems. The high cost of these devices usually makes it impossible to procure enough to supply all users in the agency. Thus, although part of the forces can operate with their transmissions "protected", those not scrambler equipped are lost to this "protected" group. In many

cases these unequipped radio units must receive the same information as the "protected" ones and all protection is lost. In one city as described under System Configuration, the agency no longer uses its scrambler because of the resulting fragmentation of its force.

Many of the cheaper scramblers do not offer the needed protection. Some of the earlier models could be understood without the aid of sophisticated decrypting equipments. The police officers using some of these systems may well be operating with a false sense of security.

Careful consideration of the need for scramblers and the development of strict limitations on their use can assist an agency who currently has the devices or is contemplating their acquisition.

In some respects, digital keyboard devices (keyboard to cathode ray tube (CRT) or hard copy devices) also provide some degree of transmission security. However, many of the same limitations apply.

#### Trunked System

The need for improved command control within the available frequencies may well be met with the ongoing development of the Digitally Addressed, Trunked Communications System (DATCS) concept being developed under APCO's Project 16. This is a LEAA grant program to implement and demonstrate these systems concepts in four model communities. This project is more fully described in APCO's publications, *THE APPLICATION OF THE 900 MHz BAND TO LAW ENFORCEMENT COMMUNICATIONS*, and *900 MHz TRUNKED COMMUNICATIONS SYSTEM FUNCTIONAL REQUIREMENTS DEVELOPMENT*.

Although these systems are being developed to meet needs of frequency availability and communications management, there is an inherent characteristic - frequency switching -- which may provide some degree of transmission security.

#### Satellite systems

Several states are investigating the application of orbital satellites aimed toward providing wide area mobile radio service. The APCO advisor put one state in touch with other agencies (non-law enforcement) who were addressing this subject.

#### Community Antenna Television (CATV)

A county in Pennsylvania received assistance in determining the feasibility of connecting its 43 Justice Courts to one arraignment center through the use of a county-wide community antenna television system (CATV). Under the Rules of the FCC existing at the time, a CATV franchisee can be required to devote some of his cable TV channels to local government or public use. The county's approach intended to make use of these channels to support its court system and also use the system for law enforcement/public safety training.

The advisor found this concept feasible. Several weeks later the FCC changed its Rules, no longer requiring a franchisee to furnish channels to government. Absent this mandate, the proposed system lost much of its viability.

### Non-ionizing Radiation

Previously described 800 MHz frequency band applications (Frequencies, System Configuration sections) have discussed the aspects of non-ionizing radiation. As of this writing there are no commercially available portable radios for this band. It may well be that 800 MHz portable radio development will be delayed until the non-ionizing radiation issues are resolved. Tighter restrictions could preclude the use of portable radios entirely.

#### d) Conclusions

"Scrambler" or other techniques to provide voice privacy or transmission security have been employed by several agencies. In some cases, insufficient study of the advantages and disadvantages, and necessary operating and procedural changes were not recognized.

Cheaper scrambler devices do not always provide the desired level of security, and some agencies may be using them unaware that their security is minimal.

The DATCS being developed in four communities under a LEAA grant as APCO's Project 16 offers a new capability to agencies and their communities for frequency utilization, system flexibility, and improved command and control.

The SMALL and MEDIUM sized agencies do not have the technical staff necessary to fully utilize the capabilities of new technology.

### 10. FCC Rules and Regulations

- a) The FCC Rules and Regulations category is concerned with problems relating to: licensing of stations and personnel; improper station operation; other Rule violations; modifications of the Rules and Regulations.
- b) FCC Rules and Regulations problems appeared in 12% of the technical assistance tasks. Statistical analysis indicates the following:

#### Percent of times problems in this category appeared

OVERALL	: 12 %
SMALL class agencies	: 8 %
MEDIUM class agencies	: 28 %
LARGE class agencies	: 7 %
VERY LARGE class agencies	: 18 %

- c) The Federal Communications Commission (FCC) Rules and Regulations control law enforcement radio systems operations. These Rules govern licensing eligibility and operational procedures. They specify the basic technical characteristics of equipments and list approved equipments that can be placed in operation. These Rules specify station identification procedures, operator licensing requirements, and other pertinent criteria.

The SMALL class agencies frequently suffer deficiencies that are the result of not having a communications qualified individual to supervise this activity. In many cases a vendor representative or contract maintenance provider is looked to for assistance.

The Rules and Regulations are changed at an almost daily rate. These changes are published in the FEDERAL REGISTER and subsequently by insertions for the Rule book. Many agencies are not aware of these changes or of the need to keep abreast of the changes. Rule changes can affect existing or planned systems. As described earlier, a court system was planning to use a CATV franchise cable system to connect its courts. Changes in the Rules by the FCC removed the franchise's requirement to furnish channels for this use. The court system in that county will need to look elsewhere to meet their need. Recent Rules changes by the FCC removed a requirement for frequency coordination from Special Emergency block frequencies. This affected several police agencies who are no longer protected by the coordination process from special emergency licensees establishing operations nearby and causing interference to the police user.

APCO has filed or commented on more than 23 Petitions with the Commission since January 1978 concerning Rule changes. APCO, supported by the International Association of Chiefs of Police (IACP), is the only major Association filing Comments with the Commission in support of law enforcement needs.

d) Conclusions

SMALL and MEDIUM agencies are often not aware of the effects of the FCC Rules and Regulations on their systems. On several occasions advisors found systems operating illegally due to expired licenses. The managers were unaware of the requirements of the Rules.

LARGER agencies experienced problems of interpretation and limitations imposed by the FCC Rules and Regulations.

#### IV. RECOMMENDATIONS

The recommendations developed for law enforcement telecommunications as a result of APCO's experience with technical assistance are presented here under several major headings.

##### A. LAW ENFORCEMENT MANAGEMENT TELECOMMUNICATIONS EDUCATION

Many of the agency deficiencies noted in the report were the result of a general lack of familiarity by law enforcement management officials, regardless of the size of the agency involved, with the factors affecting communications systems engineering, operation, regulations, procurement and training. This has resulted in procurements of unnecessarily expensive communications equipments, reduced operational performance, mis-utilization of valuable spectrum, and inefficient operation of the dispatch function.

In many departments, communications supervisors, planners and administrators are selected from the ranks of certified police officers. The knowledge necessary to operate a communications system, procure equipment and manage communications specialists is not a prerequisite to selection for a line command. Unfamiliarity with radio propagation, equipment design, and special operational skills is the norm. The result is often inadequate system planning, disorganized system growth and questioned procurements.

Senior officers, not directly responsible for the day-to-day decisions needed to manage a communications department, must have some familiarity with the elements of communications system management and operation. The chiefs and similar senior officers are frequently called upon to make basic policy decisions affecting procurements and operational requirements and procedures, without a fundamental understanding of how communications systems operate. The result is unnecessary costs and compromised system performance and officer safety.

##### APCO recommends:

that a program be undertaken to develop a unit of training in communications fundamentals, to be available to law enforcement officials as part of their career development education. It would familiarize middle management level officials with the capabilities made possible by modern communications systems technology, and the fundamental techniques of system procurement, operations and management. Such a unit of training would be incorporated into the career development education on the same footing as that directed toward investigative procedures, rules of evidence, personnel management, and similar skills to be acquired by all law enforcement officials in the enhancement of their professional competence.

##### B. TECHNICAL ASSISTANCE

Response to the technical assistance program indicates the need for its continuance. The cost savings associated with the LEAA-funded projects resulting from this qualified technical advice have paid for the project several times over. Letters of appreciation received indicate that this has been one of the LEAA's most widely recognized, successful contributions to law enforcement improvements at the state and local levels.

Technology transfer to and between many law enforcement agencies in the country has significantly improved their abilities for effective force employment. This technology transfer fills a long-felt gap, permitting better utilization of equipments, systems, techniques and

personnel in support of federal, state and locally funded programs.

APCO's technical assistance program has been described by a recipient as ". . . the nuts and bolts type of help that is so desperately needed by the local agencies". Until there is available across the nation a group of law enforcement managers who are knowledgeable in communications, technical assistance will be necessary to provide them with the special answers and skills they need.

APCO recommends:

the Technical Assistance Project for law enforcement telecommunications be continued by the LEAA.

C. TELECOMMUNICATIONS PLANNING

The Technical Assistance Project found a significant need for improved telecommunications planning among agencies of all sizes and sophistication. The need for planning exists in part because many managers are unaware of the proper function of telecommunications in their agencies and the complexities involved in establishing truly responsive systems. Equipment solutions are often sought to meet unclear objectives without adequate considerations of all present and future considerations.

APCO's Project 13A, *Planning Guidelines for Law Enforcement Telecommunications*, can provide guidance to law enforcement managers and planning agencies concerned with telecommunications.

Providing law enforcement managers with education in the planning processes, and a familiarity with telecommunications operational considerations, will significantly aid them in their career development.

APCO recommends:

- the planning of telecommunications systems in all appropriate LEAA-sponsored programs be emphasized;
- the APCO Project 13A - *Planning Guidelines for Law Enforcement Telecommunications* - be given the widest possible dissemination;
- programs to increase the familiarity of law enforcement managers with telecommunications should be developed and promulgated.

D. POLICIES AND PROCEDURES

In many agencies the role of the dispatcher/communicator is poorly defined. Guidelines and procedures for their use are minimal. As a result, the communications systems function at a reduced efficiency. Neither field forces nor communications personnel are always adequately trained. Thus, these two groups are not always working with common methods.

Documented telecommunications goals and objectives are necessary to provide the basis for developing operating procedures and guidelines for use by communications personnel and the field forces.

APCO recommends:

- telecommunications service goals and objectives be established by all law enforcement and communications agencies;

- documented telecommunications operating procedures be developed and published in all law enforcement and communications operating agencies;
- communications and field personnel be thoroughly trained in the established operating procedures;
- agencies review their operating procedures periodically to assure relevance and currency.

E. NON-IONIZING RADIATION HAZARD

Non-ionizing radiation, such as received from radio transmitters, is suspected as being hazardous. Although standards for exposure have long been in existence, these standards are the subject of new hearings to determine if they are adequate. A reduction of these levels of exposure could produce severe restrictions on the use of radio transmitters, particularly hand-held portable units.

Hand-held portable radios are widely used in law enforcement and public safety systems. Many dollars have been invested in systems employing these units. Restrictions on their use could have a serious effect on law enforcement operations. Close attention should be paid to these hearings, and representatives of the law enforcement community should be prepared to participate to the extent appropriate to insure that their needs for portable hand-held radios are presented.

APCO recommends:

law enforcement agencies, associations and federal funding sources should participate in the forthcoming hearings concerning non-ionizing radiation hazards in order to insure that their needs are considered prior to the adoption of any new exposure limitations by regulatory agencies.

F. REGULATORY CONCERNS

Numerous attempts have been made by various radio frequency user groups to obtain the use of radio frequencies currently assigned to police and local governments. APCO has filed petitions or formal comments to the FCC on 23 occasions since January 1978 in support of public safety/local government interests. In several instances these filings were made in conjunction with those submitted by knowledgeable or affected law enforcement agencies. As a result of these efforts, the FCC has acknowledged the long-term planning and funding characteristics of local governments.

Attempts to access present law enforcement frequency allocations will continue in the future. Law enforcement managers should be aware of the implications of these actions and be prepared to justify their requirements.

APCO recommends:

- law enforcement agencies and managers, state and local governments, should articulate their needs for radio communications and their dependence on the decisions of the FCC to provide adequate radio spectrum under Rules suitable to the needs of the public safety service;
- the LEAA should participate in FCC activities that may affect law enforcement communications;

- APCO and other associations should participate in legislative and regulatory activities that may affect their access to the radio spectrum.

G. FREQUENCY COORDINATION

Frequency coordination activities provide the best method available to make best use of authorized frequencies. Evidence of frequency coordination is required on any police agency's request for new or modified radio station licenses on frequencies below 470 MHz (excepting the "Engineering Route"). Frequency coordination for law enforcement is performed at the local level by a representative peer group, the APCO Frequency Coordinating Committee.

A number of the law enforcement agencies encountered during the technical assistance program were unaware of the licensing procedures or of frequency coordination activities. The participation by all agencies in the local area in this process is highly desirable as a means to insure that all needs are expressed and that a maximum of protection is provided to all systems.

APCO, within the limits of its resources, is currently revising its *The Frequency Coordinator's Manual* to reflect recent changes in the FCC Rules and Regulations. The new FREQUENCY COORDINATION SYSTEM MANUAL, when published, will be available to police and radio services.

APCO recommends:

police/law enforcement agencies should participate in the local APCO Chapter frequency coordination activities.

APPENDIX A

AGENCIES REQUESTING APCO TECHNICAL ASSISTANCE

SEPTEMBER 1978 - SEPTEMBER 1979

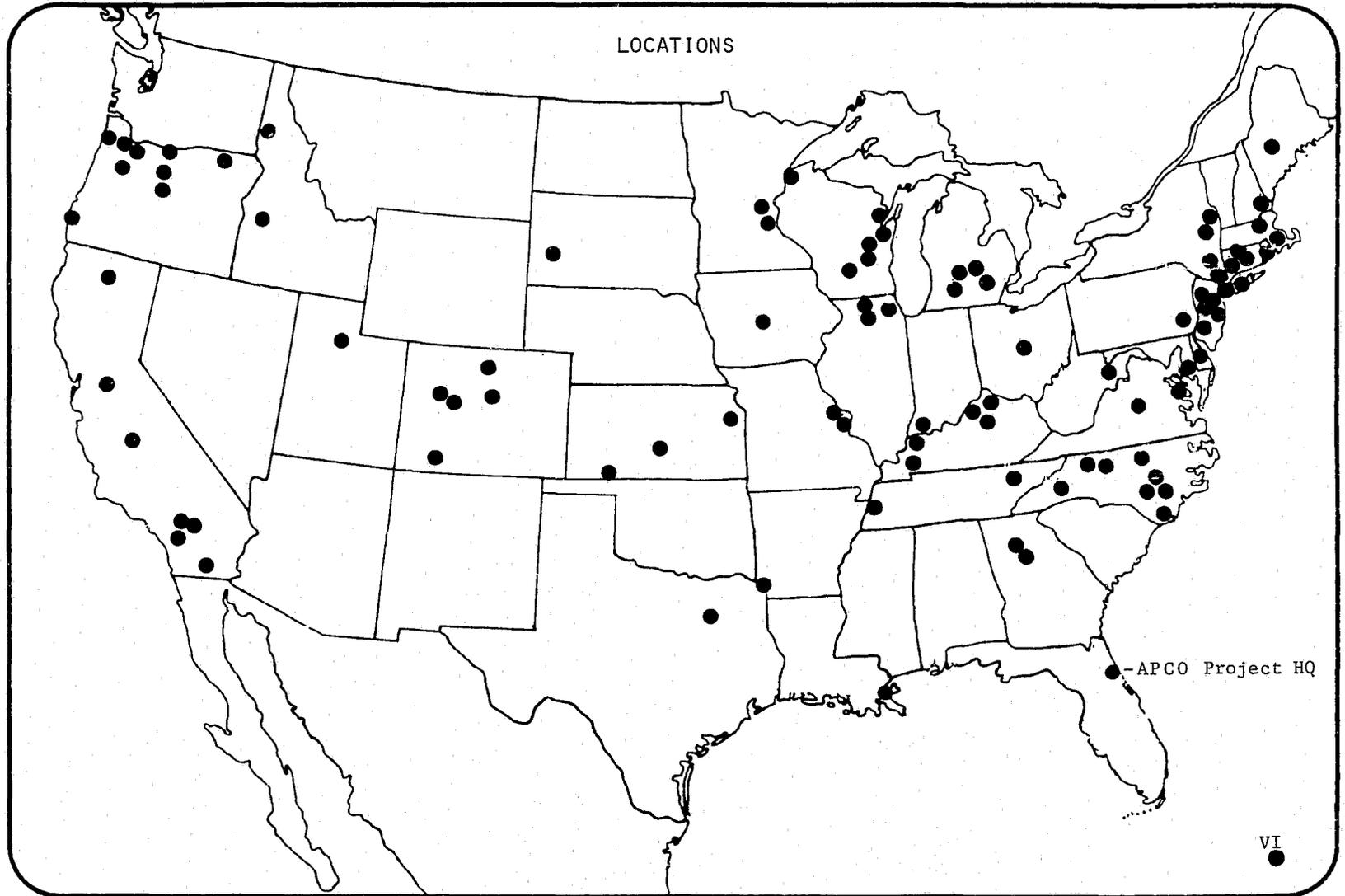
PROJECT 17

Henderson, KY  
 Visalia, CA  
 Weed, CA  
 Winnebago Co., IL  
 Iowa State Police  
 NY State Parole Div.  
 Wisconsin DOT  
 Catawba Co., NC  
 Liberal, KS  
 Durham, NC  
 Wilmington, NC  
 New York City (2)  
 New Bedford, MA  
 Sedgewick Co., KA  
 RI Drug Control  
 Union Twp., NJ  
 Hudson, NC  
 Bristol, CT  
 OLCC, OR  
 Appleton, WI  
 Manchester, NJ  
 Irvington, NJ  
 CO West COG  
 Yonkers, NY  
 NW Central Dispatch, IL  
 Sarpy Co., NB  
 Thornton, CO  
 Milburn, NJ  
 Clarke Co., GA  
 Fond du Lac Co., WI  
 Garfield Co., CO  
 Manchester, CT  
 Rapid City, SD

Saratoga Springs, NY  
 MI Dept. of Corrections  
 Ocean City, MD  
 Smith Co., TX  
 Kootenai Co., ID  
 Wasco Co., OR  
 Morgan Co., TN  
 Ft. Collins, CO  
 Suffolk Co., NY  
 ARK-TEX COG  
 Manteca, CA  
 Evansville, IN  
 Rutherfordton, NC  
 Delaware Co., PA (2)  
 Rockford, IL  
 Superior/Douglas Co., WI  
 Virgin Islands  
 Tillamook Co., OR  
 Jefferson Co., OR  
 Pendleton Co., KY  
 Eagle Co., CO  
 State of Idaho  
 Teaneck, NJ  
 Bell-Cudahy, CA  
 St. Louis, MO  
 Utah State Patrol  
 Sterling, CO  
 CO State Police  
 Fairfax Co., VA  
 Charlottesville, VA  
 Coos Bay, OR  
 Oconto, WI  
 Multnomah Co., OR

Clinton, NC  
 Spring Lake, NC  
 Hope Mills, NC  
 Sunset Hills, MO  
 Novi, MI  
 Atlanta, GA  
 New Orleans, LA  
 Dakota Co., MN  
 Knoxville, TN  
 Groton, MA  
 CT State Police  
 Madison, ME  
 Burbank, CA  
 Ramsey Co./St. Paul, MN  
 Brawley, CA  
 Genesee Co., MI (2)  
 Crook Co., OR  
 Columbus, OH  
 Battle Creek, MI  
 Carrolton, KY  
 Polk Co., OR  
 Owen Co., KY  
 Grant Co., WV  
 Newcastle Co., DE  
 Pomona, CA  
 Baltimore, MD  
 Avon, CT  
 Newburgh, NY  
 Hunterdon Co., NJ  
 CT Justice Commission  
 Olathe, KS  
 Christian Co., KY  
 Green Bay, WI

APCO TECHNICAL ASSISTANCE PROGRAM



APPENDIX B

NAME: \_\_\_\_\_

Social Security No.: \_\_\_\_\_ APCO Chapter: \_\_\_\_\_

Home Address: \_\_\_\_\_ Telephone: \_\_\_\_\_ / \_\_\_\_\_

Business Address: \_\_\_\_\_ Telephone: \_\_\_\_\_ / \_\_\_\_\_

Position/Title: \_\_\_\_\_

Are you or have you been:

- a police officer? \_\_\_\_\_ Where: \_\_\_\_\_

- a fire fighter? \_\_\_\_\_ Where? \_\_\_\_\_

Type of current agency where now employed:        Federal        State        County        City        Service District (COG)        Other

Are you full time salaried? \_\_\_\_\_

For communications, is it:

- a multi-service agency? (police/fire/EMS/emergency services/other) (Specify) \_\_\_\_\_

- a multi-agency servicing organization? (consolidated service/police department/Sheriff's office/fire/etc.) (Specify) \_\_\_\_\_

Approximate number of people in your agency: \_\_\_\_\_ Size of community served: \_\_\_\_\_

In your position do you act as an advisor or consultant to other departments/agencies/organizations? \_\_\_\_\_

Have you ever acted as an independent consultant/advisor? \_\_\_\_\_

Do you feel comfortable in the following roles? (Circle role for yes)

teacher      manager      organizer      writer      advisor

APCO experience: Chapter: \_\_\_\_\_ National: \_\_\_\_\_

Can you arrange, on short notice, an absence from your regular duties to act as a P-17 advisor, for periods of several days to a week? (Comment)

Please furnish a short, single page resumé listing your major professional experience and formal education. We will retype what you provide, if necessary. This resumé will be given to the agency you are advising, together with your report.

FORMAL ACCREDITATION: Degrees: \_\_\_\_\_ Field: \_\_\_\_\_  
 Professional Registrations: \_\_\_\_\_ State: \_\_\_\_\_ Year: \_\_\_\_\_  
 FCC Licenses: \_\_\_\_\_ Other: \_\_\_\_\_

AREAS OF ADMINISTRATIVE COMPETENCE: (years of experience)

	<u>Council of Govt.</u>	<u>Local Gov.</u>	<u>State</u>	<u>Federal</u>	<u>Corporate</u>	<u>Other</u>
Policy Level	_____	_____	_____	_____	_____	_____
Administrator	_____	_____	_____	_____	_____	_____
Manager	_____	_____	_____	_____	_____	_____
Supervisor	_____	_____	_____	_____	_____	_____

<u>AREAS OF SERVICE:</u>	<u>Police</u>	<u>Fire</u>	<u>EMS</u>	<u>Emerg. Svc</u>	<u>SAR</u>	<u>LG</u>	<u>Forest</u>	<u>Hwy.</u>
Frequency Coordinator	_____	_____	_____	_____	_____	_____	_____	_____
Financial Management	_____	_____	_____	_____	_____	_____	_____	_____
Grants Management	_____	_____	_____	_____	_____	_____	_____	_____
System Design	_____	_____	_____	_____	_____	_____	_____	_____
Maintenance	_____	_____	_____	_____	_____	_____	_____	_____
Operations	_____	_____	_____	_____	_____	_____	_____	_____
Training	_____	_____	_____	_____	_____	_____	_____	_____
Procurement	_____	_____	_____	_____	_____	_____	_____	_____
Personnel Functions	_____	_____	_____	_____	_____	_____	_____	_____

AREAS OF TECHNICAL COMPETENCE: (years)

Propagation _____	Satellite Sys. _____	Carrier/MUX _____	Fingerprint _____
Antennas _____	FAX _____	Spread Spectrum _____	Xmsn _____
RF Circuits _____	RFI/EMI/EMC _____	CCTV _____	Data _____
Installation _____	BIORAD HAZ _____	TLM/SUP. CONT. _____	Systems _____
Emerg. Power _____	Telephone Sys. _____	Veh. Location _____	Human _____
HF Radio _____	Cent. Office _____	CATV _____	Factors _____
VHF/UHF _____	Transmission _____	Audio Systems _____	Lasar _____
Microwave _____	PABX _____	Xmsn Security _____	Techs _____
RADAR _____	911 _____	Facility Security _____	Police _____
Airborne sys. _____	PSAP _____	Geocoding _____	Records _____
Marine _____		Mobile Digital _____	

PLEASE RETURN THIS QUESTIONNAIRE TO: APCO, P.O. Box 669, NEW SMYRNA BEACH, FLORIDA 32069

APPENDIX C

TO: (Advisor)

ADVISOR  
Task Assignment and  
Administrative Instructions

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Task #

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- I. General situation and current activities of agency to be assisted.  
(Problem statement)
- II. Task (mission) assignment to APCO Advisor.  
Task Number \_\_\_\_\_ (Concise statement of Task)
- III. Specific details pertinent to execution  
Contacts, names, hierarchy, location, etc.  
Dates and times. Time allocation.
- IV. Administrative details
  - a)
  - b) Travel and support - claims for reimbursement, and information if a special city.
  - c) Time charges.
  - d) Pertinent telephone numbers, etc.
  - e)
- V. Reports
  - a) Reporting due dates
  - b) Reporting forms
  - c) Recommendation concerning problem, causes, effects and solution
  - d) Special records (if required)

---

Date

Project Manager

APCO Form 17-3

Direction to Advisor



APPENDIX D

EXTRACTED -

REPORT FORMAT AND INSTRUCTIONS  
PROBLEM CATEGORY ANALYSIS FORM  
ADVISOR MEMORY JOGGERS

A P C O

TECHNICAL ASSISTANCE PROJECT (P-17)

GUIDELINE MANUAL

DATE \_\_\_\_\_

TECHNICAL ASSISTANCE ADVISOR MANUAL

APPENDIX D

PREPARATION OF THE REPORT AND REPORT FORMAT

- I. APCO technical assistance must be performed expeditiously. The time provided to the advisor is sufficient to determine the problem, obtain data, consider the ramifications, determine a solution, and write a report for the client agency.
  
- II. Your report should contain an accurate, concise analysis of the problem and your conclusions and recommendations. Its purpose is to assist the client agency in making a decision. Ideally, the body of the report should be contained on one or two pages, with voluminous discussion, comparisons and data relegated to appendices.
  - a) Clarity - There must be no doubt of your meaning.
  - b) Brevity - The report should be concise; however, clarity should never be sacrificed for brevity.
  - c) Accuracy - The report should be accurate in all details.
  - d) Coherent - Your ideas should be presented in logical order with relationship between ideas clearly shown.
  - e) Unity - You should deal with the problem. Side issues should be omitted.
  - f) Completeness - You should cover every angle of the problem.
  
- III. The majority of all APCO technical assistance efforts will involve one or more of these five key aspects of public safety communications. They are Citizen Access, Command and Control, Interagency Communications, Data Systems Access and (purely) Technical.

The appropriate aspect(s) should be referred to in the Problem Analysis section of your report. (Section 3)

In the Problem Analysis or Discussion Section, the key aspects of public safety communications (above) may involve one or more of the following problem categories. Where practical, you should address these categories during the problem analysis presentation. (This listing is neither all-inclusive nor exclusive. If they fit your task, use them; if not, use your own.) See attached analysis sheet for category details.

- |                                  |                               |
|----------------------------------|-------------------------------|
| A. Policy/Political              | F. Operations and/or training |
| B. Management/Administration     | G. Maintenance                |
| C. Procurement                   | H. New technology             |
| D. Funding                       | I. Frequencies                |
| E. System design and engineering | J. Rules and Regulations      |

In the Conclusions Section (4), give the results of the reasoning you developed in the discussion. This is the point to choose your solution.

- 1) You must eliminate less desirable courses of action and present the most workable solution.
- 2) Your conclusions are the direct and natural result of the objective analysis. They should continue the discussion.
- 3) Conclusions must answer each part of the problem. They should never add new or unrelated material.

In the Recommendations Section (5) you state concisely your recommended course of action. You tell how the solution will be put into effect. The solution must be consistent with the conclusions. Never include new material in your recommendations.

- IV. APCO technical assistance consists of a brief visit followed by an advisory report. Do not hesitate to recommend that the client agency obtain additional outside assistance which could be an engineering firm, vendor, or consultant, if such a recommendation is appropriate.
- V. Report Format (attached)
- VI. Problem Categories check list (attached)  
(Fill in blanks as appropriate, circle items, and submit to project office for tabulating our final project report.)
- VII. Buzz words. (attached)

A REVIEW AND EVALUATION  
of  
POLICE COMMUNICATIONS

A Technical Assistance Report  
Prepared for  
THE POLICE DEPARTMENT

---

TASK NO. \_\_\_\_\_

Performed by

THE ASSOCIATED PUBLIC SAFETY  
COMMUNICATIONS OFFICERS, INC.  
New Smyrna Beach, Florida  
32069

under a grant from  
THE LAW ENFORCEMENT ASSISTANCE ADMINISTRATION

ADVISOR: \_\_\_\_\_

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V. REPORT FORMAT

1. Introduction

A. In this section you describe the general nature of the situation/ problem that caused you to write this report.

(1) In this sub-paragraph describe, as necessary, the jurisdiction/ agencies involved, with pertinent data.

(2) In this sub-paragraph describe, if necessary, any geographical considerations.

(3) Other pertinent data.

B. In this paragraph briefly mention the APCO technical assistance program, funded by the LEAA, which provides you as an advisor.

C. In this paragraph establish the credibility of the report briefly, how you went about the task, who you talked with, and any documents used as a source of reference.

2. Problem Statement

A. This section begins with a concise statement of the problem or problems as given to you by the client or, if different, what you perceive to be the real problem(s).

B. Describe the basic parts or elements of the problem you will address in obtaining a solution. Use the five aspects of public safety communications; Citizen Access, Command and Control, Interagency, Information Systems, and Technical, as they apply.

C. List or describe key outside factors, if any, that play a part in your analysis.

3. Problem Analysis (or Discussion)

A. In this section you will analyze each part or element of the problem.

Discuss the element thoroughly. Bring to play all factors that are necessary to justify your conclusions.

B. As appropriate, use the key aspects to develop your considerations.

Subordinate to these aspects are the problem categories. For example:

C. Citizen Access

- (1) Policy
- (2) Management
- (3) System Design
- (4) Training

D. Command and Control

- (1) Management
- (2) System design
- (3) Funding

E. Interagency Communications

- (1) Frequencies
- (2) Rules and Regulations

4. Conclusions

- A. Results of your reasoning
- B. Workable solution
- C. Cover each facet of the problem

5. Recommendations

Recommend course of action.

APPENDICES:

PROBLEM CATEGORY ANALYSIS SHEET

PLEASE FILL IN AS APPROPRIATE AND SUBMIT WITH REPORT

ADVISOR \_\_\_\_\_ AGENCY \_\_\_\_\_ TASK # \_\_\_\_\_  
AGENCY SIZE \_\_\_\_\_ POPULATION SERVED \_\_\_\_\_ SQUARE MILES SERVED \_\_\_\_\_  
COMM. UNIT SIZE \_\_\_\_\_ NO. MOBILES \_\_\_\_\_ PORTABLES \_\_\_\_\_ BASE \_\_\_\_\_ MobRly \_\_\_\_\_  
PUBLIC SAFETY ASPECT: CITIZEN ACCESS \_\_\_\_\_ COMMAND/CONTROL \_\_\_\_\_ INTERAGENCY \_\_\_\_\_  
SINGLE AGENCY/SINGLE SERVICE \_\_\_\_\_ MULTI-AGENCY SERVICE \_\_\_\_\_ MULTI-SERVICE AGENCY \_\_\_\_\_  
\_\_\_\_\_ CONSOLIDATED SYSTEM \_\_\_\_\_ PRIMARY RADIO: LO VHF \_\_\_\_\_ HI VHF \_\_\_\_\_ UHF \_\_\_\_\_

PROBLEM CATEGORIZATION: Problems concerning law enforcement agencies have been collected and arranged under the following major categories. (Circle appropriate item - add as necessary.)

- A. **POLICY/POLITICAL**  
Problems involving the governing body. Included here are consolidations of different services (police-fire-EMS) or different agencies.
- B. **MANAGEMENT and ADMINISTRATION**  
Problems involving departmental policies, procedures, personnel, training, resource allocation, and program planning.
- C. **PROCUREMENT**  
Problems involving procurement practices, restrictions, specifications, evaluations, source selections.
- D. **FUNDING**  
Problems involving grantsmanship, sources of funding, cooperative service contracts, long term support.
- E. **SYSTEM DESIGN and ENGINEERING**  
Problems involving communications requirements, designs, frequencies, propagation, interference and compatibility, facilities, and others.
- F. **OPERATIONS and TRAINING**  
Problems involving training, SOPs, consolidations, CAD, records, resources, work loads, system discipline, 911, security, training courses, dispatcher certification.
- G. **MAINTENANCE**  
Problems involving in-house and contract maintenance, spare parts, technician training and equipment, warranties, performance, etc.
- H. **NEW TECHNOLOGY**  
Problems involving 900 MHz, satellites, optical fiber transmission, and others which may develop.
- I. **FREQUENCIES**  
Problems involving frequency assignments, new or additional frequencies, coordination, sharing, and others.
- J. **RULES and REGULATIONS**  
Rules and Regulations primarily of the Federal Communications Commission which affect the using agency operations.

## APPENDIX D

### ADVISOR TICKLERS

This list of items, by no means complete, is intended to provide a memory jogger for the advisor during his task visit. It could be used to insure that you have covered all the items you intended and not to provide other things to write about for the sake of writing a more voluminous report.

APCO's major areas of concern as developed by Project 13 are:

citizen access;  
command and control;  
interagency communication;  
data system access;  
(purely) technical.

The following tickler items are presented under those five (5) headings with no emphasis or precedence intended.

#### CITIZEN ACCESS

Telephone	Call box
911	Walk-up
Citizens radio	Automatic number identification (ANI)
Automatic location identification (ALI)	Dial tone first (DTF)
Selective routing	Ring back
Forced disconnect	Called party hold (CPH)
Referral services	Consoles/operating position
Multichannel recorders	Instant playback recorders
Time stamps/clocks	Call cards
Computer aided dispatch	Run cards
Hazardous materials procedure	Unusual occurrence procedure
Data terminal	Keyboard
Alarm annunciator	Head sets/audio
Foot switches	Automatic call distributors
Call directors	PBX
National Emergency Aid Radio (NEAR)	PABX

COMMAND and CONTROL

Dispatcher consoles	Hospital Emergency Administrative Radio (HEAR)
Computer aided dispatch (CAD)	Local government services
Automatic vehicle locator (AVL)	Antenna systems
Geocoding	Standby power system
Radio system	Multi-channel logging recorders
Frequencies-lo and hi VHF, UHF, 860 MHz bands	
Base stations	Reverse directory
Mobile relay	Run cards
Mobile repeaters	Maps
Mobile units	Protocols and procedures manual (SOPs)
Personal portables	Directories
Satellite receivers/voting system	Repair service
Comparator/selector	Closed Circuit Television (CCTV)
Continuous Tone Coded Squelch (CTCSS)	Title 28
Mobile data terminals (MDTs)	Physical security
Patching/cross patching	Transmission security
Secure voice	Criminal code
Microwave	Local wants/warrants
Paging system	Traffic control
National Law Enforcement Emergency Channel (NLEEC)	
Air/ground channels	Street department (road)
Search and Rescue (SAR)	DC control lines
Emergency service channels	RTOCs
Emergency medical channels	Foreign exchange
Simulcast	FIR cards
	NAWAS

INTERAGENCY COMMUNICATION

Hot lines	Directory
National Law Enforcement Emergency Channel (NLEEC)	
Mutual aid system	Cross patching
Fire agencies	Ambulance service
Towing service	AAA hotline
Utility companies	Railroad company
Referral directory	Federal Bureau of Investigation (FBI)
State agencies - emergency services	Adjacent agencies
Maps	Civil Air Patrol (CAP)
Court calendar	Coroner/medical examiner
District Attorney	National Guard
Crime lab	Bomb squad
Fire Marshal/arson investigators	Flood control
Secret service	Coast Guard
Weather service (NOAA)	Bureau of Alcohol, Tobacco, Firearms (BATF)
Emergency housing	Animal control
Psychiatric help	Drug help
Red Cross	Salvation Army
Church groups	Federal Disaster Agency (FDA)
Environmental Protection Agency (EPA)	Nuclear Regulatory Commission (NRC)
Federal Aviation Authority (FAA)	National River Forecast Center
Federal Emergency Management Administration (FEMA)	

DATA SYSTEMS ACCESS

Criminal justice files  
National Crime Information Center (NCIC)  
National Auto Theft Bureau (NATB)

Department of Motor Vehicles (DMV)  
Wants/warrants

TECHNICAL

Antennas  
  down-tilt  
  omni  
  
Feed line (coaxial cable)  
  cavities  
  duplexers  
  diplexers  
  ferrite combiners

Time domain reflectometry (pulse testing (TDR)  
  SINADER  
  main frame  
  propagation  
  noise level  
  intermodulation  
  co-channel  
  adjacent channel  
  crystal filters  
  vehicular chargers  
  F3-Y  
  deviation meter  
  spectrum analyzer  
  MODEM

## GLOSSARY OF TERMS

BOILER PLATE	The special conditions containing the clauses mandated by legislative action which are applied to all procurements by the agency governing body.
BLOCK ALLOCATION	Frequencies for police radio systems are grouped consecutively into blocks of frequencies in the low, high and ultra high frequency bands. Other users have similar block allocations.
CABLE PLANT	A telephone industry term used to denote all of the hardwire distribution circuits. All of the wire and cable facilities used in interconnect elements of the telecommunications system.
CAD	Computer aided dispatching.
CHANNEL	A term generally used to describe a single frequency or frequency pair, licensable by the FCC and used for transmitting and receiving a voice radio signal. The term is sometimes loosely used to describe a frequency(ies). (In realty, it consists of many discrete frequencies.)
CHANNEL CONTENTION	is the action where two or more radio units are attempting to gain access to the channel simultaneously. The FM radio system will normally recognize the unit with the strongest signal and "lose" the contender.
CCH	Computerized Criminal History information. Generally maintained at state and national levels by the NCIC. This information is protected from other than law enforcement use by Title 28 of the U.S. Code.
COMMUNICATOR	Term used to describe those dedicated personnel and functions associated with a communications center or dispatch center. It includes operators, supervisors, complaint operators and dispatchers.
COVERAGE	Used to denote the ability of a radio transmitter and a receiver to establish communications over a geographical area. The ability of a base station to reach a patrol unit and the ability of the unit to reach the base station in support of the act of communication. It is very difficult to obtain 100% coverage of an area due to technical peculiarities, and coverage is usually paired with the term "reliability".
CTCSS	Continuous tone coded squelch system. A system used to reduce the nuisance interference received from a co-channel user. Each

systems receivers are set for a unique tone -- City A - Tone A; City B - Tone B. A-system receivers pass any signal containing Tone A, etc.

#### DATA BURST

A brief, automatic transmission of digitally encoded information, usually transmitted by an equipped unit, in 1/4 to 1/2 second (250-500 milliseconds) at the beginning of each transmission. This data burst can cause the first second of the voice message to be lost.

#### DIGITAL STATUS

A method of transmitting information in digital form from a field unit to the dispatch center by means of a data burst. This information, usually relating to unit status, i.e., in service, out of service, message received, etc., is automatically processed in the center and presented to the dispatcher/communicator. These systems are used to reduce transmission time and improve communications system management.

#### FCC

The Federal Communications Commission is charged with administering the provisions of the Communications Act of 1934. The FCC is responsible for all "non-government" users (all the non-federal government users). Federal needs are met by the Interdepartment Radio Advisory Committee of which the FCC is a member.

#### IFB

Invitation for Bid. A solicitation of suppliers to provide a well-specified item which requires only a dollar amount bid response from the bidder.

#### NCIC

National Crime Information Center maintains information on crimes, computerized criminal histories, and similar data necessary to law enforcement.

#### 911

pertains to a single emergency telephone number for access to the public safety services in a community, region, and ultimately nationwide.

#### NON-IONIZING RADIATION

Used to describe all radiations which do not ionize matter. Ionizing radiation is developed by x-rays and nuclear devices. Radio waves, light waves, and electric power lines may produce non-ionizing radiation. The effects of these radiations on the human body have not been fully determined.

#### RADIO SERVICES

A FCC classification of users which categorizes the public safety service users as police, fire, local government, highway maintenance and forestry/conservation. These categories are further defined and assigned blocks of frequencies, eligibility and other criteria. All of these classes come under the broad FCC term of "non-government". They are administered under Part 90 of the Rules

and Regulations by the FCC Private Land Mobile Radio Service along with others such as the Special Emergency, Industrial, Land Transportation, and Radio Location Service.

RELIABILITY

A term often associated with radio coverage and used to denote the dependability of a radio signal. A 90% reliability would indicate that 9 times of 10 tries a radio signal would find its target receiver. Radio coverage maps usually contain reliability contours indicating the varying degrees of reliability expected across the area of interest.

RFP

Request for Proposal.

SCRAMBLERS

Scramblers, as used in this report, are all of the devices and techniques used to obtain a degree of voice privacy or transmission security. The term includes devices using digital techniques.

TELCO

Telephone company.

VEHICULAR REPEATER

A radio receiver associated with a mobile transmitter used to extend the range of a low power or portable by re-broadcasting or repeating the low power signal through the mobile's higher power transmitter.

VOTING or SATELLITE  
RECEIVER SYSTEM

A network of receivers spread through an area to improve the capability of a low power portable or mobile to reach a dispatcher or be re-broadcast. A number of these satellite receivers are tied to a voting selector, usually by wire line circuits. At the voter, all of the received signals are compared and the best one is selected for passing on to the dispatcher or for other uses. The selection process is very rapid but may cause initial portions of the transmission to be lost.

**END**