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LEAA Police Equipment Survey of 1972, Volume II

Communications Equipment and Supplies

Law Enforcement
Equipment
Technology

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LEAA Police Equipment Survey of 1972, Volume II

Communications Equipment and Supplies

by
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FOREWORD

The Law Enforcement Standards Laboratory (LESL) of the National Bureau of Standards (NBS) furnishes technical support to the National Institute of Law Enforcement and Criminal Justice (NILECJ) program to strengthen law enforcement and criminal justice in the United States. LESL's function is to conduct research that will assist law enforcement and criminal justice agencies in the selection and procurement of quality equipment.

LESL is: (1) Subjecting existing equipment to laboratory testing and evaluation and (2) conducting research leading to the development of several series of documents, including national voluntary equipment standards, user guidelines, state-of-the-art surveys and other reports.

This document is a law enforcement equipment report developed by LESL under the sponsorship of NILECJ. Additional reports as well as other documents are being issued under the LESL program in the areas of protective equipment, communications equipment, security systems, weapons, emergency equipment, investigative aids, vehicles and clothing.

Technical comments and suggestions concerning the subject matter of this report are invited from all interested parties. Comments should be addressed to the Law Enforcement Standards Laboratory, National Bureau of Standards, Washington, D.C. 20234.

Jacob J. Diamond, *Chief*
Law Enforcement Standards
Laboratory

EXECUTIVE SUMMARY

I. SUMMARY OF BACKGROUND AND METHODOLOGY

A. Background

° Law Enforcement Standards Laboratory (LESL) was established in 1971 under the sponsorship of the NILECJ Advanced Technology Division (ATD).

° NILECJ asked the Behavioral Sciences Group of the National Bureau of Standards to develop and carry out a procedure to get information from the users of law enforcement equipment.

° "User" information would aid NILECJ in setting priorities for LESL programs and would provide some detailed information in support of the research to develop standards and guidelines.

° In addition, gathering information from the users would help to make police agencies aware of LESL and ATD.

° A nationwide mail sample survey was selected as the best procedure to collect user information.

° An Equipment Priorities Questionnaire (EPQ) and six Detailed Questionnaires (DQs) were developed and administered. A separate report was prepared for each of these seven questionnaires.

B. Design of Questionnaires

° Questionnaires were developed in conjunction with NILECJ, LESL, and cooperating police departments. Questionnaires were pretested at various times with approximately 45 police departments.

° The EPQ was designed to provide information about priority needs for standards for various types of equipment.

° In addition, the EPQ asked for data about numbers of full- and part-time officers, activities performed in the department, budget, size of jurisdiction, etc.

° The six DQs (Alarms, Security and Surveillance Equipment; Communications Equipment and Supplies; Handguns and Handgun Ammunition; Sirens and Emergency Warning Lights; Body Armor and Confiscated Weapons; and Patrol Cars) were each developed separately.

° The DQs asked about kinds and quantities of equipment in use, problems with existing equipment, suggestions for improving equipment, needs for standards related to the equipment, etc. Although entitled Detailed Questionnaires, these questionnaires were designed to give an overview of the use of specific items of equipment.

C. Sample

° The population sampled was made up of all police departments listed in a computerized file and maintained by the LEAA Statistical Service.

° Courts, correctional institutions, forensic labs, special police agencies, etc., were excluded.

° The sample was stratified by LEAA geographic region (10 regions) and by department type (7 department types: state police; county police and sheriffs; city departments with 1-9 officers; city departments with 10-49 officers; city departments with 50 or more officers, excluding the 50 largest cities; the 50 largest U.S. cities by population; and township departments).

° Overall, approximately 10 percent of the 12,836 departments in the population were selected as respondents (see table 1.2-2).

° The Equipment Priorities Questionnaire was sent to every sample department (1,386). Each Detailed Questionnaire was sent to all states, to all of the 50 largest cities, and to a randomly selected subsample of the main sample (about 530 departments received each DQ).

° Thus, states and the 50 largest cities were asked to fill in all 7 questionnaires. Each of the remaining 1,286 departments was asked to fill in the EPQ and 2 of the DQs.

° The sample for the Communications DQ consisted of 528 departments (see table 1.2-3).

D. Questionnaire Administration

° Stringent control of administration was required.

° Introductory letters were sent to heads of departments asking cooperation.

° On June 1, 1972, questionnaire packages were mailed.

° In July 1972, follow-up by self-return post card was begun.

° In August 1972, follow-up by telephone was begun. Departments which had not returned questionnaires were called. Also, calls were made to clear up ambiguities in the returned questionnaires. About 1,300 calls were made. About 70 percent of the sample departments were called at least once.

° Each questionnaire was edited and coded by a specialized team to ensure consistency; it was then keypunched and tabulated.

° Completed questionnaires were accepted for tabulation through January 7, 1973.

E. Rates of Return

° Eighty-three percent of the 1,386 departments returned usable EPQs.

° Eighty-one percent of the 528 departments returned usable Communications DQs.

° Between 81 and 85 percent of the other DQ subsamples returned usable questionnaires.

° Highest rates of return (over 90%) were from states, the 50 largest cities, and cities with 50 or more officers.

° Lowest rates of return were from counties and townships (less than 75%).

F. Characteristics of Responding Departments

° The activities most commonly carried out by the respondents (to the EPQ) were serving traffic and criminal warrants (88%), traffic safety and traffic control (87%), and intradepartmental communications (87%).

° All of the responding 50 largest cities said they provided inhouse training and criminal investigations. This compared to 68 percent and 86 percent, respectively, of all responding departments.

° Only 13 percent of all respondents had crime laboratories. Seventy-three percent of the 50 largest cities and 55 percent of the states had crime laboratories.

° About three-fifths of the departments in all department types were providing emergency aid and rescue, ranging from 60 percent of the cities with 50 or more officers to 67 percent of the counties.

° Overall, the reported equipment budgets represented somewhat over 10 percent of the total budgets reported.

° Among department types, there was a wide range of total equipment expenditures, from a mean of about $10,000 for cities with 1-9 officers to a mean of almost $2.7 million for the 50 largest cities.

° One of the 50 largest cities reported an equipment budget of $40 million.

° Overall, the 50 largest cities reported a mean of 2,491 full-time sworn officers. However, 1 of the 50 largest cities had 27 percent of all the full-time officers reported by that department type and another had about 12 percent.

G. Presentation of Data

° Data in this report are presented in two forms: text tables and full tables (app. B). Text tables do not always present a complete breakdown of the data.

° All tables (text and full) present the data in unweighted form (i.e., numbers and percentages of the responding departments from the sample for this questionnaire, not figures that have been weighted to expand the data to the total population of police departments in the U.S.).

° The sample selected for this questionnaire was not proportional to the total population of police departments. If decisions are to be made which require estimates of population figures, the appropriate extrapolation must be performed. (See app. B, p. B-1.)

II. SUMMARY OF RESULTS

A. Car Radios

° A total of 67,807 car radios were reported by the 428 respondents.

° About nine-tenths of the car radios reported were in state and 50 largest city departments.

° About two-thirds of the car radios were bought within the last 5 years.

° Three-fourths of the car radios reported cost less than $1,001.

° Almost 6 out of every 10 car radios were made by 1 manufacturer.

B. Portable Radios

° A total of 22,660 portable radios were reported by the 347 respondents which were using portable radios.

° Almost three-fourths of the portable radios reported were in the 50 largest cities.

° More than four-fifths of these radios were bought within the last 5 years.

° Slightly more than three-fourths of the portable radios cost less than $901.

° About 7 out of every 10 were made by 1 manufacturer.

° About seven-tenths of them weighed between 1-1/4 and 2-1/2 pounds.

° Nickel-Cadmium batteries were used in about seven-tenths of them.

° Ninety percent of the departments used rechargeable batteries in their portables.

C. Channels and Frequencies

° An average of 3.5 channels per department was authorized to responding departments.

° An average of 3.2 channels per department was currently in use.

° About one-half of the reported channels was being used by the 50 largest cities and state police.

D. Fixed Repeaters

° About one-third of the departments used fixed repeaters.

° About nine-tenths of the departments with fixed repeaters were state or 50 largest cities departments.

E. Scramblers

° Scramblers were currently being used by only 9 percent (n=40) of the respondents.

° Of departments which did not have a scrambler system, almost 60 percent felt they needed that system.

° Departments most commonly used (or would use) scramblers for undercover investigations and long term stakeouts.

° More than four-fifths of the departments which had or said they needed scramblers, said they would be willing to pay no more than $500 for a reliable scrambler.

F. Need for Other Communications Equipment

° About one-third of the departments expressed a need for helmets with built-in communications. This need was most often expressed by state police and departments in the 50 largest cities.

° Slightly more than two-fifths of the respondents indicated a need for mobile repeaters.

° Twenty-eight percent of the departments favored the voting system; over half of the departments were unfamiliar with this system.

G. Need for Standards for Communications Equipment

° The three items most commonly chosen as needing standards were mobile radios, portable radios, and batteries.

° State police and larger city departments chose more items as needing standards than did other department types.

° Gains expected from standardization were more often expected to come from interchangeability of equipment than from either savings in training costs or savings in equipment costs.

H. Most Critical Communications Needs

° The four most critical communications needs of the respondents were for new equipment, more frequencies, personal transceivers for each officer, and standardization of all equipment.

° Personal transceivers for all officers was the most critical need of larger city departments.

° New equipment was the greatest need of small city departments and counties.

° More channels was the greatest need of state police.

LEAA POLICE EQUIPMENT SURVEY OF 1972

Volume II: Communications Equipment and Supplies

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The report outlines the methodology of and summarizes a portion of the data from the LEAA Police Equipment Survey of 1972. One of a series of 7 reports resulting from this nationwide mail survey of a stratified random sample of police departments, the present report summarizes the answers of 428 police departments concerning their communications equipment and supplies: Use of mobile radios and portable radios; power supplies for portable radios; scramblers; portable/mobile radios; helmets with built-in communications; and needs for standards and problems associated with communications equipment and supplies. The data are presented by all responding departments and by seven department types.

Key words: Communications; mobile radio; police; police equipment; portable radio; standards.

1. INTRODUCTION

1.1. Project Background

During the past several years, law enforcement agencies in the United States have become more aware of the importance of equipment in the performance of their duties. Much of their equipment had originally been designed for other uses and had to be modified. Other equipment items had to be used as given. No standards existed against which equipment performance could be measured nor were any standard test methods or procedures available. It has been difficult for agencies to compare the performance of equipment items. Recognizing this problem, the Law Enforcement Assistance Administration (LEAA) of the Department of Justice began a concentrated program in 1971, toward the improvement of law enforcement equipment.

As the first step in its program, LEAA in cooperation with the Department of Commerce established a Law Enforcement Standards Laboratory (LESL) at the National Bureau of Standards (NBS). The broad goal of LESL is to prepare performance standards which can be promulgated by LEAA as voluntary aids for the selection of equipment by law enforcement agencies. Additionally, LESL is developing standard test methods and procedures, so that the relative performance of similar items may be evaluated by departments themselves.

In order to provide equipment user information for the program, in 1971 the National Institute of Law Enforcement and Criminal Justice (NILECJ) of LEAA asked the Behavioral Science Group of the Technical Analysis Division at NBS to gather information from the users of law enforcement equipment about their specialized equipment needs and problems. Although face-to-face interviews with a large sample of representatives from law enforcement agencies would have been desirable, time and manpower constraints led to the development of a nationwide mail sample survey having two general objectives: (1) To assist NILECJ in the establishment of priorities for LESL's standards development activities; and (2) to obtain detailed information about certain broad equipment categories in support of the research to develop standards and guidelines in these areas.

This report fulfills part of the second general objective and the associated survey questionnaire (see app. A) will be referred to as the Communications Detailed Questionnaire (DQ). The remainder of the second objective is accomplished in the reports of the other five DQs: Alarms, Security and Surveillance Systems; Handguns

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and Handgun Ammunition; Sirens and Emergency Warning Lights; Body Armor and Confiscated Weapons; and Patrol Cars. The first general objective (above) is accomplished in the report on the Equipment Priorities Questionnaire (EPQ).[1]

1.2. Sample Design

Although the objective of ATD is to serve all types of law enforcement agencies, this particular study was purposefully limited to police departments as the largest single group of law enforcement agencies with identifiable equipment needs. No attempt was made to survey correctional institutions, courts, forensic laboratories, or special police agencies such as park police, harbor patrols, or university police. The computerized directory of approximately 14,000 police agencies, compiled and maintained by LEAA's Statistics Division, provided the population from which the sample was drawn. Care was taken to exclude the double listings that existed for some agencies. (Details of the selection process are given in app. B of the Equipment Priorities Questionnaire.)

The final list of 12,842 departments was cross-stratified by LEAA geographic region and department type by the mutual agreement of NBS and NILECJ. The assignment of states to regions and the seven department types chosen for study are shown in table 1.2-1.

The breakdown of the population of police departments by cross-strata is exhibited in table 1.2-2. As can be seen from the table, there were no townships in regions 4, 6, 7, 8, 9, 10. Almost 63 percent of the departments were city police, 43 percent having 1-9 full-time officers. County departments comprised about 24 percent of the population. By region, the smallest (region 10) contained only 3.4 percent of the police departments, while region 5, the largest, had 22.5 percent. The variation in the number of departments in a cell (region/department type combination) was even greater than that across the strata, i.e., the number of departments in each cell ranged from 0 to 1,470.

The considerations discussed in the previous paragraph led to the sampling plan discussed briefly below. All of the state departments and the 50 largest city departments were included in the sample and were asked to complete all 6 DQs, i.e., they were sent the entire package of 7 questionnaires. For the remaining cells the variation in cell size presented a problem: If the same fraction of the entire population was to be selected from the members of each cell, a constant sampling fraction small enough to make the total sample manageable would yield too few sample units in small cells. To solve this problem, a fixed sample of 30 police departments/cell was chosen, wherever possible, resulting in a different sampling fraction for each cell. A fixed sample size of 30 departments/cell was chosen to facilitate the equitable distribution of the 6 DQs. This plan resulted in sending the Communications DQ to 528 departments.

The departments were selected randomly within each cell, from the total cell population, each department (other than the states and 50 largest cities) receiving 2 DQs. Thus, in cells having 30 sample units, the Communications DQ was mailed to 10 departments; cells having fewer sample units were allocated proportionally fewer Communications DQs. Table 1.2-3 presents the total sample for the Communications DQ by region and department type.

Once the sample was selected, each sample unit was assigned a unique seven-digit identification number, coding region, type, and questionnaire assignment.

[1] LEAA Police Equipment Survey of 1972, Vol. I: The Need for Standards—Priorities for Police Equipment.

TABLE 1.2-1. *Stratification categories*

Department types	LEAA geographic region
State police	1 = Conn., Maine, Mass., N.H., R.I., Vt.
County police and sheriffs	2 = N.J., N.Y.
City with 1-9 officers	3 = Del., Md., Pa., Va., W. Va., D.C.
City with 10-49 officers	4 = Ala., Fla., Ga., Ky., Miss., N.C., S.C., Tenn.
City with 50 or more officers[1]	5 = Ill., Ind., Mich., Ohio, Wis., Minn.
The 50 largest U.S. cities[2]	6 = Ark., La., N. Mex., Okla., Tex.
Township departments	7 = Iowa, Kans., Mo., Nebr.
	8 = Colo., Mont., N. Dak., S. Dak., Utah, Wyo.
	9 = Ariz., Calif., Nev., Hawaii
	10 = Alaska, Idaho, Oreg., Wash.

[1]Does not include the 50 largest cities.
[2]By population, U.S. 1970 census.

TABLE 1.2-2. *Number of police departments by region and type*

	LEAA region										
Department type	1	2	3	4	5	6	7	8	9	10	Total
State	6	2	5	8	6	5	4	6	4	4	50[1]
County	66	84	257	764	536	506	413	288	103	120	3,137
City (1-9 officers)	27	348	713	979	1,470	703	611	283	135	217	5,486
City (10-49 officers)	40	237	166	344	508	230	142	71	168	79	1,985
City (50 or more officers)	60	64	36	83	119	46	23	19	87	17	554
50 largest cities	1	4	5	8	10	8	3	1	8	2	50
Township	629	349	362	-	234	-	-	-	-	-	1,574
Total	829	1,088	1,544	2,186	2,883	1,498	1,196	668	505	439	12,836

[1]Questionnaires were actually sent to 56 state police departments since there were 6 state departments which listed 2 police agencies without reference to a common central agency. However, only one set of questionnaires was accepted from each of these six agencies as described in vol. I, app. B, p. B-2.

TABLE 1.2-3. *Number in sample of departments selected to receive the detailed questionnaire: Communications—by region and department type*

	LEAA geographic region										
Department type	1	2	3	4	5	6	7	8	9	10	Total
State[1]	6	2	5	8	6	5	4	6	4	4	50
County	10	10	10	10	10	10	10	10	10	10	100
City 1-9 officers	9	10	10	10	10	10	10	10	10	10	99
City 10-49 officers	10	10	10	10	10	10	10	10	10	10	100
City 50+ officers	10	10	10	10	10	10	8	6	10	5	89
50 largest cities	1	4	5	8	10	8	3	1	8	2	50
Townships[2]	10	10	10	-	10	-	-	-	-	-	40
Total	56	56	60	56	66	53	45	43	52	41	528

[1]Questionnaires were actually sent to 56 state police departments since there were 6 state departments which listed 2 police agencies without reference to a common central agency. However, only one set of questionnaires was accepted from each of these six agencies.
[2]Township departments exist only in regions 1, 2, 3, and 5.

1.3. Questionnaire Administration

From the beginning of the project, it was evident that stringent control would be required in administering the questionnaires to ensure a high rate of response. Computer-stored daily status records were input via a teletypewriter for each sample department. In general, the following procedure was used:

(1) Each department in the sample was mailed a letter, signed by the director of NILECJ, addressed to the head of the department. This letter introduced the survey and requested cooperation.

(2) About 1 week later, the questionnaire packages were mailed.

(3) Departments not returning the questionnaires within a month were identified by the computer and were sent a self-return post card requesting information as to the status of the questionnaires. Departments not receiving the questionnaire package were sent another; those not returning the post card were placed on a list for telephone follow-up.

(4) About a month and a half later, departments with which no contact had been made were called by telephone.

(5) Returned questionnaires were reviewed for completeness and either coded for keypunching or filed for telephone callback to supply missing data or to resolve ambiguities.

Considerable effort was expended to ensure a high rate of response, and this effort was rewarded with an 80 percent response for the Communications DQ, and between 80 percent and 85 percent for each of the other questionnaires. In the course of the survey more than 70 percent of the sample departments were contacted at least once by telephone. More than 1,300 phone calls were made by the survey team.

The distribution of respondents (departments which returned usable Communications DQs) is exhibited in table 1.3-1. The highest percentages of response were from the states and larger cities (89-94%), while counties and townships had the poorest response rates (under 70%).

TABLE 1.3-1. *Number of sample of departments returning acceptable detailed questionnaires: Communications*

	LEAA geographic region											
Department type	1	2	3	4	5	6	7	8	9	10	Total	Percent total sample
State[1]	6	2	5	8	6	5	3	6	3	3	47	94
County	5	7	5	7	8	6	8	6	10	7	69	69
City 1-9 officers	6	8	8	9	9	10	7	5	9	7	78	79
City 10-49 officers	7	9	9	6	10	8	8	10	9	10	86	86
City 50+ officers	8	9	10	10	7	9	7	5	9	5	79	89
50 largest cities	1	3	4	7	9	8	3	1	8	2	46	92
Townships[2]	8	8	5	-	2	-	-	-	-	-	23	58
Total	41	46	46	47	51	46	36	33	48	34	428	80
Percent total sample	73	82	77	84	77	87	80	77	92	83	81	

[1]Questionnaires were actually sent to 56 state departments since there were 6 state departments which listed 2 police agencies without reference to a common central agency. However, only one set of questionnaires was accepted from each of these six agencies.

[2]Township departments exist only in regions 1, 2, 3, and 5.

1.4. Development and Design of the Communications DQ

The survey plan and questionnaire design (of all seven questionnaires) evolved over a 12-month period. During this time, the survey team consulted at length with NILECJ equipment experts, LESL program managers, and equipment manufacturers. In addition, the officers and administrators of about 40 police departments served as consultants and/or as respondents for pretests of various versions of the questionnaires.

The Communications DQ, in its final form, is reproduced in appendix A. This DQ asked respondents to provide data about car radios and portable radios in use in their departments; to answer questions about the power supplies used in portable radios; to provide information about other kinds of communications equipment such as scramblers, helmets with built-in communications and portable/mobile radios; to indicate the need for standards for various kinds of communications equipment and to discuss problems with communications equipment. The questionnaire was limited to general topics because: (1) It was not possible, considering the scope of the present survey, to explore in a detailed manner all of the many facets of the various communications systems in use in police departments throughout the United States, and (2) it was felt that the general data gathered in the present effort would provide important direction for research in the development of standards, the main objective of the survey.

1.5. Characteristics of Subsample Groups

The EPQ of the LEAA Police Equipment Survey requested data from each department about population served, physical size of jurisdiction served, type of jurisdiction, number of full- and part-time officers, approximate total, equipment, and personnel budgets during 1971, and activities handled by the department.

Table 1.5-1 presents a partial tabulation, by department type, of the responses to a checklist of 30 typical police activities by the respondents to the EPQ. (The EPQ respondents include, but are not limited to, the respondents to the Communications DQ. See sec. 1.2.) The activities most frequently checked by all departments were: (1) Serve traffic and criminal warrants (88%), (2) traffic safety and traffic control (87%), and (3) communications for own department (87%). The activity with the most consistent level across all department types was that of emergency aid and rescue, ranging from 60 percent (cities with 50+ officers) to 67 percent (counties).

Higher percentages of state and 50 largest city departments than of other department types were handling certain of the 30 activities. For example, all of the 50 largest city departments responding, and 98 percent of the responding state departments said that their departments provided police training for their own department. These compare to 68 percent for all responding departments. All of the responding 50 largest cities said that they handled criminal investigation in their own departments. This compares to 86 percent of the total sample of departments. Although only 13 percent of the departments overall had crime laboratories, 73 percent of the 50 largest cities and 55 percent of the states had them.

Counties appeared to be the only department type with significant responsibilities for custody and detention for more than 1 week. Seventy-eight percent of those departments had custody/detention up to 1 year, as compared with 22 percent of all responding departments.

Tables 1.5-2 and 1.5-3 present summaries of descriptive data by department type and LEAA region, respectively. As can be seen from the column for "Annual equipment budget" (table 1.5-2), there was a wide range of expenditures among different department types: from a mean of about $10,000 for cities (1-9) to almost $2.7 million for the 50 largest cities. Overall, equipment budgets represented somewhat over 10 percent of the annual total budgets.

TABLE 1.5-1. *Activities handled by at least one-third of the departments by department type, and percent of total departments having each activity*

Description of activity	State	County	City 1-9	City 10-49 (in %)	City 50+	50 largest	Township	Total
Serve traffic and criminal warrants	70	89	84	89	94	87	93	88
Traffic safety and traffic control	92	56	94	96	96	98	94	87
Communications for own department	94	86	76	95	94	96	70	87
Criminal investigation	66	86	71	95	97	100	79	86
Police training for own department	98	55	48	77	87	100	42	68
Custody/detention—less than 1 day	-	79	51	73	72	80	43	65
Breath-alcohol test	89	46	47	72	83	91	49	64
Emergency aid and rescue	62	67	62	63	60	67	62	63
Public building protection	-	40	63	60	58	44	68	54
Service function	-	-	48	55	60	60	42	48
Animal control (dogcatcher)	-	-	58	63	42	-	37	44
Highway patrol	96	38	48	36	-	-	88	43
Maintenance of police buildings	51	36	34	41	48	47		40
Custody/detention—1 week or less	-	73		36	46	49		38
Communications for other agency	66	56		40	-	-		36
Serve civil process	-	88			-	-		32
Police training for other agency	77	-			42	84		24
Custody/detention—up to 1 year	-	78			-	-		22
Underwater recovery	34	42			-	42		19
Bomb disposal	45				-	82		17
Polygraph	62				36	90		17
Vehicle inspection	55					-		17
Crime laboratory	55					73		13
Narcotics laboratory analysis	43					62		11
Harbor patrol	-					-		7
Lab analysis for blood alcohol	34					53		7
Other	-							6
Coroner	-							5
Test for driver's license	34							3
Custody/detention—more than 1 year								3

TABLE 1.5-2. *Descriptive data by department type (means)*

Department type	Area (mi^2)	Population	Number of full-time officers	Number of part-time officers	Annual total budget	Annual equipment budget	Annual personnel budget
50 largest	187	851,342	2,491	1,115	$43,268,865	$2,669,990	$34,712,818
State	62,580	3,936,410	889	18	16,377,358	2,304,339	[illegible],020,572
County	1,518	130,254	60	25	1,089,919	58,539	859,984
City (50+)	31	83,334	132	26	1,733,340	173,099	1,407,177
City (10-49)	12	15,849	22	9	257,927	24,362	206,187
Township	28	13,228	14	8	175,654	20,854	141,675
City (1-9)	9	5,038	8	5	82,381	9,764	60,061

TABLE 1.5-3. *Descriptive data by LEAA region (means)*

LEAA region	Area (mi^2)	Population	Number of full-time officers	Number of part-time officers	Annual total budget	Annual equipment budget	Annual personnel budget
1	750	158,112	96	18	$1,360,155	$135,130	$ 979,911
2	648	240,781	365	97	7,148,315	148,172	5,265,546
3	1,096	245,733	216	7	3,412,567	435,153	2,879,293
4	3,691	340,996	151	11	2,318,382	248,600	1,767,292
5	2,652	448,174	288	8	4,916,607	431,478	3,879,374
6	5,738	271,386	160	17	2,193,823	160,363	1,709,910
7	2,379	112,094	84	9	1,220,385	121,001	983,696
8	6,346	83,023	54	9	728,549	77,081	568,463
9	4,218	372,094	281	46	5,743,553	728,801	4,528,692
10	3,580	104,877	69	9	1,253,894	82,198	1,011,604

The mean number of part-time officers was based on those respondents having part-time officers in their departments. Of the 45 responding from the 50 largest cities, only 6 had part-time officers, including 1 city which had nearly 6,000. Thus, the mean value of 1,115 for this department type is somewhat misleading. It should be noted that the category part-time officers included officers described as auxiliary, volunteer, reserve, school-crossing guard, dispatcher, summer, special agent, traffic supervisor, posse, and cadet. All of these classifications were counted in the part-time officer category since it has different meanings for different departments.

Variations in these descriptive averages by LEAA region (table 1.5-3) were considerably smaller than variations by department type. Regions 1 and 8 had smaller budgets than the others, primarily because each had only 1 of the 50 largest cities.

2. QUESTION BY QUESTION DISCUSSION

2.1. Advice to the Reader

In reading section 2, certain points should be kept in mind:

(1) This report is not an evaluation of any of the equipment described or discussed within it. It is a presentation of information and opinions of a stratified random sample of police departments given in response to a specific set of questions. It does not, in any way, reflect objective testing of any equipment by the National Bureau of Standards.

(2) The report reflects only what police departments were willing and able to say in response to a specific set of questions. In most cases, no attempt was made to verify the accuracy of the information given or the level of sophistication of the respondent.

(3) Each discussion begins with the presentation of the question that appeared in the questionnaire, and in most cases the choices supplied, if any, set off in bold face type. However, the reader is cautioned to become familiar with the questionnaire sent to sample departments (see app. A) and to evaluate the data in terms of the exact questions asked.

(4) The text tables that appear in section 2 are almost never the complete tables that were tabulated for that question. Data categories for text tables may have been collapsed from the full table, or certain categories of interest may have been singled out for fuller discussion. Appendix B contains the complete tables from which the text

tables were extracted. Text tables have been numbered after the question number (e.g., the text tables for question 6A would be numbered 6A-1, 6A-2, etc.) The tables in appendix B are also numbered the same as question number, in the same manner. In some cases, tables that appear in appendix B will not have been discussed at all in the text.

(5) Data in the text of this report are usually presented by nearest whole percent of the group under consideration. In appendix B, the data are usually presented by number of respondents and percent. Because of statistical limitations imposed by the sample sizes used in this study, the reader is cautioned to be wary of assigning importance to percentage differences of less than 5 percent when percentages are based on the total number of respondents, and to percentage differences of less than 10 percent when percentages are based on one of the subsample groups (e.g., a particular department type or region). No statistical tests of significance are reported.

(6) Data were always tabulated by each of the choices supplied, if any, in the questionnaire. Any "other" choices written in by the respondents were also tabulated and/or recorded verbatim. In most cases, the numbers of respondents giving a specific "other" response do not reflect the numbers of respondents who might have marked that choice if it had been one of those provided. Therefore, in most cases, this report lists or gives examples of "other" responses, but does not present numbers or percents of departments giving that response. For those questions for which choices were not provided in the questionnaire, coding categories were developed after approximately one-fourth of the questionnaires had been returned.

(7) The following convention has been adopted in the report to designate the four city department types:

City with 1-9 officers = city (1-9)
City with 10-49 officers = city (10-49)
City with 50 or more officers = city (50+)[2]
The 50 largest cities = 50 largest[3]

In table headings this same convention has been used except that the parentheses have been removed.

(8) Questions which asked departments to identify manufacturers of their equipment were asked in this manner only to make the question clearer; not to evaluate a manufacturer's product.

(9) In an attempt to make this report more readable, the main topics of the questionnaire have been reordered in the report; the discussion of the findings does not follow the order of the questions. To find the discussion of a particular question quickly, consult the Contents or the List of Tables.

(10) When the subsample groups are discussed (e.g., "counties said..." or "cities (1-9) said...") the reference is to the responding departments from one of the sample strata. It is particularly important to note that when the text or tables refer to "all departments" or "all responding departments," the reference is to all responding departments from the sample described in section 1.2. This sample was not proportional to the total population of police departments, and although it is possible to do so, the data in this report have not been weighted to allow direct extrapolation to the total population. (See app. B, p. B-1.)

[2]Excluding the 50 largest U.S. cities.

[3]By population, 1970 U.S. Census.

2.2. Discussion

2.2.1. Characteristics of Respondents

a. Rank/Title of Respondents

All of the questionnaires in the LEAA Police Equipment Survey were mailed to the chief (or highest official) of the department with a request that the questionnaires be directed to the person or persons within the department who were felt to be best qualified to answer the questions.

The communications questionnaire was usually filled in by the chief/unit head in smaller city departments and townships and by a communications specialist in states and the 50 largest cities. (See table i.)

In cities (50+) about one-fourth (28%) of the primary respondents were communications specialists and one-fifth (20%) were either chiefs or assistant chiefs. Questionnaires from counties were most often filled in by the sheriff.

TABLE i. *Rank of primary respondent for communications questionnaire, by department type*[1]

Rank/Title	Department type (in %) City 1-9	City 10-49	City 50+	50 largest	State	Township
Chief	73	42	14	4	0	52
Assistant chief	3	9	6	0	0	0
Communications specialist	0	2	28	67	77	4

[1]Excluding counties.

b. Number of Years of Law Enforcement Experience of Respondent

In general, the questionnaire was filled in by experienced officers. About three-fourths of the respondents had more than 5 years of experience. Although a majority of the respondents had more than 10 years of experience in law enforcement, there were variations among department types. More than 70 percent of the respondents in the states and 50 largest cities had this much experience, while less than half of the respondents in counties, cities (1-9), and townships had more than 10 years in law enforcement work. (See table ii.)

TABLE ii. *Years of experience in law enforcement of primary respondent*

Department type	Number of years of law enforcement experience (by % of department types) More than 5 years	More than 10 years	More than 20 years	More than 25 years
50 largest	88	77	24	13
State	81	72	17	4
City (10-49)	84	57	13	5
City (50+)	77	61	22	14
City (1-9)	62	43	21	13
County	58	36	17	13
Township	57	48	9	9

2.2.2. Number of Officers and Characteristics Of Jurisdiction

The communications needs and requirements of police departments are usually based on two prime considerations: (1) Number of officers in the department and (2) size of jurisdiction.

Data about the average number of officers per department type are reproduced in table iii.

The largest mean number of officers per department was in the 50 largest cities. States averaged slightly less than one-third as many officers as the 50 largest cities. counties averaged about five times as many officers as did cities (10-49). (See table 5A-1.)

TABLE iii. *Average number of full-time officers, by department type*

Department type	Number of full-time officers
50 largest	2,491
State	890
City (50+)	125
County	113
City (10-49)	23
Township	16
City (1-9)	9

TABLE 5A-1. *Average size of communications jurisdiction, by department type*

Department type	Size (mi^2)		
	Overall mean	Minimum	Maximum
State	62,704	1,497	263,449
County	2,551	14	64,000
50 largest	237	24	841
City (10-49)	68	1	2,000
City (1-9)	67	1	1,200
City (50+)	34	2	310
Township	32	5	67

5A. What is the total area within your jurisdiction which must be covered by a communications system? (In Square Miles)

Square Miles

The average sizes of communications jurisdictions which state and county police had to cover were larger than those of all types of city departments and townships. The larger cities, in terms of number of officers, were not necessarily larger in geographical size. Cities (1-9) and cities (10-49) had geographically larger jurisdictions than cities (50+). The relationship between number of officers and geographical size can be seen more clearly in table 5A-2.

TABLE 5A-2. *Comparison between average number of officers in department and average size of jurisdiction*

Department type	Number of officers and size of jurisdiction	
	Mean number of full-time officers	Mean size of jurisdiction (mi^2)
50 largest	2,491	237
State	890	67,704
City (50+)	125	34
County	113	2,551
City (10-49)	23	68
Township	16	32
City (1-9)	9	67

6. Which of the following best describes the general character of your jurisdiction? (Mark X by More Than One, if Necessary)

Skyscrapers, many tall buildings
Some tall buildings
Almost no tall buildings
Primarily mountainous or very hilly
Valley area surrounded by mountains
Generally flat with some hills
Flat area, no hills

The departments which characterized their jurisdictions as being mountainous or in a valley surrounded by mountains were most often located in LEAA regions 1 (New England), 8 (Mountain States), 9 (Far West/Hawaii), and 10 (Northwest/Alaska). Respondents who reported flat, with some or no hills, were most often in LEAA regions 6 (South/Southwest) and 7 (Midwest). There were few differences among the LEAA regions in the percentages of departments which said they had almost no tall buildings. Departments in region 5 (Great Lakes) gave the greatest percentage of responses for skyscrapers, many tall buildings, or some tall buildings; this response was given least often by departments in region 1 (New England). (See table 6.)

TABLE 6. *General character of jurisdiction, by LEAA region*

LEAA region	Character (by % of region)			
	Flat/some or no hills	Valley surrounded by mountains/or mountainous, very hilly	Almost no tall buildings	Skyscrapers or some tall buildings
New England	31	81	32	12
New York/New Jersey	63	43	33	31
Middle Atlantic	33	67	20	35
South	79	36	28	30
Great Lakes	73	22	27	53
South/Southwest	91	18	28	28
Midwest	86	11	28	28
Mountain	45	81	27	24
Far West/Hawaii	46	80	35	31
Northwest/Alaska	35	70	26	18

2.2.3. Mobile Radios

2.2.3.1. Number of Mobile Radios

2A. How many car radios are there in your department?

Number

State departments accounted for slightly more than half (51%) of all the car radios reported by the 428 responding departments. The 50 largest cities accounted for an additional 40 percent of all radios reported. Thus, less than 10 percent of all radios reported were found in the other five department types. (See table 2A-1.)

Within the seven department types, there were wide ranges of minimum and maximum numbers of mobile radios reported. For example, some county departments had as few as 1 car radio, while 1 county had 900.

Total numbers of car radios were compared with the numbers of patrol cars reported in response to the patrol cars questionnaire.[4] A total of 67,807 car radios was reported by the respondents to the communications questionnaire. A total of 46,462 patrol cars was reported by the respondents to the patrol cars questionnaire. Therefore, about 46 percent more car radios than patrol cars were reported by these subsample groups.

Calls were made to a few departments to determine possible reasons for the large observed difference between the number of cars and the number of car radios. Several reasons were given for this apparent discrepancy: (1) Many departments said that they kept extra mobile radios available; some said that they kept a 10-20 percent backup inventory. (2) Many departments are using communications channels on two different frequency bands, and needed two radios in each patrol car in order to operate on both bands. In some departments, one band was used for emergencies (and was sometimes part of an area or statewide communications) and the other was used to handle local jurisdiction communications. (3) In a smaller number of departments, it appeared that errors in reporting the numbers of mobile radios may have occurred. For instance, some of the county departments contacted said that they had included other mobile radios in their jurisdictions which, although they were not used by the county police, were tied

[4] These 2 questionnaires were sent to different but equivalent subsamples, except for state and the 50 largest cities always filled in both.

TABLE 2A-1. *Number of car radios, by department type*

Department type	Number of respondents	Total number radios	Percent total radios	Mean no. per department	Maximum in any department	Minimum in any department
State	47	36,365	51	731	3,510	97
50 largest	46	27,221	40	592	4,275	101
County	69	2,653	4	38	900	1
City (50+)	79	2,597	4	33	177	7
City (10-49)	86	631	1	7	21	1
City (1-9)	78	239	*	3	28	1
Township	23	101	*	4	26	1
All departments	428	67,807	100	158	4,275	1

*Less than 1 percent.

into the central dispatch system operated by the county. It was also possible that a small number of departments may have included portable radios in their statistics on car radios, even though information about portable radios was specifically requested in Question 11A. In summary, while it appears that departments did, in fact, have considerably more mobile radios in their departments than they had patrol cars, there is reason to believe that the total of 67,807 car radios reported in the survey may have been somewhat high. Nevertheless, the estimate of the total number of police mobile radios in the country, shown in table 2A-2, is not likely to have been seriously affected.

TABLE 2A-2. *Estimated total population of police car radios in U.S., by department type*

Department type	Mean number car radios per department	Number departments that type: total population	Estimated number car radios
County	38	3,137	119,206
State	731	50	36,550
50 largest	592	50	29,600
City (50+)	33	554	19,282
City (1-9)	3	5,486	16,458
City (10-49)	7	1,985	13,895
Township	4	1,574	6,296
Total			240,287

2.2.3.2. Spectrum Utilization: Mobile Radios

In this section, mobile communications are considered in terms of police department spectrum utilization. The frequency bands used for transmitting and receiving and the number of channels authorized and in use by the responding departments are reported.

1. Give the following information about your car radios:
1A. List ALL transmitting frequencies (in kHz, MHz, etc.)

The reported frequencies were compiled in four categories: VHF low band (30-50 MHz), VHF high band (150-174 MHz), UHF band (450-470 MHz), and an "other" category which included such answers as call letters, which could not be categorized by band.

VHF high band and UHF frequencies can usually be received in buildings. VHF high band has better penetration, while UHF frequencies are more likely to pass through windows and other nonmetallic openings. One of the main attractions of the UHF band is the availability of unused frequencies compared to VHF low and high bands, which are relatively saturated.

Of all the transmitting frequencies reported by responding departments, almost half (49%) were in the VHF high band (150-174 MHz). The VHF low band (30-50 MHz) accounted for 29 percent of the reported frequencies and only 19 percent were in the UHF band.

Since VHF low band frequencies provide the greatest range and are least affected by terrain and foliage, they are more suitable for those departments with the largest jurisdictions, such as states and counties. In both of these department types, over half of the reported transmitting frequencies were in the VHF low band. (See table 1A-1.)

The three largest city department types and townships reported the greatest proportions of VHF high band transmitting frequencies. VHF high band, being more line-of-sight, does not provide as much range as low band does, but does transmit farther than UHF for the same transmitter output power. VHF frequencies have been available for law enforcement use longer than the UHF frequencies. As shown by the data, UHF frequencies were not generally being used, with the exception of the 2 largest city department types (50+ and 50 largest).

Of the responding departments, 79 percent said all their transmitting frequencies were in a single band. The remaining 21 percent used one of the combinations shown in table 1A-2. Only five departments reported using transmitting frequencies in all three bands.

The means shown in table 1A-3 were calculated by counting the total number of transmitting frequencies reported within a particular band by departments within a particular department type and dividing this total by the number of departments within that department type who reported at least one transmitting frequency within the band in question. Thus, for example, if 20 departments of a particular type reported using a total of 30 transmitting frequencies in the VHF low band, the statistic entered in the table would be "1.5."

Historically, the VHF low band has been available for police department use longer than the other two bands. Increasing pressure for channel assignments and technological improvements have permitted the opening of the VHF high band and,

TABLE 1A-1. *Distribution of transmitting frequencies among bands, by department type (406 departments responding)*

Frequency band	All depts.	Department type (by % of frequencies) State	County	City 1-9	City 10-49	City 50+	50 largest	Township
30-50 MHz	29	59	51	37	28	13	3	29
150-174 MHz	49	35	42	40	61	63	53	61
450-470 MHz	19	6	5	12	8	23	42	8
Other	1	0	0	2	1	1	3	0
	(n=1,333)	(n=292)	(n=168)	(n=109)	(n=153)	(n=181)	(n=393)	(n=37)

TABLE 1A-2. *Percent use of more than one frequency band for transmitting by the 65 departments reporting concurrent usage*

Band combination	Percent of all departments which were using more than one band (n=65)
30-50 and 150-174 MHz	60
30-50 and 450-470 MHz	10
150-174 and 450-470 MHz	30

TABLE 1A-3. *Mean number of transmitting frequencies per department, by department type and band*

Frequency band	All departments	Department type: State	County	City 1-9	City 10-49	City 50+	50 largest	Township
30-50 MHz	2.3	4.2	2.1	1.4	1.5	1.8	1.7	1.4
150-175 MHz	2.7	5.7	2.8	1.4	1.6	2.1	5.6	1.6
450-470 MHz	4.4	5.7	2.6	2.3	2.2	2.6	6.8	3.0
All bands	3.3	6.2	2.6	1.6	1.8	2.3	8.7	1.7

most recently, the UHF band for law enforcement communications. With the exception of counties, all department types, if they had made the switch to UHF at all, were using more channels per department in the UHF band than in the lower two bands. This trend was particularly noticeable in the 50 largest cities which reported 5.6 and 6.8 frequencies per department in the VHF high and UHF bands, respectively, vs. only 1.7 frequencies per department in the VHF low band. Increased spectrum space and the absence of co-channel interference at the UHF frequencies should result in an increase in the proportion of frequency assignments (now 19%, see table 1A-1) in this band.

1B. List ALL receiving frequencies; if different from Question 1A.

About two-thirds of the 50 largest city departments indicated that they were using at least 1 receiving frequency which was different from their transmitting frequencies. Their responses imply the use of some type of duplex system.[5] The majority of departments in other department types appeared to be operating in the simplex mode. Since the 50 largest cities were the primary users of different receiving frequencies, as well as being the primary users of the UHF band, they heavily influenced this picture. (See table 1B-1.)

[5]Note, that if one wishes, it is possible to determine the number of departments using simplex and duplex systems by calculating the number of different transmitting and receiving frequencies (from Question 1A and Question 1B) and the number of channels (Question 1D).

TABLE 1B-1. *Percent departments whose transmitting and receiving frequencies were not all the same (n=130)*

Department types	Different transmitting and receiving frequencies
Township	14
City (10-49)	20
City (1-9)	24
County	25
State	36
City (50+)	40
50 largest	67

1D. Number of Channels Authorized
1E. Number of Channels in Use

Although the data for this question (and for Question 5B to follow) are reported, the reader is cautioned to interpret them carefully. Discussions with departments and the FCC after the survey was conducted, revealed that the term "channel" was defined differently by different people. The major area of confusion was concerned with the meaning of simplex and duplex channel assignments.

In terms of all responding departments, 1,452 authorized channels were reported and 1,332 channels were reported in use. At the time of this survey, of the channels authorized but not in use (120 channels), state departments and the 50 largest cities accounted for just over half (68). (See table 1D and E.)

In general, the more officers in the department, the greater was the number of channels authorized for its communications, and departments were using almost all (92%) of the channels authorized to them. The overall average number of authorized channels per department was 3.5 and the average number in use was 3.2.

TABLE 1D and E. *Comparison of channels authorized with channels in use for mobile radios, by department type (department types listed from largest to smallest based on mean number of full-time officers)*

Department type	No. channels authorized	No. channels in use	Percent of authorized in use
50 largest	411	378	92
State	309	274	89
County	195	186	95
City (50+)	184	174	95
City (10-49)	169	158	94
City (1-9)	144	124	86
Township	40	38	95
All departments	1,452	1,332	92

5B. If possible, please tell us how many different law enforcement channels serve this area. This figure would include not only those channels used by your department, but also those used by other law enforcement agencies operating in the same geographical area (e.g., state and local police).

Channels
Don't Know

Responding departments reported an average of 11.6 law enforcement communications channels in use in their areas. This is slightly over three times the average number reported for their own use. However, of the 428 departments which returned Communications Questionnaires, 132 departments (31%) did not answer or did not know the number of different law enforcement channels serving their areas. (See table 1D and E and 5B.)

Although state departments who answered this question (18 departments) reported the greatest number of channels in their areas, they also had by far the largest areas. The 50 largest cities had slightly less than half as many authorized channels in their areas as state departments, but these channels were concentrated in much smaller jurisdictions.

TABLE 1D and E and 5B. *Comparison of average number of channels authorized, in use, and in area for mobile radios, by department type*[1]

Department type	Authorized (n=417)	Channel In use (n=418)	In area (n=296)
50 largest	9.1	8.	32.6
State	6.6	5.8	71.7
County	2.9	2.8	5.7
City (50+)	2.4	2.5	6.2
City (10-49)	2.0	1.8	4.9
City (1-9)	2.0	1.7	4.0
Township	1.7	1.6	5.1

[1] "No Answers" were excluded from the calculation of averages.

5C. Do you have one common frequency for routine and emergency traffic?

Yes

No (If "No") Do you think you need a common frequency?

Yes

No

This question was originally intended to obtain information on interdepartmental sharing of frequencies. That is: Did the different departments in one district or region have a common frequency for communicating with each other on both a routine and emergency basis? It was subsequently discovered that it had sometimes been interpreted to refer to intradepartmental capability. Consequently, the data received in answer to this question are not presented here.

2.2.3.3. Characteristics of Mobile Radios

1. Give the following information about your car radios:

1C. Output power (in watts)

This was a difficult question for some departments to answer and 39 of the respondents did not answer it. Four departments gave output powers under 10 watts (they were using repeaters) and 36 departments gave output powers above 110 watts (probably their base station output power since the maximum power available from commercial mobile radios is 110 watts). (See table 1C-1.)

The frequency count shows that the most frequently cited output power was in the 90-110 watt range. State departments, as expected by the size of their jurisdictions, showed the greatest use (81%) of high (90-110 watts) output power. Only in the 50 largest cities did the highest proportion of departments cite one of the lower ranges of output power (i.e., 33% of the 50 largest cities reported output in the 30-49 watt range while 26% reported output powers of 90-110 watts). (See table 1C-2.)

The overall average (mean) output power reported by police departments in this survey was 70.9 watts, the median was 75 watts, and the most often cited (mode) output power was 100 watts. The average output power per department type arranged according to average size of jurisdiction is shown in table 1C-3. County and state departments had the highest average output power and also were larger in physical size than other department types.

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TABLE 1C-1. *Frequency count of reported output power, for all responding departments*

Output power in watts	All department types Number	Percent
Less than 10	4	1
10-29	28	7
30-49	73	17
50-69	65	15
70-89	24	6
90-110	159	37
More than 110	36	8
No answer	39	9
Total	428	100

TABLE 1C-2. *Percentages of each department type which cited output power of 90-110 watts*

Department type	Percent of department type citing 90-110 watts
State	81
County	52
Township	35
City (50+)	34
50 largest	26
City (10-49)	24
City (1-9)	22

TABLE 1C-3. *Average output power, by department type, arranged by average size of jurisdiction*

Department type		Output power mean number watts
(smallest)	Township	74
	City (50+)	68
	City (1-9)	64
	City (10-49)	64
	50 largest	56
	County	84
(largest)	State	91

3. How recently were most of the car radios bought by your department? (Mark X by Your Best Estimate)

Within the last calendar year
1-3 years ago
4-5 years ago
More than 5 years ago

Almost half (47%) of the responding departments (evenly across department types) had purchased the bulk of their car radios within the last 3 years and about two-thirds of the departments (65%) had bought most of their car radios within the last 5 years. The other one-third (34%) bought them more than 5 years ago.[6]

Of the 65 percent which had bought most of their radios within the last 5 years, about half had bought them 1 to 3 years ago, about one-fourth had bought them 4 to 5 years ago and the remaining one-fourth had bought them within the last year. (See table 3.)

There were no major differences among department types, although townships were slightly more likely than the others to have bought their car radios within the last 5 years.

TABLE 3. *Cumulative percentages for period of time within which 428 departments bought most of their car radios, by department type*

Department type	Time period		
	Within the last year	3 years ago or less	5 years ago or less
City (50+)	25	42	62
Township	22	44	79
City (10-49)	19	56	65
County	13	40	63
City (1-9)	10	48	61
50 largest	7	48	68
State	6	46	67
All departments	15	47	65

4. About how much did each of the car radios cost that are most frequently used in your department (including base plate, control head, microphone, and speaker)? For example, if most of the radios now in use are Motorolas, please give us the cost of one set. (Mark X by Your Best Estimate Below)

Less than $ 700
$ 701-$ 800
$ 801-900
$ 901-1,000
$ 1,001-1,500
Over $ 1,500

More than half (56%) of the responding departments paid $900 or less for their most frequently used car radios. Very few departments (4% overall) paid more than $1,500 per unit; state departments paid significantly less per unit; and counties and townships paid significantly more per unit. It might have been expected that states and

[6] Data about purchase of equipment was provided as of summer 1972. The term "most" in the question was used to solicit responses concerning the most recent major purchase(s) of mobile radios.

counties would pay more per unit because of a need for higher output power and increased channel capacity to serve their larger jurisdictions. However, this hypothesis held true only for the counties, suggesting, perhaps, that a further examination of the purchasing practices of these two department types would be needed to explain the survey results. (See table 4.)

TABLE 4. *Cumulative percentages for cost of the car radios most frequently used in a department (including base plate, control head, microphone, and speaker), by department type*

Cost	All departments	Department type Cumulative percentages of departments State	City 1-9	50 largest	City 10-49	County	City 50+	Township
$700 or less	22	51	29	24	15	14	13	9
$800 or less	40	64	52	44	38	23	33	22
$900 or less	56	83	70	57	54	32	53	31
$1000 or less	73	87	79	61	81	54	75	57
$1500 or less	96	98	97	91	98	93	94	87

2B. (How many car radios are there in your department?) Of those car radios, about how many were made by each of the following manufacturers?

Number	*Manufacturer*
	Motorola
	RCA
	GE
	Other

Ninety-nine percent of all the car radios reported were manufactured by only three companies, and over half (57%) were produced by just one manufacturer. The three largest city department types seemed to favor manufacturer C for roughly two-thirds of their car radio purchases. State departments distributed their buying equally between manufacturers B and C. Manufacturer A captured only 8 percent of the reported market. Other manufacturers combined represented 1 percent of the respondents' police mobile radio purchases. (See table 2B-1.)

TABLE 2B-1. *Percentages of car radios in use in department made by various manufacturers, by department type*

Department type	Manufacturer A	B	C	Other
50 largest	5	23	71	0
City (10-49)	6	23	69	2
City (50+)	14	22	63	0
County	3	38	59	0
City (1-9)	5	37	52	5
Township	3	44	52	1
State	11	44	45	1
All departments	8	34	57	1

Thirty-nine percent of the responding departments had a mixture of brands of mobile radios within their departments. Radios produced by different manufacturers are not always compatible, that is, control heads, microphone jacks, etc. may not mate, and interchangeability of equipment is difficult. This problem was mentioned by many departments (see sec. 2.2.6). On the other hand, these data may only be a reflection of the fact that many departments (see sec. 2.2.3.2) operated communications equipment on more than one band and consequently may have purchased the radios for use on one band from one manufacturer and those for use on the other band from another manufacturer (see sec. 2.2.3.1). (See table 2B-2.)

TABLE 2B-2. *Proportions of different manufacturers represented within one department*

Radios made by	Percent all departments
One manufacturer	60
Two manufacturers	30
Three manufacturers	8
Four manufacturers	1
No answer	1

2.2.4. Portable Radios

9. Do you now use portable (hand-held) radios in your department?

Yes
No

Most of the responding departments (81%) used portable radios, with the greatest proportions of users in the larger departments. All of the responding state and 50 largest city departments reported using them. (See table 9.)

TABLE 9. *Use of portable radios, by department type*

Department type	Departments using portable radios (% dept. type)
50 largest	100
State	100
City (50+)	99
City (10-49)	90
Township	70
County	62
City (1-9)	53

2.2.4.1. Number of Portable Radios

11A. How many portable radios do you now have in your department? Number

Almost three-fourths (72%) of the portable radios reported were used in the 50 largest cities. Although departments in the 50 largest cities averaged about 356 portable radios per department, use of these radios varied greatly among particular cities. For example, the numbers of portable radios available in any single police department, within the 50 largest cities group, ranged from a maximum of 4,500 radios in 1 of these departments to a minimum of only 15 radios in another. (See table 11A-1.)

As the mean number of officers per department type increased, the mean number of portable radios per department type increased. As was discussed in section 2.2.3.1 (and is repeated in table 11A-2, below), state departments averaged many more mobile radios per department than did the 50 largest cities, even though they averaged fewer officers per department. This anomaly did not occur with respect to portable radios. (See table 11A-3.)

TABLE 11A-1. *Number of portable radios by department type*

Department type	No. of respondents	Total no. portable radios	Percent total radios	Mean no. per department	Maximum in any department	Minimum in any department
50 largest	46	16,363	72	355.7	4,500	15
State	47	3,621	16	77.0	419	5
City	78	1,682	7	21.6	108	2
County	42	464	2	11.1	125	1
City (10-49)	77	366	2	4.8	21	1
City (1-9)	41	109	*	2.7	11	1
Township	16	55	*	3.4	17	1
All departments	347	22,660	100	65.3	4,500	1

*Less than 1 percent.

TABLE 11A-2. *Comparison between mean number of officers per department type, mean number of car radios and mean number of portable radios*

Department type	Mean no. officers	Mean no. car radios	Mean no. portable radios
50 largest	2491	591.8	355.7
State	890	731.2	77.0
City (50+)	125	32.9	32.6
County	113	38.5	11.1
City (10-49)	23	7.3	4.8
Township	16	4.4	3.4
City (1-9)	9	3.1	2.7

TABLE 11A-3. *Comparison of estimated number of police portable radios and car radios in the United States, by department type*

Department type	Estimated no. portable radios	Estimated no. car radios
50 largest	17,785	29,600
State	3,850	36,550
City (50+)	11,966	18,282
County	34,820	119,206
City (10-49)	9,528	13,895
Township	5,352	6,296
City (1-9)	14,812	16,458
Total	98,113	240,287

2.2.4.2. Spectrum Utilization: Portable Radios

10. Give the following information about your portable radios.
A. List all transmitting frequencies (in kHz, MHz, etc.)

Five percent of the 348 departments using portable radios did not report their transmitting frequencies. Of the remaining 329 departments, the most used transmitting band for portable radios was the VHF high band (150-174 MHz), with approximately the same proportion of total frequencies as was found for mobile radios. (See table 10A-1.)

Within department types, in all but two cases (counties and 50 largest cities), the band in which the highest percentage of total mobile transmitting frequencies were used was also the band in which the highest percentage of portable transmitting frequencies existed. In contrast, over half of the portable radio transmitting frequencies reported by counties were in the VHF high band, while the majority of their mobile transmitting frequencies were VHF low band. The 50 largest cities, which tended to use a greater proportion of UHF frequencies for their mobile radios, tended to use a greater proportion of VHF high band frequencies for their portable radios. (See table 10A-2.)

Within the seven department types, the numbers of transmitting frequencies per department for mobile and portable radios were very similar, except for state departments. It is probable that the higher mean number of mobile radio transmitting frequencies reported by states was a reflection of their relative emphasis on highway patrol activities. (See table 10A-3.)

TABLE 10A-1. *Comparison of percentages of total transmitting frequencies, by band, for mobile and portable radios for all departments*

Radio	Percent of frequencies in: VHF low band	VHF high band	UHF band
Mobile	29	49	19
Portable	22	51	24

TABLE 10A-2. *Percentages of total mobile and portable frequencies, by band, for county and 50 largest city departments*

Frequency band	Department type			
	County		50 largest	
	Percent mobile	Percent portable	Percent mobile	Percent portable
30-50 MHz	51	36	3	3
150-174 MHz	42	59	33	50
450-470 MHz	5	1	42	44

TABLE 10A-3. *Mean[1] numbers of portable and mobile radio transmitting frequencies, by department type (department types ordered from largest to smallest by number of full-time officers)*

Department type	Portable radios Mean no. frequencies	Mobile radios Mean no. frequencies
50 largest	8.6	8.7
State	4.1	6.2
City (50+)	1.9	2.4
County	2.1	2.6
City (10-49)	1.4	1.8
Township	1.7	1.7
City (1-9)	1.5	1.6

[1]Means calculated only for those departments reporting any mobile transmitting frequencies or any portable transmitting frequencies.

10B. List ALL *receiving* frequencies, if different from 10A.

Most departments were using the same set of frequencies for receiving as for transmitting to their portable radios. Only 62 departments reported receiving frequencies that were different from their transmitting frequencies, and the majority of these were departments in the 50 largest cities. (See table 10B.)

TABLE 10B. *Percentages of total portable radio frequencies used for both transmitting and receiving, by department type*

Department type	Percent same
City (1-9)	97
City (10-49)	93
State	91
Township	87
County	82
City (50+)	77
50 largest	43

10. Give the following information about your portable radios.

10D. Number of Channels Authorized

10E. Number of Channels in Use

The three largest department types (by average number of officers) accounted for 71 percent of all the authorized portable radio channels reported by responding departments and 72 percent of those actually in use. These department types also accounted for almost two-thirds (64%) of the authorized but not yet used channels. A total of 162 channels (14% of all authorized channels) was reported to be authorized but not used. (See table 10D and E-1.)

The number of channels used for mobile communications exceeded that for portable radios. (See table 10D and E-2.)

TABLE 10D and E-1. *Comparison of channels authorized and in use for portable radios, by department type*

	Channels			
	Authorized		In use	
Department type	No.	Percent	No.	Percent
50 largest	431	37	374	37
State	228	19	205	20
City (50+)	171	15	148	15
City (10-49)	126	11	111	11
County	96	8	84	8
City (1-9)	95	8	65	6
Township	27	2	25	2
All departments	1,774	100	1,015	100

TABLE 10D and E-2. *Comparison of channels authorized and in use for portable and mobile radios, by all department types*

	Channels			
	Portable		Mobile	
Use category	Total no.	Average	Total no.	Average
Authorized	1,174	3.4	1,452	3.5
In use	1,012	2.9	1,332	3.2
	(n=247)		(n=417)	

2.2.4.3. Characteristics of Portable Radios

10. Give the following information about your portable radios:
10C. Output Power in Watts

As was expected, due to the nature of the power supplies employed, the average output power for portable radios was far lower than the output power for mobile radios. The mean output power, for all departments, for portable radios was 3.9 watts, while the mean output power for mobile radios was 70.9 watts. (Most portable radios currently on the market transmit with an RF output of five watts or less.)

In general, the larger the average size of department type jurisdiction, the greater the mean reported output power for portable radios. There was only one exception to this general trend: The 50 largest cities, which had the third largest mean size of jurisdiction, reported the lowest mean output power for their portable radios. (See table 10C.)

A few departments reported very high portable radio output powers, but the problem was not as great, either in frequency or degree, as for mobile radios. Follow-up telephone calls to some of these departments revealed that they had estimated the output power of their portable equipment rather than actually checking the specifications.

TABLE 10C. *Mean output power in watts for portable radios, by department type—arranged from smallest to largest mean size of jurisdiction*

Department type	Mean output power in watts
Township	3.4
City (50+)	3.4
City (1-9)	3.6
City (10-49)	4.2
50 largest	2.8
County	4.6
State	5.1

22. Should standards for power supplies such as charging equipment, and batteries for portable radios be given
High Priority
Medium Priority
Low Priority
Standards are not needed for these items

About three-fourths of departments which used portable radios felt that either high or medium priority should be assigned to developing standards for power supplies for portable radios. These departments were evenly divided between those which assigned high vs. medium priorities. About 25 percent of all departments using portables either said that no standards for power supplies were needed or that such standards should have low priority. The 50 largest cities, which were the biggest users of portable radios, were most likely to assign high priority to standards for power supplies for portable radios. (See table 22.)

TABLE 22. *Priorities assigned to standards for power supplies for portable radios by 348 departments which used portable radios as compared to average number of portables available, by department type*

Department type	High priority	Medium priority	Low priority	Don't need standards	Average no. of portable radios
		(in % of department types)			
50 largest	61	26	7	7	355.7
City (50+)	37	33	19	9	21.6
State	36	36	11	17	77.0
County	37	35	7	19	11.1
City (10-49)	30	44	17	8	4.8
Township	25	50	12	12	3.4
City (1-9)	24	37	22	17	2.7

23. What types of batteries do you *now* use for your portable radios? (Mark X by *Each* Item That Applies)

24. What types of batteries do you *prefer* to use for your portable radios? (Mark X by One of the Following)

Alkaline-Manganese
Carbon-Zinc
Mercury
NiCad (Nickel-Cadmium)
Silver Oxide
Other

More than 80 percent of the 348 departments which were using portable radios said that they were using Nickel-Cadmium batteries for those radios. A similar percentage also said that Nickel-Cadmium was the battery they would prefer to use with their portable radios. Although 25 percent of the portable radio users said they were currently using at least some Alkaline-Manganese or some Mercury batteries, less than half of those who used these two types of batteries said that they would prefer to use them. (See table 23 and 24.)

TABLE 23 and 24. *Comparison between batteries now in use and batteries preferred, by the 348 departments using portable radios*

Battery type	All departments using portable radios (in %)	
	(Question 23) Now using	(Question 24) Would prefer to use
Alkaline-Manganese	11	6
Carbon-Zinc	6	1
Mercury	14	6
Nickel-Cadmium	82	83
Silver Oxide	0	0
Other	3	1
No answer	3	4

Note: Percentages add to more than 100 percent since departments could give more than one answer to Question 23.

25. Do you use batteries for your portable radios which must be recharged:

Yes No

Nine out of every 10 departments which had portable radios used batteries which had to be recharged. There were no major differences among department types, although percentages of departments using batteries which must be recharged were slightly smaller for state, county and small city (1-9) departments than for larger city types. These differences may not be statistically significant. (See table 25.)

TABLE 25. *Use of batteries which must be recharged, by 348 departments which used portable radios*

Department type	Batteries must be recharged
	Percent of department type
50 largest	98
City (50+)	94
City (10-49)	94
Township	94
County	84
State	83
City (1-9)	80
All departments	90

(Do you use batteries for your portable radio which must be recharged?) *YES*

25A. How long can you use the battery before it must be recharged?

Hours

25B. How long does it usually take to recharge the battery to a point where it can be used again?

Hours

25C. How long does it usually take to fully recharge the battery?

Hours

25D. How long can you usually use these batteries before they must be replaced?

Months

Responses from the departments using rechargeable batteries showed that they averaged 8 hours of battery use before recharging was required. This was also the most commonly reported figure by all department types (modal response).

On the average, departments reported that a portable radio could be recharged enough to be usable in a little more than half the time it took for a full charge: Mean time to fully recharge was 9.2 hours; mean time to recharge to usable point was 5.6 hours. There was, however, considerable variability to their answers. Some departments said that it took a minimum of 24 hours to recharge portable radio batteries to a usable point while others said it required only 1 hour. Similarly, for full recharging, some departments said 1 hour was sufficient, several said 24 hours were required, and at least one county department said full recharging took 48 hours. This wide range of responses probably was a reflection of the use of "quickcharge" and "slow-charge" systems, the

ages of the charging systems in use, and the design parameters of many different portable radio/battery systems in use. (See table 25A and B and C and D.)

Departments replaced their rechargeable batteries, on the average, every 16.7 months. Excluding those departments (8%) who had never needed to replace their batteries (no data is available on how long these batteries had been in use), battery life ranged from as little as 3 months to as long as 5 years.

The larger departments—states, 50 largest, cities (50+), and cities (10-49)—reported average battery lives between 1-1/2 and 2 years. On the other hand, counties and cities (1-9) were only able to use their batteries for 6 or 7 months before replacement. Follow-up phone calls revealed that few departments kept actual battery use and life records; these data, therefore, are probably based, in large measure, on estimates. (See table 12 and 13-1.)

TABLE 25A. and B. and C. and D. *Length of time to partially and completely recharge batteries: Length of time batteries can be used before needing recharging, and needing replacement, by departments which use rechargeable batteries in their portable radios*

	Question	Departments recharging batteries: Mean no. hours	Maximum no. hours	Minimum no. hours
A.	No. of hours battery can be used before needing re-charging (261 responses)	8.0	50	1
B.	No. of hours required to recharge battery to point where it can be used again (260 responses)	5.6	24	1
C.	No. of hours required to fully recharge battery (259 responses)	9.2	48	1
		Months	Months	Months
D.	No. of months battery can be used before being re-placed (206 responses)	16.7	60	3
	No. of departments never needing to replace batteries: 26 (8%)			

TABLE 12 and 13-1. *Weight of portable radios, by 348 departments using portable radios*

Weight	Percent of departments using portables
Less than 20 oz	5
20 oz to 26 oz	26
27 oz to 32 oz	25
33 oz to 38 oz	20
More than 38 oz	21
No answer	2

12. About how much does one of these "most used" portable radios weigh?

Less than 20 oz
20 oz to 26 oz
27 oz to 32 oz
33 oz to 38 oz
More than 38 oz

13. How do you feel about the weight of the "most used" portable radios?

The weight is about right
The unit is somewhat heavy
The unit is entirely too heavy

About 7 out of every 10 departments reported that their portable radios weighed between 20 and 38 oz (.567 to 1.077 kg). About one-fifth of the departments had radios weighing more than 1.077 kg. (See table 12 and 13-2.)

Departments with units weighing over 1.077 kg (38 oz) more frequently reported that the radios were entirely too heavy than those which had lighter weight sets.

TABLE 12 and 13-2. *Comparison between weight of most used portable radios and respondents' feeling about that weight*

How respondents feel about weight	Reported weight of portable radios (in % of departments)					
	Less than 20 oz	20 oz –26 oz	27 oz –32 oz	33 oz –38 oz	More than 38 oz	No answer
Weight is right	7	38	29	17	9	1
Somewhat heavy	2	17	28	36	23	3
Entirely too heavy	4	6	8	18	60	4

12A. When did you buy most of these "most used" portable radios?

Within the last calendar year
1-2 years ago
4-5 years ago
More than 5 years ago

Half of the departments in the sample had bought the portable radios most commonly used in their department 1 to 3 years ago.[7] About one-fourth had bought them 4 to 5 years ago. Seventeen percent had purchased their radios within the previous year and the remaining 10 percent had radios which were not more than 5 years old. All seven department types reflected roughly these same proportions.

It appears that departments had made major purchases of portable radios more recently than they had made major purchases of mobile radios (90% of the departments had purchased portables and 65% had purchased mobile radios in quanitity within the last 5 years). This finding may have resulted in part because of improved portable radio technology, the recent availability of federal purchase funds, and/or the relatively shorter life of portable radios.

[7] Data about purchase of equipment was provided as of summer 1972.

TABLE 12A. *When departments bought most of their "most often used" brands of portable radios*

When purchased	Percent of departments using portables (n=348)
Within last year	17
3 years ago or less	67
5 years ago or less	90
No answer	1

12B. About how much did you pay for one of these "most used" portable radios (including antenna, carrying case, and spare batteries)?

Less than $500
$501-$700
$701-$900
$901-$1,100
$1,101-$1,500
Over $1,500

Forty-four percent of the departments paid between $700 and $900 apiece for their portable radios and 77 percent of them paid $900 or less. About one-fourth of cities (1-9) had bought their portables for less than $500. These small cities along with the 50 largest cities paid a wide range of prices. Two percent of cities (1-9) paid more than $1,101 as did 13 percent of the 50 largest cities. Counties, in general, paid higher prices for their portable radios and states paid lower prices. (See table 12B.)

TABLE 12B. *Cumulative percentages for costs of "most commonly used" portable radios in 348 departments*

	Department type						
	Cumulative percentages						
	City (1-9)	Township	County	City (10-49)	State	50 largest	City (50+)
Less than $500	24	12	9	6	2	2	0
$700 or less	41	24	15	35	54	24	22
$900 or less	78	74	66	89	89	52	69
$1100 or less	98	93	78	98	99	85	96
No answer	0	6	5	0	0	2	0

11B. (How many portable radios do you now have in your department?) Of those portable radios, about how many were made by the following manufacturers?

Number *Manufacturer*

Manufacturer A made roughly 7 out of every 10 portable radios used by the respondents. There were no major differences among department types, except that a smaller percentage of portables in states and cities (1-9) was made by this company than in the larger city department types. Manufacturer B made slightly more than 1 out of every 10 portable radios and manufacturers C and D each made only 1 out of every 20 radios reported. Only in cities (1-9) did a manufacturer other than manufacturer A capture a significant proportion of the reported market (35%, manufacturer B). (See table 11B.)

TABLE 11B. *Percentage of portable radios in use in departments made by various manufacturers, by department type*

Department type	Manufacturer (by % of radios)				
	A	B	C	D	Other
50 largest	76	10	3	6	5
City (10-49)	76	14	4	0	6
Township	75	2	7	0	16
City (50+)	72	17	6	4	0
County	67	11	0	0	22
City (1-9)	54	35	0	0	11
State	48	14	13	2	23

12. What model of portable radio do you have more of in your department than any other?

Manufacturer

Model or Model No.

Although only 1 percent of the portable radio users failed to answer this question at all, 14 percent gave a manufacturer but not model, and 6 percent gave insufficient information to identify a particular model. A total of 26 different portable radio models were mentioned by the respondents, but half of those 348 respondents listed 1 of 2 models: 27 percent for 1 model and 23 percent for another. Both of these models are produced by the same manufacturer. (See table 12.)

TABLE 12. *Of the 348 departments using portable radios, percent listing each of two "most used" models, by department type*

Department type	Model (% of department type)		
	Model X	Model Y	No answer, manufacturer only, model uncertain
State	36	4	15
50 largest	36	33	6
City (10-49)	31	26	20
City (50+)	27	29	18
County	23	14	33
City (1-9)	17	20	29
Township	12	31	37

2.2.5. Special Systems

2.2.5.1. Mobile Repeaters

13. A portable radio can be used with a repeater by a patrolman when he is out of his car. The portable radio transmits to the car radio which then relays the signals to the base radio. Do you need repeaters like this in your communications system?

Yes No Why?

(See table 13-1.)

Almost half of the respondents (43%) indicated a need for a mobile repeater system (i.e., a system in which a mobile car radio is used to relay transmissions from a low powered portable radio to a base station location). Generally, the larger the average size of the department type jurisdiction, the higher the percentage of departments saying they needed mobile repeater systems. In exception to this pattern, only 26 percent of the 50 largest cities indicated a need for mobile repeater systems. (See table 13-2.)

Since there is a relationship between jurisdiction size and frequency of need for mobile repeaters (except for the 50 largest cities), it was not surprising that the most frequently given reason for needing this system was to overcome distance (range) problems. The other four most commonly given reasons for choosing this system were

TABLE 13-1. *Percent departments which need repeaters within their mobile systems, by department type, arranged according to average size of jurisdiction*

Department type	Percent of all departments saying yes
Township	31
City (50+)	35
City (1-9)	44
City (10-49)	40
50 largest	26
County	58
State	68

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TABLE 13-2. *If "yes," why do you need mobile repeaters?*

Reasons	Percent of all departments saying yes (n=150)
1. To overcome distance (range) problems	23
2. To improve or strengthen portables	21
3. Constant communication necessary	18
4. To overcome terrain-caused problems	16
5. Mobility of officers improved	11
6. Good for special assignments	9
Other	7
No answer	11

Note: Percentages add to more than 100 percent because the respondents could give more than one reason.

TABLE 13-3. *If "no," why don't you need mobile repeaters?*

Reasons	Percent of all departments saying no (n=194)
1. Not needed—current equipment adequate	21
2. Use or prefer other system	19
3. Not needed—area not large enough to warrant use	18
4. Have no hand and/or car radios	2
Other	9
No answer	38

Note: Percentages add to more than 100 percent because respondents could have given more than one reason.

all somewhat related to the problems of covering large areas of territory (to strengthen the portable system, to remain in constant communication, to overcome terrain-caused problems, and to increase officer mobility). (See table 13-3.)

Departments usually indicated that they did not need a mobile repeater system when their current equipment was adequate, when their area was not large enough to warrant use, or when they used or preferred other systems for handling problems of distance, such as fixed repeaters and/or voting systems.

Half of the 32 departments in the 50 largest cities which did not need mobile repeater systems said that they use or prefer other systems. This probably accounted for the atypical response of the 50 largest cities which often indicated that they did not need a mobile repeater system even though they had larger average jurisdictions to cover than townships and other city departments.

2.2.5.2. Fixed Repeaters

7A. Do you use fixed repeaters in your area (to cover dead spots in communication which otherwise would exist)?

Yes No

Fixed repeaters can be used to overcome obstacles, either natural or manmade, which would otherwise create dead spots in communications and to increase the range of system coverage. They are also used to cut mobile transmitter costs because, in general, less powerful transmitters are needed when repeater systems are employed.

About one-third of the 428 responding departments used repeaters. State police and police in the 50 largest cities were the 2 most frequent users of this equipment.

It might be hypothesized that there could be a relationship between the size of the jurisdiction to be covered and the use of fixed repeaters. It can be seen that state police departments, which were the most frequent users of fixed repeaters, did have the largest jurisdictions to cover. However, less than one-third of county police, who had the second largest average size of jurisdiction, used repeaters. Within city department types, the frequency of use of repeaters increased with the size of the department type in terms of number of officers, rather than in terms of average size of jurisdiction. (See table 7A-1.)

TABLE 7A-1. *Use of fixed repeaters by department type, as compared to average size of jurisdiction*

Department type	Use of repeaters and jurisdiction size	
	Percent use of repeaters	Mean size of jurisdiction (mi^2)
State	77	64,704
50 largest	65	237
City (50+)	37	33
County	30	2,551
City (10-49)	20	68
City (1-9)	13	67
Township	9	31

7B. (If "Yes" to Question 7A) How many fixed repeaters does your department have?

Fixed Repeaters

Most of the fixed repeaters were found in state police departments or in the 50 largest cities. About three out of every five repeaters cited were used by state police departments. A little more than one-fourth of all repeaters were operated by the 50 largest cities. Thus, almost 90 percent of fixed repeaters were employed by these two groups. Of the departments reporting fixed repeater operations, state police departments each operated 21 repeater units and the 50 largest cities each operated 11 repeater units (means). Between 20 percent and 37 percent of other larger department types (at least 10 officers or more) and county police, reported using fixed repeaters (Question 7A) but these department types generally had an average (mean) of only 1 or 2 repeaters in each department. (See table 7B-1.)

The largest mean numbers of repeaters were found in departments along the East Coast (in the Middle Atlantic and New York/New Jersey areas) and along the West

TABLE 7B-1. *Percentage of total repeaters in use, and mean number per department of those using repeaters, by department type*

Department type	Percent total reported repeaters (n=1,197)	Mean no. repeaters per department of those using any repeaters
State	62	20.6
50 largest	27	10.9
City (50+)	5	2.1
County	4	1.9
City (10-49)	2	1.1
City (1-9)	1	**
Township	*	**
All departments	100	

*Less than 1 percent.
**Mean probably not valid; number of respondents too small.

TABLE 7B-2. *Average number of fixed repeaters, by LEAA region, compared to percentage of departments in regions which use fixed repeaters*

	LEAA region	Number and use of repeaters	
		Mean no. repeaters in region	Percent of departments which use fixed repeaters
9	(Far West/Hawaii)	15.7	48
3	(Middle Atlantic)	15.6	17
2	(New York/New Jersey)	13.6	17
7	(Midwest)	9.4	19
5	(Great Lakes)	6.8	39
4	(South)	6.4	38
6	(South/Southwest)	6.2	26
8	(Mountain)	6.1	45
1	(New England)	5.1	27
10	(Northwest/Alaska)	4.0	68

Coast (in the region which includes California, Nevada, Arizona, and also Hawaii). Although more than two-thirds of departments in region 10 (which includes the northwestern states of Washington, Oregon, Idaho, and Alaska) reported using fixed repeaters, this region had the smallest average number of repeaters per department. (See table 7B-2.)

8. If you use, or will be using fixed repeaters, which of the following types do you prefer?

Will not use fixed repeaters
F1F1 repeater (same frequency in and out)
F1F2 repeater (two different frequencies)
No preference

The F1F1 system, in which communications are transmitted and received on the same frequency, is not generally being marketed because it has not yet been perfected. Thus, state departments and large city departments (50 largest and 50+) preferred the F1F2 (in which communications are transmitted and received on different frequencies). Smaller department types also selected this system if they indicated a preference at all. (See table 8A.)

TABLE 8A. *Preference for F1F1 or F1F2 repeaters, by department type*

Department type	Favoring F1F2 repeaters	Favoring F1F1 repeaters	Having no preference	Indicating will not use or no answer
State	79	6	6	8
50 largest	76	7	4	13
City (50+)	54	6	11	28
County	21	11	23	44
City (10-49)	19	9	22	50
Township	17	4	22	56
City (1-9)	10	5	33	52
All departments	37	7	19	37

2.2.5.3. Portamobile Radios with Voting Systems

14. Some law enforcement agencies use portamobile radios with several receivers and a voting system. Do you favor such a system?

Yes
No If "Yes" or "No," why?
Unfamiliar with voting system

More than half of the respondents who used portable radios (N=348) were unfamiliar with voting systems, an arrangement which provides more reliable communications by employing 1 or more satellite receivers for each channel. These receivers are situated at scattered locations throughout the coverage area. The audio output signals of the satellite receivers are transmitted to a selector or comparator at the base station by radio or land lines. The comparator performs the voting process by selecting the strongest of the several possible signals received from the portable or mobile radio via the satellite receivers. State police and police in the 50 largest cities were the only department types in which most respondents had knowledge of voting systems. About three-fourths (74%) of the respondents in the 50 largest cities and about half (53%) in the state departments favored the system.

Data from this question further explained why, in Question 13, only 26 percent of the 50 largest cities said they needed mobile repeaters and most often gave as a reason their preference for other systems. About three-fourths of the 50 largest cities favored

the voting system. Twenty-eight of the 45 respondents (65%) familiar with the concept favored the use of such a system. (See table 14-1.)

The 3 reasons most often given for favoring the voting system (by all respondents, and also by the 50 largest cities) were: (1) That the system improves transmitting/receiving coverage and extends range, (2) that the department already uses the system and likes it and (3) that the system increases the flexibility and usefulness of the portable radios. (See table 14-2.)

Departments which did not favor the voting system most commonly gave as reasons that they had no need or practical use for the system or that they considered the voting system inadequate. (See table 14-3.)

TABLE 14-1. *Of the 348 departments with portable radios, percentages of responses about voting systems, by department type*

Department type	Do you favor a voting system? (by %)		
	Yes	No	Unfamiliar with system
Township	0	0	100
City (10-49)	10	12	78
County	16	12	72
City (1-9)	5	24	71
City (50+)	28	17	55
State	53	32	15
50 largest	74	13	13
All departments	28	17	55

TABLE 14-2. *Reasons given for favoring a portamobile radio with a voting system, by 98 departments which favored this system*

Reasons	Percent of departments favoring voting system[1] (n=98)
1. Improves transmitting/receiving coverage and extends range	31
2. Already use and/or think it's a good system	23
3. Increases portable usefulness and flexibility	20
4. Voter relays best signal	10
5. For extra backup	4
6. Miscellaneous	11
No answer	11

[1]Percentages add to more than 100 since departments allowed multiple answers.

TABLE 14.3. *Reasons given for not favoring a portamobile radio with a voting system, by 58 departments which do not favor this system*

Reasons	Percent of departments not favoring voting system[1] (n=58)
1. No need or practical use	21
2. Consider voting system inadequate	17
3. Current system adequate	10
4. Area too small to warrant use	10
5. Too expensive	7
6. Important calls voted out[2]	3
7. Miscellaneous	10
No answer	31

[1]Percentages add to more than 100 since departments allowed multiple answers.
[2]This answer cannot really be considered a valid reason for not favoring a voting system. It is probably better interpreted as an indication of lack of knowledge about this system.

2.2.5.4. Scrambler Systems

17. In some areas, police use voice privacy systems which scramble messages so that they cannot be received by people other than police. Do you HAVE a system of this type?

Yes
No
(If "No") Do you *NEED* a scrambler system of this type?
Yes
No (If " No," skip to Question 21)

Scramblers were in use in less than 10 percent of the 428 responding departments. Cities (50+), states, and the 50 largest cities tended to have greater percentages of departments using scramblers. Counties and the two smallest city department types tended to have lower percentages of users. (See table 17-1.)

TABLE 17-1. *Availability of scramblers, by department type*

Department type	Have scramblers: percent of department type
City (50+)	18
State	13
50 largest	11
Township	9
City (10-49)	8
City (1-9)	5
County	3

Almost three-fifths of departments which did not have scramblers felt that they needed this system. Medium-sized cities (10-49) were much more likely than state police to perceive a need for these systems. There were no major differences between the 50 largest cities and smaller departments such as townships, counties and cities (1-9) in their responses to this question. These data represent the departments' assessments of their need for scramblers and did not distinguish between various degrees of need such as "essential to the functioning of the department" and "desirable but not essential." (See table 17-2.)

TABLE 17-2. *Perceived need for scrambler system by 388 departments which currently do not have the system, by department type*

Department type	Need scrambler system (% of department type)	No answer
City (10-49)	71	4
City (50+)	65	5
County	61	3
Township	57	0
50 largest	54	10
City (1-9)	46	3
State	44	5

18. (If "Yes" to Question 17) For which of the following purposes do you need, or would you like, a scrambler system? (Mark X by Each Item That Applies)

General communications
During robberies
Long term stakeout
Demonstrations or protests
Undercover investigations
Other (Specify)

Departments which had scramblers (n=40, 9%) and departments which said they needed scramblers (n=225, 53%) were asked to answer this question. For three of the choices (undercover investigations, robberies, and long term stakeout) the percentages of votes from the "have" and the "need" groups were fairly comparable. However, departments which did not currently have scramblers were much more likely to say they would use them for general communications (49%) than were those departments which already had them (15%). In contrast, those departments which were already using scramblers were more likely to say they would use them during demonstrations or protests (60%) than were those departments which said they needed but did not yet have scramblers (45%). (See table 18.)

Nineteen percent of departments which had, or needed, scramblers indicated other uses for scramblers. Some of the more commonly mentioned other uses were: For fires and accidents, for administrative operations, for crimes in progress (in addition to robberies), and for use in command units (communications vans).

TABLE 18. *Purposes for which scramblers were (or would be) used, by all departments currently using scramblers and all departments saying scramblers were needed*

Use for scrambler	Percent of departments	
	Using scramblers[1] (n=40)	Needing scramblers[1] (n=225)
Undercover investigations	82	78
Demonstrations	60	45
Robberies	52	42
Long term stakeouts	50	63
General communications	15	49
Other	37	16

[1]Percentages add to more than 100 since multiple answers were allowed.

19. (If "Yes" to Question 17) How do you (would you) use your scramblers? (Mark X by *One* of the Following)

With car radios
With portable radios
With both car radios and portable radios
Only in special vehicles (Specify)

The perceptions of the 225 departments which did not have, but said they needed scramblers were very different from the answers of the 40 departments which were currently using scramblers. More than half (58%) of the users of scramblers said they were using them with car radios only. An additional 35 percent of the current users said they were using their scramblers with both car radios and portable radios.

In contrast, three-quarters (75%) of the departments which said they needed scramblers said they would use them with both car radios and portable radios. Only 15 percent said they would use them with car radios only. (See table 19.)

TABLE 19. *Use of scramblers with car radios, portable radios, and special vehicles, by all departments currently using scramblers and all departments saying scramblers were needed*

Use with	Percent of departments	
	Using scramblers (Question 17)[1] (n=40)	Needing scramblers (Question 17)[1] (n=227)
Car radios only	58	15
Portable radios only	2	3
Both car and portable radios	35	76
Special vehicles	18	8

[1]The categories were meant to be mutually exclusive. However, a number of departments marked more than one of the available choices. The first three categories were made mutually exclusive in the tabulations. Double responses using the special vehicles category were permitted and therefore the total percentages add to more than 100 percent.

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20. (If "Yes" to Question 17) How much do you think your department would pay for a good, reliable scrambler system? (Mark X by your best estimate below)

Less than $250 per unit
$251-$500 per unit
$501-$750 per unit
$751-$1,000 per unit
More than $1,000 per unit

These data were useful as an indication of the accuracy of the respondents' perceptions of the costs of voice privacy systems. The simplest scramblers now on the market are inverters. They cost between $200 and $400 each, provide good intelligibility but offer only a low degree of privacy (an electronic hobbyist can easily build a low cost unscrambler). Eighty-three percent of the respondents which had (or needed) scramblers said that they were willing to pay $500 or less for a "good, reliable scrambler system." These departments would only be able to buy a "low privacy" inverter system.

Scramblers using cryptographic techniques provide many different key settings, a substantial degree of privacy, and cost $800-$2,000. Only 2 percent of the respondents with an interest in scramblers said they would be willing to pay more than $750—enough to buy a cryptographic type system. More of the 50 largest cities (30%) than of any other department type said they would be willing to pay more than $500 for a reliable scrambler system. (See table 20.)

TABLE 20. *Amounts the 265 departments which used or said they needed scramblers would be willing to pay for a reliable scrambler system, by department type*

Department type	Amount (by %)				
	Less than $250	$251-$500	$501-$750	More than $750	No answer
City (50+)	52	43	2	0	4
City (10-49)	52	30	8	0	10
City (1-9)	50	42	0	3	5
County	49	30	2	2	16
State	42	37	8	4	8
50 largest	30	37	30	0	4
Township	21	43	14	7	14

2.2.5.5. Communications Helmet

21. Helmets with built-in communications have been developed and are now on the market. Is there a need for such helmets in your department?

Yes
No
Why? or Why Not?

Although only about one-third of all 428 respondents to the communications questionnaire said they needed helmets with built-in communications, almost three-quarters of the state and 50 largest city departments said they needed them. (See table 21-1.)

Half of the 139 departments which expressed need for helmet communications gave as their reason the usefulness of this system in crowd control or riots. About one-third of those departments said it would be useful for motorcycle duty. These two reasons were also most often chosen by the states and 50 largest cities. For state police, motorcycle duty was most often chosen while crowd control was second; the reverse was true of departments in the 50 largest cities. (See table 21-2.)

TABLE 21-1. *Need for built-in communications in helmets, by department type (all respondents, n=428)*

Department type	Need built-in communications (% department type)
50 largest	72
State	72
City (50+)	34
County	22
City (10-49)	19
City (1-9)	15
Township	9

TABLE 21-2. *Reasons for needing built-in helmet communications, by 139 departments which said they needed this system*

Reason	Percent of all departments needing helmets with built-in communications[1] (n=139)
For crowd control/riots	50
For motorcycle duty	30
Frees hands	9
Improves operations/more efficient	4
Useful when away from base or mobile unit	4
Counteracts noise (other than crowds)	3
No answer	16

[1]Percentages add to more than 100 since multiple answers were allowed.

The majority of respondents (67%, n=286) said that their departments did not need built-in helmet communications. Many of the reasons for saying "No" to Question 21 were simply that the respondents saw no need for that type of communications system in their departments: Use not warranted based on department or area (22%), impractical/don't need (16%), no helmets used by department (13%). The reason given with greatest frequency (expense not warranted, 66%) might also be said to be in the general "no need" category. Only 4 percent of those saying built-in helmet communications were not needed mentioned a perceived negative aspect of this system as their reason. (See table 21-3.)

TABLE 21-3. *Reasons for not needing built-in communications, by 286 departments which said they did not need this system*

Reasons	Percent of departments not needing helmet communications[1] (n=286)
Expense not warranted	66
Use not warranted based on department or area	22
Impractical/don't need	16
No helmets used by department	13
Have or prefer other equipment for same job	6
Too cumbersome/dangerous	3
Low priority	2
Not enough power	1
Other	2
No answer	32

[1]Percentages add to more than 100 since multiple answers were allowed.

2.2.6. General Information

2.2.6.1. Need for Standards and Expected Gains from Standards

15. Many policemen have indicated the need for standardization of communications equipment. Which of the following equipment and components would you like to see standardized? (Mark X by Each Item That Applies)

Portable radios
Mobile radios
Batteries for portable radios
Control heads
Microphones
Switches on control heads
Mounting brackets
Cable between microphone and control head
Other (specify)

About two-thirds of the respondents said standards were needed for mobile radios (70%) and portable radios (66%). More than half of the departments said batteries for

portable radios needed standards (56%). No item was selected by less than one-third of the respondents. This interest in standards for communications equipment further supports the findings of the Equipment Priorities Questionnaire of this survey in which communications equipment was either the first or second most important category of equipment for every department type in terms of need for standards. (See table 15-1.)

States and 50 largest cities tended to say that more of the items in the list needed standards than did the other department types. In 5 of the department types (cities 1-9, cities 10-49, cities 50+, counties, and townships) portable radios, mobile radios, and batteries for portable radios always received 1 of the 3 highest percentages of votes. States chose mobile radios and batteries for portable radios among the top three, but not portable radios. The 50 largest cities chose portable radios and batteries for portable radios among the top 3, but not mobile radios. (See table 15-2.)

Items not listed in the questionnaire which were sometimes mentioned as needing standards included chargers, antennas, crystals, connectors, other controls, and other cables.

TABLE 15-1. *Need for standards for communications equipment, by all respondents*

Equipment item	Percent of departments indicating standards are needed
Mobile radios	70
Portable radios	66
Batteries	56
Control heads	42
Mounting brackets	37
Microphones	36
Switches on control heads	36
Cable between microphone and control head	33
Other	12
No answer	

TABLE 15-2. *Items said to need standards by 40 percent or more of the departments within a department type. Ordered from highest to lowest frequency of response by all 428 departments*

	Department type (by %)						
Equipment item	State	50 largest	Cities 50+	Cities 10-49	County	Township	Cities 1-9
Mobile radios	64	59	57	76	72	83	79
Portable radios	49	70	68	67	68	70	68
Batteries for portables	66	78	67	55	49	61	
Control heads	68	63	42	43			
Mounting brackets	49	-	41	-			
Microphones	57	46		-			
Switches on con head	49	43		41			
Cable btw mike and con head	51	46					

16. What will your department gain by the standardization discussed above? (Mark X by Each Item That Applies)

10% lower cost of equipment
25% lower cost of equipment
50% lower cost of equipment
Interchangeability of radios
Interchangeability of components
Savings in training of technicians
Savings in training of patrolmen
Interchangeability with other communications systems
Other (specify)

According to all 428 respondents as a group, and according to each department type, the biggest gain that would be realized by police departments if standards were set for communications equipment would be an improvement in the interchangeability of equipment; about half or more of all respondents chose each interchangeability item. About a quarter of the respondents chose each of the savings in training items. (See table 16-1.)

Among the seven department types, the same general proportions of the responses were found. The states and the 50 largest cities tended to have higher percentages of departments expecting to see better interchangeability of radios and components result from standardization. These two department types also had higher percentages of departments expecting savings in training of technicians. States and townships had higher percentages expecting savings in training of patrolmen. Cities (1-9) appeared to feel they had the least to gain overall from the standardization of communications equipment.

In terms of expected cost benefits from standardization, departments most often said they expected to see costs lowered by 25 percent or less. Only about one-third of the respondents said that they expected any cost benefit from standardization of communications equipment. (See table 16-2.)

TABLE 16-1. *Expected gains from standardization of communications equipment, by all respondents*

Expected gain	Percent all departments (n=428)
Interchangeability...	
of radios	62
of components	52
with other communications systems	47
Savings in training...	
of mechanics	28
of patrolmen	23
Lower cost of equipment...	
10 percent lower cost	16
25 percent lower cost	13
50 percent lower cost	3

Note: Percentages add to more than 100 percent since multiple answers were allowed. The reader should be particularly careful in interpretations of tables 16-1 and 16-2 because of the multiple responses. It is much more likely, for example, that a respondent would have selected only one of the three lower cost of equipment choices than it is that he would have selected only one of the two or three choices in the other two general categories.

TABLE 16-2. *Expected gains from standardization of communications equipment, by department type*[1]

Expected gain	Department type (in %)						
	50 largest	State	City 50+	City 10-49	County	City 1-9	Township
Interchangeability...							
of radios	78	74	67	63	55	50	43
of components	70	72	59	53	42	28	48
with other systems	52	30	46	55	54	37	57
Savings in training...							
of patrolmen	30	40	32	26	25	17	43
of technicians	57	43	20	12	16	8	35
Lower cost of equipment...							
10 percent lower cost	22	19	18	15	17	14	0
25 percent lower cost	15	19	13	13	13	6	13
50 percent lower cost	4	0	3	2	3	4	4

[1]Percentages add to more than 100 since multiple answers were allowed.

2.2.6.2. Communications Needs

26. What are your most critical communications needs? (Mark X by Each Item That Applies)

More frequencies and channels
New equipment
More reliable equipment
Personal transceivers for each officer
Portamobile voting system
Scramblers
Standardization of all equipment
Other (specify)

Five of the eight choices in the questionnaire were cited as "critical communications needs" by one-third or more of the respondents. Nearly half of the departments said new equipment, more frequencies/channels, and personal transceivers for each officer were critical communications needs. (See table 26-1.)

Personal transceivers for each officer seemed to be the most critical communications need for all city department types with more than 10 officers and townships. Cities (1-9) and counties most often said they needed new equipment. Almost three-quarters of the states said that more frequencies and channels was a critical communications need. The fact that 45 percent of the cities (10-49) said the same thing is not surprising in view of their answers to Question 17: 71 percent of the cities (10-49) which did not currently have scramblers said that this equipment was needed in their departments. (See table 26-2.)

TABLE 26-1. *Most critical communications needs, by all departments*[1]

Communications need	Percent of all departments
New equipment	45
More frequencies/channels	44
Personal transceivers	43
Standardize all equipment	38
Scramblers	34
More reliable equipment	21
Portamobile voting system	8
Other	11

[1]Percentages add to more than 100 percent since multiple answers were allowed.

TABLE 26-2. *Most critical communications needs indicated by 40 percent or more of the departments within each department type*[1]

	Department type (by %)						
Communications need	State	50 largest	City 50+	City 10-49	City 1-9	County	Township
New equipment	45	43	43	41	51	49	-
More frequencies/channels	57	48	46	44		41	-
Personal transceivers	-	74	47	48			52
Standardize all equipment	51	43		42			
Scramblers				45			
More reliable equipment							
Portamobile voting system							
Other							

[1]Percentages add to more than 100 since multiple answers were allowed.

2.2.6.3. Problems with and Failures of Communications Equipment

27. What are your most serious problems with communications equipment?

Question 27 was "open-ended" allowing respondents to write in their problems with communications equipment and categories, for these narrative responses were developed after the questionnaires were returned. Many of the responses to this question were related to the "critical communications needs" discussed in the previous question. Some of the most commonly indicated problems were: Overcrowding and congestion of channels, problems with old equipment, and problems having to do with repairs, maintenance and lack of reliability of equipment. Since there were many different answers to this question, none of the categories of problems in table 27 was mentioned by as many as one-quarter of the respondents. Perhaps the most important aspect of this question is the fact that more than 75 percent of the departments listed some communications problem that they considered to be serious (11% gave no answer and 13% said "no problems").

TABLE 27. *Most serious problems with communications equipment, by all respondents*[1]

Problem	Percent of all departments (n=428)
Overcrowding/congestion	19
Old equipment/need new or more	16
Malfunctions, breakdowns, failures	14
Repair, maintenance, service	11
Inadequacy of equipment (range, power)	10
Electrical/mechanical interference (skip)	8
Reliability/lack of quality control	6
Character of area/terrain causing dead spots	5
Unauthorized monitoring	4
Standardization, interchangeability needs	3
Expense/high cost	2
Other	6
No problems	13
No answer	11

[1]Percentages add to more than 100 since multiple answers were allowed.

28. What are your most common equipment failures, whether entire units or specific components?

As in Question 27, response categories were developed from the narrative answers supplied to this question. Eighty-two percent of the respondents listed at least one common equipment failure (15% no answer and 12% "no problem"). Three failure categories stood out: Tubes, transistors, capacitors (25%); specific components, normal wear and tear (18%); mike cables, connectors, wiring (15%). (See table 28.)

TABLE 28. *Most common equipment failures, by all respondents*[1]

Failure category	Percent of all departments (n=428)
Tubes, transistors, capacitors	25
Specific components, normal wear and tear	18
Mike cables, connections, wiring	15
Antennas, relays, cables	9
Switches/fuses (circuit breakers)	9
Crystals, trimmers, frequency problems	9
Transmitter problems/failures	7
Portable/mobile radios and accessories	6
Power supplies, vibrators, inverters, reeds	4
Other	7
No failures	12
No answer	16

[1]Percentages add to more than 100 since multiple answers were allowed.

2.2.7. Comments

29. Do you have any other general comments or observations about communications equipment that might be helpful to the people who will be studying and testing this equipment for police use?

No attempt was made to actually code the comments received to this question. They have been retained verbatim, and can be made available for research purposes (without identification of specific respondents).

When a "comments" section is provided at the end of a lengthy questionnaire such as this one, the response rate is usually expected to be low. However, in the case of the communications questionnaire, over one-fourth of the 428 respondents provided an additional comment or statement. (See table 29.).

TABLE 29. *Additional comments/observations about communications equipment, by department type*

Department type	Percent of all respondents
State	45
City (10-49)	38
50 largest	36
Township	33
City (50+)	26
County	18
City (1-9)	17
All respondents	29

The comments appeared to be well thought out and expressed the high degree of concern the respondents felt about their communications equipment. Several areas of particular concern were identified: High expense of communications equipment, maintenance for the equipment, the need for scramblers, overcrowding of frequency bands, and need for improvement in portable radios and power sources. Examples of the expression of these concerns follows.

The High Expense of Communications Equipment

> Communications equipment and systems are expensive. It appears each manufacturer adds new features one at a time so obsolescence comes at shorter intervals. An advanced technology by one manufacturer may not be available by another causing a problem in developing an open specification. Or the technology may be similar yet different enough to create not only bidding difficulties but maintenance differences requiring different techniques and test equipment.
>
> Cost of equipment—many P.D.s operate on small limited budgets; therefore, cannot afford to purchase proper amount of equipment for proper security.
>
> Require LEAA expenditures be made only for equipment that meets the same performance standards for best make tested. Money spent for inferior equipment is money wasted.

Some replacement components are priced too high. More standard components are needed.

Would like to see standardized equipment at lower cost so departments with limited budgets can get more equipment.

Small departments are unable to purchase much needed equipment because of budgets and city leaders who think in the past.

Keep the price down.

The Need for Scrambers

The biggest problem that my department has is the monitoring of the frequency that we are assigned. A call can be transmitted and the person we are looking for can be gone upon the arrival of officers, since he or she has heard our transmissions. This will occur daily. Or someone will call by public service wanting to know why their name or their neighbor's name was mentioned or why we are looking for them. To ensure or secure efficient police work we must cut down on outside monitors.

In our department what is needed is a scrambler system which can be used with the base station, mobile radios, and handheld radios, which is priced within reach of the average department.

A well built and high quality scrambler device at a moderate price range is one of the greatest needs of law enforcement today. Studying and testing scramble devices should have a high priority.

For purposes of security, we would like to see an absolutely foolproof scrambler system.

We also need good scramblers at a reasonable cost.

The Problem of Maintenance

There should be a survey on maintenance, new methods of servicing electronic equipment, standards for electronic technicians and some means of providing good in-service training regarding all electronic equipment the men service.

Manufacturers, due to feedback from users, are informed of common equipment failure but they do not pass information on to local repair shops.

Any study of police communications should also consider estimated life of hardware, general maintenance, installation and other long term requirements for reliability and performance. There should be no "down time" on police communication facilities, which are often used 15 years or more. Especially true of base facilities.

Current communications maintenance programs are inadequate. Equipment receives no attention until it fails. Often no "backup" hardware is available, pressuring technicians into "hurry-up" jobs and inadequate service.

The Problem of Overcrowded Frequency Bands

The use of power allocations and frequency allocations should be checked more closely. Crowded conditions and non-essential chatter is causing a great deal of problems in emergency situations.

We are on a frequency with at least 15 other towns. We are constantly drowned out by others who must be overmodulated.

Frequency coordination has always been a problem. At the present time, we have cities operating on our channel which are less than 40 miles away.

We would like to see, in this area, a frequency with a channel of our own with no outsiders.

The Need for Improvements in Portable Radios and Power Sources

Our portables are useless. They almost never work right.

This department purchased two hand portable units. We've had them about 18 months and they have been returned to factories several times for repairs.

Portable radios with capacity for long distance receiving and transmitting.

Consideration should be given to designing a radio for a police officer that would be durable and waterproof under the most extreme condition a police officer may be called upon to perform service.

Hand held radio lighter in weight but retain and improve the present power output levels.

One of the biggest problems is the weight and size of the portable radios. The output power is low, but the weight of the unit makes it cumbersome.

I believe there is a great need for reasonably priced integrated-circuit designed radios to be carried or worn by all officers for constant communication availability. Might eventually eliminate need for radios in cars.

Battery size and weight reduction should receive high priority.

We feel that batteries used in portable and hand-carried equipment are too large and too heavy—that the power source development have not been kept with circuitry sophistication. We would like to see a 5-watt hand-carried portable transceiver with very small dimensions.

One suggestion is that manufacturers of power source batteries be given the necessary incentive to "catch up" with the communications industry by making compatible batteries that are smaller in size, weigh less, have a longer life and increase the power output.

APPENDIX A

NBS-885
May 1972

OMB 41-F72030

Approval Expires June 30, 1973

U.S. Department of Commerce
National Bureau of Standards

DETAILED QUESTIONNAIRE: COMMUNICATIONS

POLICE EQUIPMENT SURVEY

Sponsored By:

National Institute of Law Enforcement and Criminal Justice
Law Enforcement Assistance Administration
U. S. Department of Justice

Directed and Conducted By:

Behavioral Sciences Group
National Bureau of Standards
Washington, D.C. 20234
Phone: 301-921-3558

NOTE: This questionnaire is included in this document as a supplement to the discussion in the text. It has no other intended use.

INTRODUCTION: Maintaining good communications under very poor conditions is important to good police action. Many departments have lost communication when they needed it most. System parts often cannot be interchanged, batteries are unreliable and some equipment is too expensive for many departments to buy. In order to make it easier for law enforcement departments to be able to buy communications equipment that meets their needs, the Law Enforcement Standards Laboratory will be writing performance standards for this equipment. These standards will be available to any department that wishes to use them.

PURPOSE OF THIS QUESTIONNAIRE: The purpose of this "detailed" questionnaire is to get answers from YOU, the user, about the communications equipment you are now using, and the problems you find in using it. Your answers will be used to determine what kinds of testing need to be done, and what sorts of problems must be solved. We must find out what YOUR needs are.

GENERAL INSTRUCTIONS:

1. Fill in the questionnaire completely. Even if you do not have all the information you need "at your fingertips", please make your best effort to supply every answer AS ACCURATELY AS POSSIBLE.

2. Answer all questions FOR YOUR OWN DEPARTMENT. Do not attempt to supply information that might exist in some other department.

3. The results of this questionnaire will be compiled by computer. It is very important that you follow directions and answer every question in the boxes and spaces provided.

4. No individual department will be identified in the report of this survey; the results will be published only in table form.

5. Additional instructions for filling in your answers appear after some questions. Follow the directions given.

6. Please PRINT all answers and comments CLEARLY.

7. When this questionnaire has been completely filled in; place it, with the other questionnaires sent to your department, in the stamped, addressed envelope supplied. Return all of them to:
   Technology Building, A-110
   National Bureau of Standards
   Washington, D.C. 20234

8. If you have any questions, write to the above address or call collect:
   E. Bunten, or P. Klaus
   Phone: 301-921-3558

9. Remember that it is only by getting YOUR DEPARTMENT'S answers to these questions that it will be possible to begin really working on problems that police have with communications equipment and supplies.

PART I: CAR RADIOS

1. Give the following information about your car radios:
   1.A. List ALL transmitting frequencies (in KHz, MHz, etc.)
   (Attach an additional sheet if necessary.)

(10-17)*** _____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

1.B. List ALL receiving frequencies; if different from Question 1.A.

(18-25) _____ _____ _____

_____ _____ _____

(26-28) 1.C. Output power (in watts)_____

(29-30) 1.D. Number of Channels Authorized_____

(31-32) 1.E. Number of Channels in Use_____

2.A. How many car radios are there in your department?

(33-36) Number_____

2.B. Of those car radios, about how many were made by each of the following manufacturers?

NUMBER	MANUFACTURER
(37-40) _____	Motorola
(41-44) _____	RCA
(45-48) _____	GE
(49-52) _____	Other (Specify)_____

3. How recently were most of the car radios bought by your department? (Mark X by your best estimate)

(53-56)
_____Within the last calendar year
_____1 - 3 years ago
_____4 - 5 years ago
_____More than 5 years ago

***Numbers in parentheses are for computer use only.

4. About how much did each of the car radios cost that are most frequently used in your department (including base plate, control head, microphone, and speaker)? For example, if most of the radios now in use are Motorolas, please give us the cost of one set. (MARK X BY YOUR BEST ESTIMATE BELOW)

(57-62)

_____Less than $700

_____$701-$800

_____$801-$900

_____$901-$1000

_____$1001-$1500

_____Over $1500

5.A. What is the total area within your jurisdiction which must be covered by a communication system? (IN SQUARE MILES)

(63-68) _____Square Miles

5.B. If possible, please tell us how many different law enforcement channels serve this area. This figure would include not only those channels used by your department, but also those used by other law enforcement agencies operating in the same geographical area (e.g., state and local police).

(69-70) _____Channels

(71) _____Don't Know

5.C. Do you have one common frequency for routine and emergency traffic?

(72) _____Yes

_____No (IF "NO") Do you think you need a common frequency?

(73) _____Yes

_____No

6. Which of the following best describes the general character of your jurisdiction? (MARK X BY MORE THAN ONE, IF NECESSARY)

(74-80)

_____ Skyscrapers, many tall buildings

_____ Some tall buildings

_____ Almost no tall buildings

_____ Primarily mountainous or very hilly

_____ Valley area surrounded by mountains

_____ Generally flat with some hills

_____ Flat area, no hills

7.A. Do you use fixed repeaters in your area (to cover dead spots in communication which otherwise would exist)?

(10)

_____ Yes

_____ No

7.B. (IF "YES" TO QUESTION 7.A.) How many fixed repeaters does your department have?

(11-12)

_____ Fixed Repeaters

8. If you use, or will be using fixed repeaters, which of the following types do you prefer?

(13-16)

_____ Will not use fixed repeaters

_____ F1F1 repeater (same frequency in and out)

_____ F1F2 repeater (two different frequencies)

_____ No preference

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PART II: PORTABLE (HAND-HELD) RADIOS

9. Do you now use portable (hand-held) radios in your department?

(17) _____Yes

_____No (IF "NO", SKIP TO PART III, QUESTION 15)

(IF "YES" TO QUESTION 9, ANSWER QUESTIONS 10-14)

10. Give the following information about your portable radios:

10.A. List ALL transmitting frequencies (in KHz, MHz, etc.) (Attach an additional sheet if necessary.)

(18-25) _____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

10.B. List ALL receiving frequencies; if different from Question 1.A.

(26-33) _____ _____ _____

_____ _____ _____

(34-35) 10.C. Output power (in watts) _____

(36-37) 10.D. Number of Channels Authorized_____

(38-39) 10.E. Number of Channels in Use_____

11.A. How many portable radios do you now have in your department?

(40-44) Number_____

11.B. Of those portable radios, about how many were made by the following manufacturers?

	NUMBER	MANUFACTURER
(45-49)	_____	Motorola
(50-54)	_____	RCA
(55-59)	_____	General Electric
(60-64)	_____	Halicrafters
(65-69)	_____	Other (Specify)_____
	_____	Other (Specify)_____

12. What model of portable radio do you have more of in your department than any other?

(70-71) MANUFACTURER _____

(72-80) MODEL OR MODEL NUMBER _____

12.A. When did you buy most of these "most used" portable radios?

(10-13)

_____ Within the last calendar year

_____ 1-3 years ago

_____ 4-5 years ago

_____ More than 5 years ago

12.B. About how much did you pay for one of these "most used" portable radios (including antenna, carrying case, and spare batteries)?

(14-19)

_____ Less than $500

_____ $501-$700

_____ $701-$900

_____ $901-$1100

_____ $1101-$1500

_____ Over $1500

12.C. About how much does one of these "most used" portable radios weigh?

(20-24)

_____ Less than 20 oz.

_____ 20 oz. to 26 oz.

_____ 27 oz. to 32 oz.

_____ 33 oz. to 38 oz.

_____ More than 38 oz.

12.D. How do you feel about the weight of the "most used" portable radios?

(25-27)

_____ The weight is about right

_____ The unit is somewhat heavy

_____ The unit is entirely too heavy

13. A portable radio can be used with a repeater by a patrolman when he is out of his car. The portable radio transmits to the car radio which then relays the signals to the base radio. Do you need repeaters like this in your communications system?

(28) _____ Yes

_____ No

Why? _____

_____

_____

_____

14. Some law enforcement agencies use portamobile radios with several receivers and a voting system. Do you favor such a system?

(29) _____ Unfamiliar with "voting system"

_____ Yes

_____ No

(IF "YES" OR "NO", WHY? _____

_____

_____

_____

PART III: NEED FOR STANDARDS

15. Many policemen have indicated the need for standardization of communications equipment. Which of the following equipment and components would you like to see standardized? (MARK X BY EACH ITEM THAT APPLIES)

(30-38)

_____ Portable radios

_____ Mobile radios

_____ Batteries for portable radios

_____ Control heads

_____ Microphones

_____ Switches on control heads

_____ Mounting brackets

_____ Cable between microphone and control head

_____ Other (Specify) _____

_____ Other (Specify) _____

16. What will your department gain by the standardization discussed above? (X EACH ITEM THAT APPLIES)

(39-47)

_____ 10% lower cost of equipment

_____ 25% lower cost of equipment

_____ 50% lower cost of equipment

_____ Interchangeability of radios

_____ Interchangeability of components

_____ Savings in training of technicians

_____ Savings in training of patrolmen

_____ Interchangeability with other communications systems

_____ Other (Specify) _____

_____

_____

_____

PART IV: SCRAMBLERS

17. In some areas, police use "voice privacy" systems which scramble messages so that they cannot be received by people other than police. Do you HAVE a scrambler system of this type?

(48) _____ Yes

_____ No (IF "NO") Do you NEED a scrambler system of this type?

(49) _____ Yes

_____ No (IF "NO" SKIP TO QUESTION 21)

18. For which of the following purposes do you need, or would you use, a scrambler system? (MARK X BY EACH ITEM THAT APPLIES)

(50-55) _____ General communications

_____ During robberies

_____ Long-term stake out

_____ Demonstrations or protests

_____ Undercover investigations

_____ Other (Specify) _____

_____ Other (Specify) _____

_____ Other (Specify) _____

19. How do you (would you) use your scramblers? (MARK X BY ONE OF THE FOLLOWING)

(56-59) _____ With car radios

_____ With portable radios

_____ With both car radios and portable radios

_____ Only in special vehicles (Specify) _____

_____

20. How much do you think your department would pay for a good, reliable scrambler system? (MARK X BY YOUR BEST ESTIMATE BELOW.)

(60-64) _____ Less than $250 per unit

_____ $251-$500 per unit

_____ $501-$750 per unit

_____ $751-$1000 per unit

_____ More than $1000 per unit

PART V: HELMET COMMUNICATIONS

21. Helmets with built-in communications have been developed and are now on the market. Is there a need for such helmets in your department?

(65)

_____ Yes

_____ No

Why? or Why not? _____

_____

_____

_____

PART VI: POWER SUPPLIES

22. Should standards for power supplies such as charging equipment, and batteries for portable radios be given? (CHOOSE ONE OF THE FOLLOWING)

(66-69)

_____ High priority

_____ Medium priority

_____ Low priority

_____ Standards are not needed for these items

23. What types of batteries do you now use for your portable radios? (MARK X BY EACH ITEM THAT APPLIES)

(70-75)

_____ Alkaline-Manganese

_____ Carbon-Zinc

_____ Mercury

_____ NiCad (Nickel-cadmium)

_____ Silver Oxide

_____ Other (Specify) _____

24. What type of batteries do you prefer to use for your portable radios? (MARK X BY ONE OF THE FOLLOWING)

(10-15) _____ Alkaline-Manganese

_____ Carbon-Zinc

_____ Mercury

_____ NiCad (Nickel-cadmium)

_____ Silver Oxide

_____ Other (Specify) _____

25. Do you use batteries for your portable radios which must be recharged?

(16) _____ Yes

_____ No (IF "NO" SKIP TO QUESTION 26, PART VII)

25.A. (IF "YES" TO Q. 25) How long can you use the battery before it must be recharged?

(17-19) _____ Hours

25.B. (IF "YES" TO Q. 25) How long does it usually take to recharge the battery to a point where it can be used again?

(20-21) _____ Hours

25.C. (IF " YES" TO Q. 25) How long does it usually take to fully recharge the battery?

(22-23) _____ Hours

25.D. (IF "YES" TO Q. 25) How long can you usually use these batteries before they must be replaced?

(24-25) _____ Months

PART VII: GENERAL COMMENTS

26. What are your most critical communications needs? (MARK X BY EACH ITEM THAT APPLIES)

(26-31)

_____ More frequencies and channels

_____ New equipment

_____ More reliable equipment

_____ Personal transceivers for each officer

_____ Portamobile voting system

_____ Scramblers

_____ Standardization of all equipment

_____ Other (Specify) _____

_____ Other (Specify) _____

27. What are your most serious problems with communications equipment?

(32-33) _____

_____

_____

_____

_____

28. What are your most common equipment failures, whether entire units or specific components?

(34-35) _____

_____

_____

_____

_____

_____

29. Do you have any other general comments or observations about communications equipment that might be helpful to the people who will be studying and testing this equipment for police use?

IDENTIFYING INFORMATION: (All identifying information will be kept confidential)

Name of Department: _____

Address: _____

Name of person who answered this questionnaire:

_____
Name

Title: _____ Rank: _____

No. of years experience in law enforcement: _____

Telephone Number: _____

Others who helped: 1. _____
Name

Title: _____ Rank: _____

No. of years experience in law enforcement: _____

Telephone Number: _____

2. _____
Name

Title: _____ Rank: _____

No. of years experience in law enforcement: _____

Telephone Number: _____

APPENDIX B
Data Tables

B.1. Advice to the Reader

(a) The data presented in the following tables resulted from the responses of a stratified random sample (see sec. 1.2) of police departments in response to a specific set of questions (see app. A). These data do not, in any way, reflect objective testing of any of the equipment by the National Bureau of Standards. The reader is cautioned to become familiar with the questionnaire and to evaluate the data in terms of the exact questions asked.

(b) Tables have been numbered after the question number (e.g., the tables for Question 6A would be numbered 6A-1, 6A-2, etc.). The data are usually presented by number of respondents and nearest whole percentage. Because of the statistical limitations imposed by the sample sizes used in this study, the reader is cautioned to be wary of assigning importance to percentage differences of less than 5 percent when percentages are based on all respondents, and to percentage differences of less than 10 percent when percentages are based on one of the subsample groups (e.g., a particular department type or region). No statistical tests of significance are reported.

(c) These tables are based on the responding departments from the specific sample selected for this questionnaire. This sample was not proportional to the total population of police departments, and although it is possible to do so, the data in these tables have not been weighted to allow direct extrapolation to the total population.

(d) In order to extrapolate to the total population from the respondent data presented in this report, use the following procedure: For each department type, multiply the percentage of respondents of a particular department type giving the answer of interest (see B.2 Data Tables, app. B) by the total number of departments of that department type in the population (see table 1.2-2, sec. 1.2); add those seven subtotals; and divide the total by the total number of police departments in the population (table 1.2-2). The quotient of this division will be an estimate of the percentage of all U.S. police departments that would choose the answer of interest.

B.2. Data Tables

Table i-1

RANK OF PERSON WHO FILLED IN QUESTIONNAIRE

RESPONSE	DEPARTMENT TYPE																	
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
CHIEF	122	29	0	0	4	6	57	73	36	42	11	14	2	4	12	52
CAPTAIN	29	7	3	6	2	3	0	0	8	9	14	18	1	2	1	4
COMMISSIONER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLONEL	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
ACTING CHIEF	3	1	0	0	0	0	0	0	2	2	0	0	0	0	1	4
ASSISTANT CHIEF	16	4	0	0	1	1	2	3	8	9	5	6	0	0	0	0
MAJOR	2	0	1	2	0	0	0	0	0	0	0	0	1	2	0	0
LIEUTENANT	37	9	2	4	4	6	4	5	12	14	12	15	3	7	0	0
CORPORAL	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
PRIVATE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEPUTY SHERIFF	20	5	0	0	19	28	0	0	0	0	1	1	0	0	0	0
INSPECTOR	4	1	1	2	0	0	0	0	1	1	0	0	2	4	0	0
SHERIFF	25	6	0	0	25	36	0	0	0	0	0	0	0	0	0	0
CONSTABLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SERGEANT	30	7	2	4	4	6	1	1	10	12	6	8	3	7	4	17
PATROLMAN	17	4	0	0	1	1	4	5	4	5	3	4	1	2	4	17
OTHER TITLE	18	4	2	4	0	0	8	10	1	1	5	6	2	4	0	0
UNDERSHERIFF	4	1	0	0	4	6	0	0	0	0	0	0	0	0	0	0
COMMUNICATIONS SPECIALIST	96	22	36	77	4	6	0	0	2	2	22	28	31	67	1	4
NO ANSWER	3	1	0	0	1	1	1	1	1	1	0	0	0	0	0	0
TOTALS	428	101	47	99	69	100	78	99	86	99	79	100	46	99	23	98

Table i-2

YEARS OF EXPERIENCE OF PERSON WHO FILLED IN QUESTIONNAIRE

RESPONSE	DEPARTMENT TYPE																	
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
2 OR LESS	29	7	1	2	7	10	8	10	4	5	3	4	2	4	4	17
3-5 YEARS	68	16	6	13	20	29	19	24	7	8	10	13	1	2	5	22
6-10 YEARS	77	18	4	9	15	22	15	19	23	27	13	16	5	11	2	9
11-15 YEARS	82	19	16	34	7	10	8	10	21	24	13	16	9	20	8	35
16-20 YEARS	76	18	10	21	6	9	9	12	17	20	18	23	15	33	1	4
21-25 YEARS	33	8	6	13	3	4	6	8	7	8	6	8	5	11	0	0
26-30 YEARS	28	7	2	4	7	10	4	5	2	2	8	10	5	11	0	0
31 OR MORE	17	4	0	0	2	3	6	8	3	3	3	4	1	2	2	9
NO ANSWER	18	4	2	4	2	3	3	4	2	2	5	6	3	7	1	4
TOTALS	428	101	47	100	69	100	78	100	86	99	79	100	46	101	23	100

Table 1 A-1
GIVE THE FOLLOWING INFORMATION ABOUT YOUR CAR RADIOS:
1.A. LIST ALL TRANSMITTING FREQUENCIES (IN KHZ, MHZ, ETC.)

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
FREQUENCY CATEGORY	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
30-50 MHZ	396	29	173	59	88	51	45	37	44	28	23	13	12	3	11	29
150-174 MHZ	662	49	102	35	72	42	48	40	95	61	115	63	207	53	23	61
450-470 MHZ	261	19	17	6	8	5	14	12	13	8	42	23	164	42	3	8
OTHER	14	1	0	0	0	0	2	2	1	1	1	1	10	3	0	0
NO ANSWER	22	2	0	0	5	3	11	9	2	1	2	1	1	0	1	3
TOTALS	1355	100	292	100	173	101	120	100	155	99	183	101	394	101	38	101
NUMBER OF RESPONDENTS	428		47		69		78		86		79		46		23	

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
FREQUENCY CATEGORY	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
30-50 MHZ	2.30	4.22	2.10	1.41	1.52	1.77	1.71	1.37
150-174 MHZ	2.72	5.67	2.77	1.41	1.64	2.05	5.59	1.64
450-470 MHZ	4.42	5.67	2.67	2.33	2.17	2.62	6.83	3.00
OTHER	2.80	.00	.00	1.00	1.00	1.00	10.00	.00
TOTALS	3.28	6.21	2.62	1.63	1.82	2.35	8.73	1.68

RANGE	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
30-50 MHZ	21	1	20	1	21	1	3	1	4	1	3	1	5	1	2	1
150-174 MHZ	29	1	15	1	8	1	3	1	4	1	5	1	29	1	4	1
450-470 MHZ	14	1	9	4	4	1	4	1	3	1	6	1	14	2	3	3
OTHER	10	1	0	***	0	***	1	1	1	1	1	1	10	10	0	***

Table 1 B-1

GIVE THE FOLLOWING INFORMATION ABOUT YOUR CAR RADIOS:
1.B. LIST ALL RECEIVING FREQUENCIES; IF DIFFERENT FROM QUESTION 1.A.

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
FREQUENCY CATEGORY	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
30-50 MHZ	93	23	32	60	18	49	11	33	14	52	6	10	10	5	2	50
150-174 MHZ	121	30	13	25	13	35	10	30	6	22	31	53	47	24	1	25
450-470 MHZ	169	41	8	15	1	3	1	3	5	19	17	29	137	70	0	0
OTHER	4	1	0	0	0	0	0	0	0	0	2	3	2	1	0	0
NO ANSWER	22	5	0	0	5	14	11	33	2	7	2	3	1	1	1	25
TOTALS	409	100	53	100	37	101	33	99	27	100	58	98	197	101	4	100
NUMBER OF RESPONDENTS	152		17		21		27		19		33		31		4	

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
FREQUENCY CATEGORY	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
30-50 MHZ	2.02	2.91	2.57	1.37	1.27	1.50	3.33	1.00
150-174 MHZ	1.92	2.60	1.62	1.25	1.00	1.63	2.94	1.00
450-470 MHZ	4.45	2.67	1.00	1.00	1.67	1.70	6.85	.00
OTHER	2.00	.00	.00	.00	.00	2.00	2.00	.00
TOTALS	2.98	3.12	2.00	1.37	1.47	1.81	6.53	1.00

RANGE	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
30-50 MHZ	12	1	7	1	12	1	3	1	3	1	2	1	4	3	1	1
150-174 MHZ	9	1	3	2	2	1	2	1	1	1	4	1	9	1	1	1
450-470 MHZ	14	1	4	1	1	1	1	1	2	1	3	1	14	1	0	***
OTHER	2	2	0	***	0	***	0	***	0	***	2	2	2	2	0	***

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Table 1 B-3

(CAR RADIOS)
NUMBER OF DEPARTMENTS WHOSE TRANSMITTING AND RECEIVING FREQUENCIES ARE THE SAME.

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
DEPARTMENTS WITH SAME TRANS. AND REC. FREQS.	276	68	30	64	48	75	51	76	67	80	46	60	15	33	19	86

Table 1 C-1

(CAR RADIOS)
1.C. OUTPUT POWER (IN WATTS)

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
AVERAGE WATTAGE	70.95	91.28	84.62	64.00	63.33	67.54	56.34	74.44
WATTAGE RANGE	OVERALL	WATTS	WATTS	WATTS	WATTS	WATTS	WATTS	WATTS
MINIMUM	15	30	30	15	25	15	15	25
MAXIMUM	110	110	110	110	110	110	110	110
MODE	100	100	100	100	100	100	***	***
NUMBER OF RESPONDENTS	351	47	53	56	69	67	41	18

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
LESS THAN 10	4	1	0	0	0	0	1	1	1	1	2	3	0	0	0	0
10 - 29	28	7	0	0	0	0	4	5	5	6	9	11	9	20	1	4
30 - 49	73	17	1	2	4	6	15	19	19	22	16	20	15	33	3	13
50 - 69	66	15	6	13	11	16	15	19	18	21	11	14	1	2	4	17
70 - 89	24	6	2	4	1	1	5	6	6	7	4	5	4	9	2	9
90 - 110	160	37	38	81	37	54	17	22	21	24	27	34	12	26	8	35
MORE THAN 110	34	8	0	0	7	10	6	8	9	10	6	8	3	7	3	13
NO ANSWER	39	9	0	0	9	13	15	19	7	8	4	5	2	4	2	9
TOTALS	428	100	47	100	69	100	78	99	86	99	79	100	46	101	23	100

Table 1 D-1

GIVE THE FOLLOWING INFORMATION ABOUT YOUR CAR RADIOS:

1.D. NUMBER OF CHANNELS AUTHORIZED
1.E. NUMBER OF CHANNELS IN USE

Table 1 E-1

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
CHANNELS AUTHORIZED	1452	100	309	21	195	13	144	10	169	12	184	13	411	28	40	3
CHANNELS IN USE	1332	100	274	21	186	14	124	9	158	12	174	13	378	28	38	3
NUMBER OF RESPONDENTS	417		47		67		73		85		77		45		23	
NUMBER OF RESPONDENTS	418		47		67		73		86		77		45		23	

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
CHANNELS AUTHORIZED	3.48	6.57	2.91	1.97	1.99	2.39	9.13	1.74
CHANNELS IN USE	3.19	5.83	2.78	1.70	1.84	2.26	8.40	1.65

RANGE	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
CHANNELS AUTHORIZED	40	1	20	2	36	1	12	1	6	1	6	1	40	1	4	1
CHANNELS IN USE	40	1	20	2	36	1	4	1	5	1	6	1	40	1	4	1

Table 2 A-1

2.A. HOW MANY CAR RADIOS ARE THERE IN YOUR DEPARTMENT?

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
TOTAL NUMBER OF RADIOS	67807	34365	2653	239	631	2597	27221	101
PERCENT	100	51	4	0	1	4	40	0
AVERAGE NUMBER	158.43	731.17	38.45	3.06	7.34	32.87	591.76	4.39
MAXIMUM	4275	3510	900	28	21	177	4275	26
MINIMUM	1	97	1	1	1	7	101	1
NUMBER OF RESPONDENTS	428	47	69	78	86	79	46	23

Table 2 B-1

2.B. OF THOSE CAR RADIOS, ABOUT HOW MANY WERE MADE BY EACH OF THE FOLLOWING MANUFACTURERS?

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
MANUFACTURER C	38510	57	15308	45	1553	59	125	52	436	69	1650	63	19385	71	53	52
MANUFACTURER A	5714	8	3780	11	68	3	12	5	38	6	363	14	1450	5	3	3
MANUFACTURER B	23225	34	15079	44	1020	38	89	37	146	23	575	22	6272	23	44	44
OTHER	358	1	198	1	12	0	13	5	11	2	9	0	114	0	1	1
NO ANSWER	6	0	0	0	1	0	2	1	0	0	2	0	1	0	0	0
TOTALS	67813	100	34365	101	2654	100	241	100	631	100	2599	99	27222	99	101	100
NUMBER OF RESPONDENTS	428		47		69		78		86		79		46		23	

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
MANUFACTURER C	329	52	39	39	53	55	52	54	69	62	60	56	40	44	16	55
MANUFACTURER A	76	12	20	20	8	8	8	8	8	7	14	13	16	18	2	7
MANUFACTURER B	200	32	37	37	31	32	30	31	30	27	31	29	31	34	10	34
OTHER	22	3	4	4	3	3	5	5	5	4	1	1	3	3	1	3
NO ANSWER	6	1	0	0	1	1	2	2	0	0	2	2	1	1	0	0
TOTALS	633	100	100	100	96	99	97	100	112	100	108	101	91	100	29	99

Table 3-1

3. HOW RECENTLY WERE MOST OF THE CAR RADIOS BOUGHT BY YOUR DEPARTMENT?

RESPONSE	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
WITHIN THE LAST YEAR	64	15	3	6	9	13	8	10	16	19	20	25	3	7	5	22
1 - 3 YEARS AGO	139	32	19	40	19	27	31	38	32	37	14	17	19	41	5	22
4 - 5 YEARS AGO	78	18	10	21	16	23	11	13	8	9	16	20	9	20	8	35
OVER 5 YEARS AGO	146	34	15	32	24	34	30	37	30	35	28	35	14	30	5	22
NO ANSWER	7	2	0	0	2	3	2	2	0	0	2	2	1	2	0	0
TOTALS	434	101	47	99	70	100	82	100	86	100	80	99	46	100	23	101
NUMBER OF RESPONDENTS	428		47		69		78		86		79		46		23	

Table 4-1

4. ABOUT HOW MUCH DID EACH OF THE CAR RADIOS COST THAT ARE MOST FREQUENTLY USED IN YOUR DEPARTMENT (INCUDING BASE PLATE, CONTROL HEAD, MICROPHONE, AND SPEAKER)? FOR EXAMPLE, IF MOST OF THE RADIOS NOW IN USE ARE MOTOROLAS, PLEASE GIVE US THE COST OF ONE SET.

RESPONSE	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
LESS THAN $700	93	22	24	51	10	14	23	29	13	15	10	13	11	24	2	9
$701-$800	78	18	6	13	6	9	18	23	20	23	16	20	9	20	3	13
$801-$900	67	16	9	19	6	9	14	18	14	16	16	20	6	13	2	9
$901-$1000	72	17	2	4	15	22	7	9	23	27	17	22	2	4	6	26
$1001-$1500	97	23	5	11	27	39	14	18	15	17	15	19	14	30	7	30
OVER $1500	11	3	1	2	2	3	0	0	0	0	3	4	3	7	2	9
NO ANSWER	11	3	0	0	3	4	3	4	1	1	2	3	1	2	1	4
TOTALS	429	102	47	100	69	100	79	101	86	99	79	101	46	100	23	100
NUMBER OF RESPONDENTS	428		47		69		78		86		79		46		23	

Table 5 A-1

5.A. WHAT IS THE TOTAL AREA WITHIN YOUR JURISDICTION WHICH MUST BE COVERED BY A COMMUNICATION SYSTEM? (IN SQUARE MILES)

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
AVERAGE AREA IN SQ. MILES	7501.27	62704.25	1582.33	66.89	68.44	33.47	236.81	31.45
RANGE OF AREA IN SQ. MILES	OVERALL	SQ. MI.	SQ. MI.	SQ. MI.	SQ. MI.	SQ. MI.	SQ. MI.	SQ. MI.
MINIMUM	1	1497	14	1	1	2	24	5
MAXIMUM	263449	263449	10300	1200	2000	310	841	67

Table 5 B-1

5.B. IF POSSIBLE, PLEASE TELL US HOW MANY DIFFERENT LAW ENFORCEMENT CHANNELS SERVE THIS AREA. THIS FIGURE WOULD INCLUDE NOT ONLY THOSE CHANNELS USED BY YOUR DEPARTMENT, BUT ALSO THOSE USED BY OTHER LAW ENFORCEMENT AGENCIES OPERATING IN THE SAME GEOGRAPHICAL AREA (E.G., STATE AND LOCAL POLICE).

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
NUMBER OF CHANNELS	11.55	71.72	5.69	4.04	4.94	6.18	32.64	5.07
NO ANSWER/DONT KNOW	132	29	14	21	17	22	21	8

Table 6-1

6. WHICH OF THE FOLLOWING BEST DESCRIBES THE GENERAL CHARACTER OF YOUR JURISDICTION?

RESPONSE	TOTAL		LEAA REGION																	
			1		2		3		4		5		6		7		8		9		10	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
SKYSCRAPRS -MANY TALL BUILDINGS	23	5	2	5	3	7	1	2	1	2	7	14	3	7	1	3	1	3	4	8	0	0
SOME TALL BUILDINGS	107	25	3	7	11	24	15	33	13	28	20	39	12	26	9	25	7	21	11	23	6	18
ALMOST NO TALL BUILDINGS	122	29	13	32	15	33	9	20	13	28	14	27	13	28	10	28	9	27	17	35	9	26
MOUNTAINS VERY HILLY	103	24	15	37	8	17	18	39	9	19	7	14	4	9	3	8	11	33	18	37	10	29
VALLEY SURROUNDED BY MTS	113	26	18	44	12	26	13	28	8	17	4	8	4	9	1	3	16	48	23	48	14	41
FLAT WITH SOME HILLS	178	42	12	29	22	48	8	17	23	49	24	47	23	50	30	83	14	42	11	23	11	32
FLAT WITH NO HILLS	77	18	1	2	7	15	7	15	14	30	15	29	19	41	1	3	1	3	11	23	1	3
NO ANSWER	1	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
TOTALS	724	169	64	156	78	170	71	154	81	173	92	180	78	170	55	153	59	177	95	197	51	149
RESPONDNTS	428		41		46		46		47		51		46		36		33		48		34	

Table 6 -2

6. WHICH OF THE FOLLOWING BEST DESCRIBES THE GENERAL CHARACTER OF YOUR JURISDICTION?

RESPONSE	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
SKYSCRAPERS, TALL BUILDINGS	23	5	9	19	1	1	0	0	0	0	1	1	12	26	0	0
SOME TALL BUILDINGS	107	25	15	32	6	9	6	8	14	16	33	42	33	72	0	0
ALMOST NO TALL BUILDINGS	122	29	7	15	16	23	22	28	37	43	32	41	3	7	5	22
MOUNTAINOUS OR VERY HILLY	103	24	22	47	33	48	14	18	13	15	6	8	7	15	8	35
VALLEY SURROUNDED BY MTS.	113	26	22	47	20	29	16	21	21	24	19	24	8	17	7	30
GENERALLY FLAT, SOME HILLS	178	42	36	77	21	30	34	44	37	43	25	32	15	33	10	43
FLAT AREA, NO HILLS	77	18	19	40	4	6	16	21	12	14	17	22	9	20	0	0
NO ANSWER	1	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0
TOTALS	724	169	130	277	101	146	108	140	134	155	133	170	88	192	30	130
NUMBER OF RESPONDENTS	428		47		69		78		86		79		46		23	

Table 7 A-1

7.A. DO YOU USE FIXED REPEATERS IN YOUR AREA (TO COVER DEAD SPOTS IN COMMUNICATION THAT WOULD OTHERWISE EXIST)?

RESPONSE	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	7	2	0	0	2	3	4	5	0	0	0	0	1	2	0	0
YES	145	34	36	77	21	30	10	13	17	20	29	37	30	65	2	9
NO	276	64	11	23	46	67	64	82	69	80	50	63	15	33	21	91
TOTALS	428	100	47	100	69	100	78	100	86	100	79	100	46	100	23	100

Table 7 A-2

7.A. DO YOU USE FIXED REPEATERS IN YOUR AREA (TO COVER DEAD SPOTS IN COMMUNICATION THAT WOULD OTHERWISE EXIST)?

RESPONSE	TOTAL		LEAA REGION 1		2		3		4		5		6		7		8		9		10	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	7	2	0	0	1	2	1	2	0	0	1	2	2	4	0	0	1	3	0	0	1	3
YES	145	34	11	27	8	17	8	17	18	38	20	39	12	26	7	19	15	45	23	48	23	68
NO	276	64	30	73	37	80	37	80	29	62	30	59	32	70	29	81	17	52	25	52	10	29
TOTALS	428	100	41	100	46	100	46	100	47	100	51	100	46	100	36	100	33	100	48	100	34	100

Table 7 B-1

7.B. (IF YES TO QUESTION 7.A.) HOW MANY FIXED REPEATERS DOES YOUR DEPARTMENT HAVE?

RESPONSE	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NUMBER OF FIXED REPEATERS	1197	100	742	62	43	4	9	1	18	2	55	5	328	27	2	0

RESPONSE	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
AVERAGE NUMBER	8.49	20.61	2.05	1.29	1.12	1.90	10.93	1.00
MAXIMUM	224	224	7	2	2	6	87	1
MINIMUM	1	2	1	1	1	1	1	1

Table 8-1

8. IF YOU USE, OR WILL BE USING FIXED REPEATERS, WHICH OF THE FOLLOWING TYPES DO YOU PREFER?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
WILL NOT USE	99	23	2	4	14	20	24	31	32	37	15	19	5	11	7	30
F1F1	32	7	3	6	8	11	4	5	8	9	5	6	3	7	1	4
F1F2	159	37	38	79	15	21	8	10	16	19	43	54	35	76	4	17
NO PREFERENCE	80	19	3	6	16	23	26	33	19	22	9	11	2	4	5	22
NO ANSWER	60	14	2	4	17	24	16	21	11	13	7	9	1	2	6	26
TOTALS	430	100	48	99	70	99	78	100	86	100	79	99	46	100	23	99
NUMBER OF RESPONDENTS	428		47		69		78		86		79		46		23	

Table 8-3

COMPARISON OF USE OF FIXED REPEATERS WITH PREFERENCE.

RESPONSE	8. WHICH TYPES DO YOU PREFER?									
7.A. DO YOU USE FIXED REPEATERS?	TOTAL		WONT USE		F1F1		F1F2		NO PREF.		NO ANSWER	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	7	100	1	14	0	0	0	0	0	0	6	86
YES	147	100	0	0	19	13	115	78	11	7	2	1
NO	276	100	98	36	13	5	44	16	69	25	52	19

Table 9-1

9. DO YOU NOW USE PORTABLE (HAND-HELD) RADIOS IN YOUR DEPARTMENT?

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	2	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0
YES	348	81	47	100	43	62	41	53	77	90	78	99	46	100	16	70
NO	78	18	0	0	25	36	36	46	9	10	1	1	0	0	7	30
TOTALS	428	100	47	100	69	100	78	100	86	100	79	100	46	100	23	100

Table 10 A-1

IF YES TO QUESTION 9, GIVE THE FOLLOWING INFORMATION ABOUT YOUR PORTABLE RADIOS:
10.A. LIST ALL TRANSMITTING FREQUENCIES (IN KHZ, MHZ, ETC.)

RESPONSE	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	DEPARTMENT TYPE															
FREQUENCY CATEGORY	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
30-50 MHZ	226	22	115	59	31	36	19	31	27	25	18	12	12	3	4	15
150-174 MHZ	511	51	61	31	51	59	26	43	65	61	92	62	200	52	16	62
450-470 MHZ	245	24	19	10	1	1	10	16	7	7	37	25	168	44	3	12
OTHER	5	0	0	0	1	1	2	3	0	0	0	0	0	0	2	8
NO ANSWER	19	2	0	0	3	3	4	7	8	7	1	1	2	1	1	4
TOTALS	1006	99	195	100	87	100	61	100	107	100	148	100	382	100	26	101
NUMBER OF RESPONDENTS	348		47		43		41		77		78		46		16	

RESPONSE	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
	DEPARTMENT TYPE							
FREQUENCY CATEGORY	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
30-50 MHZ	2.02	3.11	1.41	1.46	1.42	1.64	1.71	1.33
150-174 MHZ	2.52	3.39	2.68	1.37	1.38	1.74	5.41	1.60
450-470 MHZ	4.15	4.75	1.00	2.00	1.40	2.47	6.00	3.00
OTHER	1.67	.00	1.00	2.00	.00	.00	.00	2.00
TOTALS	3.00	4.15	2.10	1.54	1.43	1.91	8.64	1.67

RANGE	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
30-50 MHZ	20	1	20	1	5	1	3	1	3	1	2	1	3	1	2	1
150-174 MHZ	29	1	14	1	7	1	4	1	4	1	5	1	29	1	4	1
450-470 MHZ	14	1	7	2	1	1	2	2	2	1	4	1	14	1	3	3
OTHER	2	1	0	***	1	1	2	2	0	***	0	***	0	***	2	2

Table 10 B-1

IF YES TO QUESTION 9, GIVE THE FOLLOWING INFORMATION ABOUT YOUR PORTABLE RADIOS:
10.B. LIST ALL RECEIVING FREQUENCIES; IF DIFFERENT FROM QUESTION 10.A.

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
FREQUENCY CATEGORY	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
30-50 MHZ	5	2	3	37	0	0	0	0	1	7	0	0	0	0	1	33
150-174 MHZ	72	34	1	12	11	79	1	20	2	14	18	64	38	27	1	33
450-470 MHZ	116	54	4	50	0	0	0	0	3	21	9	32	100	70	0	0
OTHER	2	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0
NO ANSWER	19	9	0	0	3	21	4	80	8	57	1	4	2	1	1	33
TOTALS	214	100	8	99	14	100	5	100	14	99	28	100	142	99	3	99
NUMBER OF RESPONDENTS	81		4		10		5		13		19		27		3	

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
FREQUENCY CATEGORY	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
30-50 MHZ	1.25	1.50	.00	.00	1.00	.00	.00	1.00
150-174 MHZ	1.80	1.00	1.57	1.00	1.00	1.38	2.53	1.00
450-470 MHZ	4.64	4.00	.00	.00	1.50	1.80	5.88	.00
OTHER	2.00	.00	.00	.00	.00	.00	2.00	.00
TOTALS	3.15	2.00	1.57	1.00	1.20	1.50	5.60	1.00

RANGE	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
30-50 MHZ	2	1	2	1	0	***	0	***	1	1	0	***	0	***	1	1
150-174 MHZ	5	1	1	1	2	1	1	1	1	1	4	1	5	1	1	1
450-470 MHZ	14	1	4	4	0	***	0	***	2	1	2	1	14	1	0	***
OTHER	2	2	0	***	0	***	0	***	0	***	0	***	2	2	0	***

Table 10 B-3

IF YES TO QUESTION 9: (PORTABLE RADIOS)
NUMBER OF DEPARTMENTS WHOSE TRANSMITTING AND RECEIVING FREQUENCIES ARE THE SAME.

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
DEPARTMENTS WITH SAME TRANS. AND REC. FREQS.	267	81	43	91	33	82	36	97	64	93	59	77	19	43	13	87

Table 10 C-1

(PORTABLE RADIOS)
10.C. OUTPUT POWER (IN WATTS)

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
AVERAGE WATTAGE	3.87	5.11	4.63	3.57	4.19	3.41	2.84	3.36
WATTAGE RANGE	OVERALL	WATTS	WATTS	WATTS	WATTS	WATTS	WATTS	WATTS
MINIMUM	1	1	1	1	1	1	1	1
MAXIMUM	18	18	10	5	16	18	8	6
NUMBER OF RESPONDENTS	309	44	30	35	67	74	45	14

Table 10 D-1

IF YES TO QUESTION 9, GIVE THE FOLLOWING INFORMATION ABOUT YOUR PORTABLE RADIOS:

10.D. NUMBER OF CHANNELS AUTHORIZED
10.E. NUMBER OF CHANNELS IN USE

Table 10 E-1

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
CHANNELS AUTHORIZED	1174	100	228	19	96	8	95	8	126	11	171	15	431	37	27	2
CHANNELS IN USE	1012	100	205	20	84	8	65	6	111	11	148	15	374	37	25	2
NUMBER OF RESPONDENTS	347		47		43		41		76		78		46		16	
NUMBER OF RESPONDENTS	346		47		43		41		75		78		46		16	

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
CHANNELS AUTHORIZED	3.38	4.85	2.23	2.32	1.66	2.19	9.37	1.69
CHANNELS IN USE	2.92	4.36	1.95	1.59	1.48	1.90	8.13	1.56

RANGE	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
CHANNELS AUTHORIZED	40	1	20	1	5	1	23	1	4	1	6	1	40	1	4	1
CHANNELS IN USE	40	1	20	1	5	1	4	1	4	1	4	1	40	1	3	1

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Table 11 A-1

11.A. HOW MANY PORTABLE RADIOS DO YOU NOW HAVE IN YOUR DEPARTMENT?

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
TOTAL NUMBER OF RADIOS	22660	3621	464	109	366	1682	16363	55
PERCENT	100	16	2	0	2	7	72	0
AVERAGE NUMBER	65.30	77.04	11.05	2.66	4.75	21.56	355.72	3.44
MAXIMUM	4500	419	125	11	21	108	4500	17
MINIMUM	1	5	1	1	1	2	15	1
NUMBER OF RESPONDENTS	347	47	42	41	77	78	46	16

Table 11 B-1

11.B. OF THOSE PORTABLE RADIOS, ABOUT HOW MANY WERE MADE BY THE FOLLOWING MANUFACTURERS?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
MANUFACTURER A	16143	71	1741	48	312	67	59	54	278	76	1216	72	12496	76	41	75
MANUFACTURER C	1026	5	471	13	2	0	0	0	15	4	107	6	427	3	4	7
MANUFACTURER B	2647	12	506	14	49	11	38	35	51	14	284	17	1718	10	1	2
MANUFACTURER D	1033	5	60	2	0	0	0	0	0	0	4	0	969	6	0	0
OTHER	1811	8	843	23	101	22	12	11	22	6	71	4	753	5	9	16
NO ANSWER	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
TOTALS	22661	101	3621	100	465	100	109	100	366	100	1682	99	16363	100	55	100
NUMBER OF RESPONDENTS	348		47		43		41		77		78		46		16	

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
MANUFACTURER A	272	55	40	41	26	53	24	56	63	66	64	60	43	50	12	63
MANUFACTURER C	46	9	12	12	1	2	0	0	8	8	13	12	11	13	1	5
MANUFACTURER B	106	21	21	22	14	29	13	30	15	16	22	21	20	23	1	5
MANUFACTURER D	4	1	1	1	0	0	0	0	0	0	1	1	2	2	0	0
OTHER	67	14	23	24	7	14	6	14	9	9	7	7	10	12	5	26
NO ANSWER	1	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
TOTALS	496	100	97	100	49	100	43	100	95	99	107	101	86	100	19	99

Table 12-1

12. WHAT MODEL OF PORTABLE RADIO DO YOU HAVE MORE OF IN YOUR DEPARTMENT THAN ANY OTHER?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
MANUFACTURER	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	3	1	0	0	2	5	0	0	0	0	1	1	0	0	0	0
1	6	2	3	6	1	2	0	0	0	0	1	1	0	0	1	6
4	1	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
8	3	1	0	0	2	5	1	2	0	0	0	0	0	0	0	0
15	5	1	2	4	0	0	1	2	1	1	0	0	0	0	1	6
16	64	18	9	19	9	21	10	24	12	16	15	19	9	20	0	0
18	2	1	0	0	0	0	0	0	0	0	0	0	2	4	0	0
19	1	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
21	1	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
30	2	1	0	0	1	2	1	2	0	0	0	0	0	0	0	0
31	224	64	23	49	25	58	25	61	58	75	53	68	30	65	10	62
37	26	7	7	15	1	2	0	0	6	8	7	9	4	9	1	6
39	3	1	2	4	0	0	0	0	0	0	0	0	1	2	0	0
42	3	1	0	0	0	0	1	2	0	0	0	0	0	0	2	12
51	4	1	1	2	0	0	1	2	0	0	1	1	0	0	1	6
TOTALS	348	100	47	100	43	100	41	100	77	100	78	100	46	100	16	100

Table 12-2

12. WHAT MODEL OF PORTABLE RADIO DO YOU HAVE MORE OF IN YOUR DEPARTMENT THAN ANY OTHER?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
MODEL	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	51	15	3	6	11	26	9	22	11	14	11	14	2	4	4	25
1	95	27	17	36	10	23	7	17	24	31	21	27	14	30	2	12
2	79	23	2	4	6	14	8	20	20	26	23	29	15	33	5	31
4	2	1	0	0	1	2	1	2	0	0	0	0	0	0	0	0
5	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
6	4	1	0	0	0	0	1	2	2	3	1	1	0	0	0	0
8	3	1	1	2	0	0	1	2	1	1	0	0	0	0	0	0
9	11	3	7	15	2	5	0	0	1	1	0	0	1	2	0	0
10	15	4	0	0	1	2	3	7	2	3	3	4	6	13	0	0
11	20	6	0	0	2	5	3	7	5	6	8	10	2	4	0	0
13	2	1	0	0	0	0	0	0	0	0	2	3	0	0	0	0
14	2	1	1	2	1	2	0	0	0	0	0	0	0	0	0	0
15	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
16	4	1	1	2	1	2	1	2	1	1	0	0	0	0	0	0
17	1	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
18	5	1	1	2	0	0	0	0	1	1	3	4	0	0	0	0
19	2	1	0	0	0	0	0	0	0	0	1	1	1	2	0	0
20	9	3	2	4	1	2	0	0	2	3	1	1	2	4	1	6
21	5	1	4	9	0	0	0	0	0	0	1	1	0	0	0	0
25	2	1	0	0	0	0	0	0	0	0	0	0	2	4	0	0
28	1	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
30	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6
31	2	1	1	2	0	0	0	0	1	1	0	0	0	0	0	0
34	3	1	0	0	2	5	1	2	0	0	0	0	0	0	0	0
37	1	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
41	4	1	2	4	2	5	0	0	0	0	0	0	0	0	0	0
43	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6
0	21	6	4	9	3	7	3	7	5	6	3	4	1	2	2	12
TOTALS	348	100	47	100	43	100	41	100	77	100	78	100	46	100	16	100

Table 12 A-1

12.A. WHEN DID YOU BUY MOST OF THESE MOST USED PORTABLE RADIOS?

RESPONSE	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
WITHIN THE LAST YEAR	59	17	6	12	6	14	9	22	17	21	13	17	5	11	3	18
1 - 3 YEARS AGO	176	50	20	42	26	60	25	61	29	36	41	53	27	59	8	47
4 - 5 YEARS AGO	80	23	14	29	7	16	4	10	22	27	17	22	10	22	6	35
OVER 5 YEARS AGO	36	10	8	17	2	5	3	7	12	15	7	9	4	9	0	0
NO ANSWER	2	1	0	0	2	5	0	0	0	0	0	0	0	0	0	0
TOTALS	353	101	48	100	43	100	41	100	80	99	78	101	46	101	17	100
NUMBER OF RESPONDENTS	348		47		43		41		77		78		46		16	

Table 12 B-1

12.B. ABOUT HOW MUCH DID YOU PAY FOR ONE OF THESE MOST USED PORTABLE RADIOS (INCLUDING ANTENNA, CARRYING CASE, AND SPARE BATTERIES)?

RESPONSE	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
LESS THAN $700	23	7	1	2	4	9	10	24	5	6	0	0	1	2	2	12
$701-$800	91	26	25	52	7	16	7	17	23	29	17	22	10	22	2	12
$801-$900	154	44	17	35	22	51	15	37	42	54	37	47	13	28	8	50
$901-$1000	64	18	5	10	5	12	8	20	7	9	21	27	15	33	3	19
$1001-$1500	15	4	0	0	3	7	1	2	1	1	4	5	6	13	0	0
OVER $1500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NO ANSWER	4	1	0	0	2	5	0	0	0	0	0	0	1	2	1	6
TOTALS	351	100	48	99	43	100	41	100	78	99	79	101	46	100	16	99
NUMBER OF RESPONDENTS	348		47		43		41		77		78		46		16	

Table 12 C-1

12.C. ABOUT HOW MUCH DOES ONE OF THESE MOST USED PORTABLE RADIOS WEIGH?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
LESS THAN 20 OZ.	17	5	0	0	1	2	3	7	4	5	6	8	2	4	1	6
20 OZ. TO 26 OZ.	91	26	9	19	10	23	13	32	25	32	20	26	9	20	5	31
27 OZ. TO 32 OZ.	89	25	12	26	12	27	8	20	15	19	23	29	12	26	7	44
33 OZ. TO 38 OZ.	71	20	14	30	4	9	7	17	15	19	16	21	12	26	3	19
MORE THAN 38 OZ.	75	21	12	26	15	34	9	22	16	21	13	17	10	22	0	0
NO ANSWER	7	2	0	0	2	5	1	2	3	4	0	0	1	2	0	0
TOTALS	350	99	47	101	44	100	41	100	78	100	78	101	46	100	16	100
NUMBER OF RESPONDENTS	348		47		43		41		77		78		46		16	

Table 12 D-1

12.D. HOW DO YOU FEEL ABOUT THE WEIGHT OF THE MOST USED PORTABLE RADIOS?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
WEIGHT IS RIGHT	165	47	24	51	25	58	19	46	40	52	37	47	9	20	11	69
SOMEWHAT HEAVY	133	38	14	30	13	30	14	34	27	35	33	42	27	59	5	31
ENTIRELY TOO HEAVY	49	14	9	19	5	12	7	17	10	13	8	10	10	22	0	0
NO ANSWER	1	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
TOTALS	348	99	47	100	43	100	41	99	77	100	78	99	46	101	16	100
NUMBER OF RESPONDENTS	348		47		43		41		77		78		46		16	

Table 12 C-1

COMPARISON BETWEEN WEIGHT OF MOST USED PORTABLE RADIOS AND THE RESPONDENTS FEELING ABOUT THAT WEIGHT.

RESPONSE	12.C. WEIGHT OF PORTABLE RADIOS						
12.D. HOW DO YOU FEEL ABOUT THEIR WEIGHT?	TOTAL	LESS THAN 20 OZ.	20 OZ.- 26 OZ.	27 OZ.- 32 OZ.	33 OZ.- 38 OZ.	MORE THAN 38 OZ.	NO ANSWER
WEIGHT IS RIGHT	167	12	64	48	27	15	1
SOMEWHAT HEAVY	133	3	23	37	35	31	4
ENTIRELY TOO HEAVY	49	2	3	4	9	29	2
NO ANSWER	1	0	1	0	0	0	0

Table 13-1

13. A PORTABLE RADIO CAN BE USED WITH A REPEATER BY A PATROLMAN WHEN HE IS OUT OF HIS CAR. THE PORTABLE RADIO TRANSMITS TO THE CAR RADIO WHICH THEN RELAYS THE SIGNALS TO THE BASE RADIO. DO YOU NEED REPEATERS LIKE THIS IN YOUR COMMUNICATIONS SYSTEM?

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	4	1	0	0	0	0	1	2	0	0	1	1	2	4	0	0
YES	150	43	32	68	25	58	18	44	31	40	27	35	12	26	5	31
NO	194	56	15	32	18	42	22	54	46	60	50	64	32	70	11	69
TOTALS	348	100	47	100	43	100	41	100	77	100	78	100	46	100	16	100

Table 13-2

13. A PORTABLE RADIO CAN BE USED WITH A REPEATER BY A PATROLMAN WHEN HE IS OUT OF HIS CAR. THE PORTABLE RADIO TRANSMITS TO THE CAR RADIO WHICH THEN RELAYS THE SIGNALS TO THE BASE RADIO. DO YOU NEED REPEATERS LIKE THIS IN YOUR COMMUNICATIONS SYSTEM?

IF YES, WHY?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
REASON	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
TO OVERCOME AREA (TERRAIN) CAUSED PROBLEMS	24	14	1	2	5	19	2	9	6	18	7	24	0	0	3	50
CONSTANT COMMUNICATIONS NECESSARY	27	16	9	22	6	22	1	5	5	15	4	14	2	13	0	0
TO IMPROVE STRENGTHEN PORTABLES	31	18	7	17	0	0	5	23	8	24	5	17	5	33	1	17
TO OVERCOME DISTANCE (RANGE) PROBLEMS	34	20	7	17	10	37	5	23	3	9	7	24	2	13	0	0
GOOD FOR SPECIAL ASSIGNMTS	13	8	7	17	1	4	1	5	1	3	1	3	2	13	0	0
MOBILITY OF OFFICERS IMPROVED	17	10	7	17	2	7	1	5	3	9	1	3	2	13	1	17
OTHER	10	6	1	2	0	0	1	5	4	12	1	3	2	13	1	17
NO ANSWER	16	9	1	2	3	11	6	27	3	9	3	10	0	0	0	0
TOTALS	172	101	40	96	27	100	22	102	33	99	29	98	15	98	6	101
NUMBER OF RESPONDENTS	150		32		25		18		31		27		12		5	

Table 13-3

13. A PORTABLE RADIO CAN BE USED WITH A REPEATER BY A PATROLMAN WHEN HE IS OUT OF HIS CAR. THE PORTABLE RADIO TRANSMITS TO THE CAR RADIO WHICH THEN RELAYS THE SIGNALS TO THE BASE RADIO. DO YOU NEED REPEATERS LIKE THIS IN YOUR COMMUNICATIONS SYSTEM?

IF NO, WHY NOT?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
REASON	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
CURRENT EQUIPMENT ADEQUATE -NOT NEEDED	40	19	1	7	3	16	2	8	12	25	15	27	5	15	2	18
AREA NOT LARGE ENOUGH TO WARRANT USE	34	16	0	0	0	0	9	35	15	31	6	11	3	9	1	9
USE OR PREFER OTHER SYSTEM -VOTERS, SATELLITES, ETC	37	18	0	0	2	11	0	0	5	10	14	25	16	48	0	0
HAVE NO HAND AND/OR CAR RADIOS	4	2	0	0	0	0	1	4	2	4	0	0	1	3	0	0
NO ADVANTAGE FOR HIGHWAY PATROL	2	1	2	13	0	0	0	0	0	0	0	0	0	0	0	0
OTHER	15	7	3	20	1	5	0	0	3	6	2	4	6	18	0	0
NO ANSWER	74	36	8	53	13	68	14	54	11	23	18	33	2	6	8	73
TOTALS	207	99	15	100	19	100	26	101	48	99	55	100	33	99	11	100
NUMBER OF RESPONDENTS	194		15		18		22		46		50		32		11	

Table 14-1

14. SOME LAW ENFORCEMENT AGENCIES USE PORTAMOBILE RADIOS WITH SEVERAL RECEIVERS AND A VOTING SYSTEM. DO YOU FAVOR SUCH A SYSTEM?

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UNFAMILIAR	192	55	7	15	31	72	29	71	60	78	43	55	6	13	16	100
YES	98	28	25	53	7	16	2	5	8	10	22	28	34	74	0	0
NO	58	17	15	32	5	12	10	24	9	12	13	17	6	13	0	0
TOTALS	348	100	47	100	43	100	41	100	77	100	78	100	46	100	16	100

Table 14-2

14. SOME LAW ENFORCEMENT AGENCIES USE PORTAMOBILE RADIOS WITH SEVERAL RECEIVERS AND A VOTING SYSTEM. DO YOU FAVOR SUCH A SYSTEM?

IF YES, WHY?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
REASON	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
IMPROVES XMIT/REC COVERAGE AND EXTENDS RANGE	30	28	7	27	2	22	0	0	2	25	9	37	10	26	0	0
INCREASES PORTABLE USEFULNESS AND FLEXIBILITY	20	18	1	4	1	11	0	0	1	12	7	29	10	26	0	0
ALREADY USE AND/OR THINK IT IS A GOOD SYSTEM	23	21	5	19	4	44	1	33	1	12	2	8	10	26	0	0
VOTER RELAYS BEST SIGNAL	10	9	6	23	0	0	1	33	0	0	2	8	1	3	0	0
FOR EXTRA BACKUP	4	4	0	0	0	0	0	0	1	12	0	0	3	8	0	0
OTHER	11	10	5	19	1	11	0	0	2	25	0	0	3	8	0	0
NO ANSWER	11	10	2	8	1	11	1	33	1	12	4	17	2	5	0	0
TOTALS	109	100	26	100	9	99	3	99	8	98	24	99	39	102	0	0
NUMBER OF RESPONDENTS	98		25		7		2		8		22		34		0	

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Table 14-3

14. SOME LAW ENFORCEMENT AGENCIES USE PORTABLE RADIOS WITH SEVERAL RECEIVERS AND A VOTING SYSTEM. DO YOU FAVOR SUCH A SYSTEM?

IF NO, WHY NOT?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
REASON	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO NEED OR PRACTICAL USE CONSIDER VOTING SYSTEM	12	19	6	40	0	0	1	9	2	20	3	21	0	0	0	0
INADEQUATE	6	9	0	0	2	29	1	9	0	0	1	7	2	29	0	0
CURRENT SYSTEM ADEQUATE FOR REQUIREMENTS	6	9	1	7	1	14	1	9	0	0	2	14	1	14	0	0
IMPORTANT CALLS VOTED OUT	2	3	0	0	0	0	1	9	0	0	0	0	1	14	0	0
TOO EXPENSIVE	4	6	2	13	1	14	0	0	1	10	0	0	0	0	0	0
SIZE AND WEIGHT UNSATISFACTORY	4	6	0	0	0	0	0	0	0	0	2	14	2	29	0	0
AREA TOO SMALL TO WARRANT USE	6	9	0	0	0	0	2	18	1	10	3	21	0	0	0	0
OTHER	6	9	3	20	1	14	0	0	0	0	1	7	1	14	0	0
NO ANSWER	18	28	3	20	2	29	5	45	6	60	2	14	0	0	0	0
TOTALS	64	98	15	100	7	100	11	99	10	100	14	98	7	100	0	0
NUMBER OF RESPONDENTS	58		15		5		10		9		13		6		0	

Table 15

15. MANY POLICEMEN HAVE INDICATED THE NEED FOR STANDARDIZATION OF COMMUNICATIONS EQUIPMENT. WHICH OF THE FOLLOWING EQUIPMENT AND COMPONENTS WOULD YOU LIKE TO SEE STANDARDIZED?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
PORTABLE RADIOS	283	66	23	49	47	68	53	68	58	67	54	68	32	70	16	70
MOBILE RADIOS	298	70	30	64	50	72	62	79	65	76	45	57	27	59	19	83
BATTERIES	241	56	31	66	34	49	26	33	47	55	53	67	36	78	14	61
CONTROL HEADS	180	42	32	68	21	30	20	26	37	43	33	42	29	63	8	35
MICROPHONES	156	36	27	57	17	25	25	32	30	35	27	34	21	46	9	39
SWITCHES ON HEADS	154	36	23	49	23	33	18	23	35	41	29	37	20	43	6	26
MOUNTING BRACKETS	157	37	23	49	21	30	25	32	30	35	32	41	18	39	8	35
CABLE BTWN. MIKE AND HEAD	140	33	24	51	17	25	11	14	29	34	30	38	21	46	8	35
OTHER	53	12	13	28	6	9	2	3	9	10	10	13	12	26	1	4
NO ANSWER	10	2	0	0	3	4	3	4	0	0	4	5	0	0	0	0
TOTALS	1672	390	226	481	239	345	245	314	340	396	317	402	216	470	89	388
NUMBER OF RESPONDENTS	428		47		69		78		86		79		46		23	

Table 16

16. WHAT WILL YOUR DEPARTMENT GAIN BY THE STANDARDIZATION DISCUSSED ABOVE?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
10% LOWER COST	69	16	9	19	12	17	11	14	13	15	14	18	10	22	0	0
25% LOWER COST	54	13	9	19	9	13	5	6	11	13	10	13	7	15	3	13
50% LOWER COST	13	3	0	0	2	3	3	4	2	2	3	4	2	4	1	4
INTERCHANGEABILITY/RADIOS	265	62	35	74	38	55	39	50	54	63	53	67	36	78	10	43
INTERCHANGEABILITY/COMP.	221	52	34	72	29	42	22	28	46	53	47	59	32	70	11	48
SAVINGS IN TRAINING/TECHS.	97	23	20	43	11	16	6	8	10	12	16	20	26	57	8	35
SAVINGS IN TRAINING/PTRLMN.	120	28	19	40	17	25	13	17	22	26	25	32	14	30	10	43
INTRCHG. W/OTHER SYSTEMS	200	47	14	30	37	54	29	37	47	55	36	46	24	52	13	57
OTHER	55	13	12	26	8	12	4	5	10	12	12	15	7	15	2	9
NO ANSWER	21	5	0	0	5	7	10	13	1	1	5	6	0	0	0	0
TOTALS	1115	262	152	323	168	244	142	182	216	252	221	280	158	343	58	252
NUMBER OF RESPONDENTS	428		47		69		78		86		79		46		23	

Table 17

17. IN SOME AREAS, POLICE USE VOICE PRIVACY SYSTEMS WHICH SCRAMBLE MESSAGES SO THAT THEY CANNOT BE RECEIVED BY PEOPLE OTHER THAN POLICE. DO YOU HAVE A SCRAMBLER SYSTEM OF THIS TYPE?

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
YES	40	9	6	13	2	3	4	5	7	8	14	18	5	11	2	9
NO	388	91	41	87	67	97	74	95	79	92	65	82	41	89	21	91
TOTALS	428	100	47	100	69	100	78	100	86	100	79	100	46	100	23	100

(IF NO) DO YOU NEED A SCRAMBLER SYSTEM OF THIS TYPE?

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	16	4	2	5	2	3	2	3	3	4	3	5	4	10	0	0
YES	225	58	18	44	41	61	34	46	56	71	42	65	22	54	12	57
NO	147	38	21	51	24	36	38	51	20	25	20	31	15	37	9	43
TOTALS	388	100	41	100	67	100	74	100	79	100	65	100	41	100	21	100

Table 18-1

IF YES IN QUESTION 17
18. FOR WHICH OF THE FOLLOWING PURPOSES DO YOU NEED, OR WOULD YOU USE, A SCRAMBLER SYSTEM?

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
GEN. COMMUNICATIONS	116	44	3	12	25	58	21	55	33	52	23	41	4	15	7	50
ROBBERIES	116	44	7	29	18	42	15	39	33	52	32	57	8	30	3	21
LONG-TERM STAKE OUT	161	61	15	62	23	53	20	53	42	67	35	62	19	70	7	50
DEMONSTRATIONS	125	47	16	67	15	35	9	24	31	49	33	59	17	63	4	29
UNDERCOVER INVESTIGATIONS	208	78	22	92	29	67	28	74	50	79	44	79	25	93	10	71
OTHER	51	19	3	12	9	21	6	16	8	13	13	23	8	30	4	29
NO ANSWER	1	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0
TOTALS	778	293	66	274	119	276	99	261	198	314	180	321	81	301	35	250
NUMBER OF RESPONDENTS	265		24		43		38		63		56		27		14	

Table 18-3

FUNCTIONS FOR WHICH DEPARTMENTS WHICH HAVE SCRAMBLER SYSTEMS USE THEM

	All Dept. Types		State		County		City (1-9 Officers)		City (10-49 Officers)		City (50 or more Officers)		Fifty Largest Cities		Township	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Genl. Communications	6	15	0	0	2	100	0	0	1	14	3	21	0	0	0	0
Robberies	21	52	2	33	1	50	3	75	5	71	7	50	1	20	2	100
Long-Term Stake Out	20	50	3	50	1	50	2	50	5	71	4	29	3	60	2	100
Demonstrations	24	60	4	67	1	50	2	50	5	71	8	57	3	60	1	50
Undercover Investigations	33	82	6	100	2	100	4	100	5	71	9	64	5	100	2	100
Other	15	37	0	0	1	50	2	50	1	14	7	50	3	60	1	50
No Answer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	119	296	15	250	8	400	13	325	22	312	38	271	15	300	8	400
Number of Respondents	40		6		2		4		7		14		5		2	

Table 18-5

FUNCTIONS FOR WHICH DEPARTMENTS WHICH DO NOT HAVE BUT NEED SCRAMBLERS WOULD USE THEM

	All Dept. Types		State		County		City (1-9 Officers)		City (10-49 Officers)		City (50 or more officers)		Fifty Largest Cities		Township	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Genl. Communications	110	49	3	17	23	56	21	62	32	57	20	48	4	18	7	58
Robberies	95	42	5	28	17	41	12	35	28	50	25	60	7	32	1	8
Long-Term Stake Out	141	63	12	67	22	54	18	53	37	66	31	74	16	73	5	42
Demonstrations	101	45	12	67	14	34	7	21	26	46	25	60	14	64	3	25
Undercover Investigations	175	78	16	89	27	66	24	71	45	80	35	83	20	91	8	67
Other	36	16	3	17	8	20	4	12	7	12	6	14	5	23	3	25
No Answer	1	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0
Totals	659	293	51	285	111	271	86	254	176	313	142	339	66	301	27	225
Number of Respondents	225		18		41		34		56		42		22		12	

Table 19

IF YES IN QUESTION 17 (ALL DEPARTMENTS WHICH DID NOT HAVE SCRAMBLERS BUT SAID THEY NEEDED SCRAMBLERS.)
19. HOW (WOULD YOU) USE YOUR SCRAMBLERS?

RESPONSE

	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
WITH CAR RADIOS	34	15	1	6	11	27	8	24	10	18	1	2	1	4	2	17
WITH PORTABLE RADIOS	7	3	1	6	0	0	2	6	1	2	3	7	0	0	0	0
WITH CAR AND PORTABLE	171	76	14	78	28	68	24	70	44	79	36	86	15	68	10	83
SPECIAL VEHICLES	17	8	3	17	2	5	0	0	2	4	3	7	6	27	1	8
TOTALS	229	102	19	107	41	100	34	100	57	103	43	102	22	99	13	108
NUMBER OF RESPONDENTS	225		18		41		34		56		42		22		12	

IF YES IN QUESTION 17 (All Departments Which Had Scramblers.)
19. HOW DO YOU USE YOUR SCRAMBLERS?

RESPONSE	ALL DEPARTMENT TYPES	
	NO.	%
WITH CAR RADIOS	23	58
WITH PORTABLE RADIOS	1	2
WITH CAR AND PORTABLE	14	35
SPECIAL VEHICLES	7	18
TOTALS	45	113
NUMBER OF RESPONDENTS	40	

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Table 20-1

IF YES IN QUESTION 17
20. HOW MUCH DO YOU THINK YOUR DEPARTMENT WOULD PAY FOR A GOOD, RELIABLE SCRAMBLER SYSTEM?

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
LESS THAN $250	123	46	10	42	21	49	19	50	33	52	29	52	8	30	3	21
$251-$500	97	37	9	37	13	30	16	42	19	30	24	43	10	37	6	43
$501-$750	19	7	2	8	1	2	0	0	5	8	1	2	8	30	2	14
$751-$1000	2	1	1	4	1	2	0	0	0	0	0	0	0	0	0	0
MORE THAN $1000	2	1	0	0	0	0	1	3	0	0	0	0	0	0	1	7
NO ANSWER	22	8	2	8	7	16	2	5	6	10	2	4	1	4	2	14
TOTALS	265	100	24	99	43	99	38	100	63	100	56	101	27	101	14	99
NUMBER OF RESPONDENTS	265		24		43		38		63		56		27		14	

Table 21-1

21. HELMETS WITH BUILT-IN COMMUNICATIONS HAVE BEEN DEVELOPED AND ARE NOW ON THE MARKET. IS THERE A NEED FOR SUCH HELMETS IN YOUR DEPARTMENT?

RESPONSE	DEPARTMENT TYPE													
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	3	1	0	0	1	1	2	3	0	0	0	0	0	0	0	0
YES	139	32	34	72	15	22	12	15	16	19	27	34	33	72	2	9
NO	286	67	13	28	53	77	64	82	70	81	52	66	13	28	21	91
TOTALS	428	100	47	100	69	100	78	100	86	100	79	100	46	100	23	100

Table 21-3

21. HELMETS WITH BUILT-IN COMMUNICATIONS HAVE BEEN DEVELOPED AND ARE NOW ON THE MARKET. IS THERE A NEED FOR SUCH HELMETS IN YOUR DEPARTMENT?

IF YES, WHY?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
REASON	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
FOR CROWD CONTROL/RIOTS	70	41	24	56	8	50	6	43	7	39	13	37	11	27	1	50
FOR MOTORCYCLE DUTY	41	24	6	14	1	6	2	14	2	11	13	37	17	41	0	0
USEFUL WHEN AWAY FROM MOBILE OR BASE UNIT	5	3	2	5	1	6	0	0	1	6	0	0	1	2	0	0
ELIMINATES OR PREVENTS LOSS OF EQUIPMENT	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0
FREES HANDS	13	8	3	7	1	6	2	14	2	11	2	6	3	7	0	0
IMPROVES OPERATIONS/MORE EFFICIENT	6	4	0	0	1	6	0	0	2	11	2	6	1	2	0	0
COUNTERACTS NOISE (OTHER THAN CROWDS)	4	2	3	7	0	0	0	0	0	0	0	0	1	2	0	0
OTHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NO ANSWER	22	13	1	2	4	25	4	29	4	22	5	14	3	7	1	50
TOTALS	169	100	43	100	16	99	14	100	18	100	35	100	41	98	2	100
NUMBER OF RESPONDENTS	139		34		15		12		16		27		33		2	

Table 21-4

21. HELMETS WITH BUILT-IN COMMUNICATIONS HAVE BEEN DEVELOPED AND ARE NOW ON THE MARKET. IS THERE A NEED FOR SUCH HELMETS IN YOUR DEPARTMENT?

IF NO, WHY NOT?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
REASON	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
TOO CUMBERSOME/DANGEROUS	9	3	0	0	1	2	1	2	1	1	3	6	2	15	1	4
EXPENSE NOT WARRANTED	19	6	2	15	4	7	1	2	8	11	3	6	1	8	0	0
NO HELMETS USED BY DEPT.	38	13	0	0	10	18	9	14	10	14	7	13	0	0	2	9
HAVE OR WOULD PREFER OTHER EQUIP FOR SAME JOB	17	6	0	0	1	2	3	5	6	8	5	9	1	8	1	4
IMPRACTICAL/DO NOT NEED	45	15	1	8	5	9	9	14	9	12	9	17	1	8	11	48
USE NOT WARRANTED BASED ON DEPT OR AREA SIZE	63	21	4	31	14	25	20	31	15	21	5	9	1	8	4	17
LOW PRIORITY	5	2	0	0	0	0	2	3	1	1	2	4	0	0	0	0
NOT ENOUGH POWER	2	1	0	0	1	2	0	0	0	0	0	0	1	8	0	0
OTHER	6	2	0	0	1	2	0	0	1	1	1	2	3	23	0	0
NO ANSWER	92	31	6	46	19	34	20	31	22	30	18	34	3	23	4	17
TOTALS	296	100	13	100	56	101	65	102	73	99	53	100	13	101	23	99
NUMBER OF RESPONDENTS	286		13		53		64		70		52		13		21	

Table 22

IF YES TO 9: (DO YOU NOW USE PORTABLE RADIOS IN YOUR DEPARTMENT?)
22. SHOULD STANDARDS FOR POWER SUPPLIES SUCH AS CHARGING EQUIPMENT, AND BATTERIES FOR PORTABLE RADIOS BE GIVEN?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
HIGH PRIORITY	127	36	17	36	16	37	10	24	23	30	29	37	28	61	4	25
MEDIUM PRIORITY	127	36	17	36	15	35	15	37	34	44	26	33	12	26	8	50
LOW PRIORITY	50	14	5	11	3	7	9	22	13	17	15	19	3	7	2	12
STANDARDS NOT NEEDED	41	12	8	17	8	19	7	17	6	8	7	9	3	7	2	12
NO ANSWER	3	1	0	0	1	2	0	0	1	1	1	1	0	0	0	0
TOTALS	348	100	47	100	43	100	41	100	77	100	78	100	46	100	16	100

IF NO TO 9: (DO YOU NOW USE PORTABLE RADIOS IN YOUR DEPARTMENT?)
22. SHOULD STANDARDS FOR POWER SUPPLIES SUCH AS CHARGING EQUIPMENT, AND BATTERIES FOR PORTABLE RADIOS BE GIVEN?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
HIGH PRIORITY	17	22	0	0	8	32	7	19	1	11	0	0	0	0	1	14
MEDIUM PRIORITY	26	33	0	0	8	32	11	31	4	44	0	0	0	0	3	43
LOW PRIORITY	7	9	0	0	1	4	2	6	2	22	1	100	0	0	1	14
STANDARDS NOT NEEDED	15	19	0	0	4	16	8	22	2	22	0	0	0	0	1	14
NO ANSWER	15	19	0	0	5	20	9	25	0	0	0	0	0	0	1	14
TOTALS	78	100	0	100	25	100	36	100	9	100	1	100	0	100	7	100

Table 23

IF YES TO 9:
23. WHAT TYPES OF BATTERIES DO YOU NOW USE FOR YOUR PORTABLE RADIOS?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
ALKALINE-MANGANESE	40	10	9	13	9	19	5	12	7	8	0	0	9	12	1	6
CARBON-ZINC	20	5	5	7	2	4	1	2	5	6	2	2	5	7	0	0
MERCURY	50	12	17	24	2	4	3	7	10	12	6	7	12	16	0	0
NICAD (NICKEL-CADMIUM)	286	69	40	56	27	56	28	68	60	71	73	89	45	62	13	81
SILVER OXIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER	10	2	0	0	4	8	1	2	1	1	1	1	2	3	1	6
NO ANSWER	9	2	0	0	4	8	3	7	1	1	0	0	0	0	1	6
TOTALS	415	100	71	100	48	99	41	98	84	99	82	99	73	100	16	99
NUMBER OF RESPONDENTS	348		47		43		41		77		78		46		16	

Table 24

IF YES TO 9:
24. WHAT TYPE OF BATTERIES DO YOU PREFER TO USE FOR YOUR PORTABLE RADIOS?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
ALKALINE-MANGANESE	23	6	4	8	8	18	5	12	2	3	2	3	1	2	1	6
CARBON-ZINC	3	1	1	2	0	0	0	0	2	3	0	0	0	0	0	0
MERCURY	20	6	6	12	1	2	4	10	6	8	1	1	2	4	0	0
NICAD (NICKEL-CADMIUM)	289	82	39	78	26	59	26	63	66	86	75	96	44	92	13	81
SILVER OXIDE	1	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
OTHER	3	1	0	0	1	2	1	2	0	0	0	0	1	2	0	0
NO PREFERENCE	2	1	0	0	0	0	1	2	1	1	0	0	0	0	0	0
NO ANSWER	13	4	0	0	8	18	3	7	0	0	0	0	0	0	2	12
TOTALS	354	101	50	100	44	99	41	98	77	101	78	100	48	100	16	99
NUMBER OF RESPONDENTS	348		47		43		41		77		78		46		16	

Table 25

IF YES TO 9:
25. DO YOU USE BATTERIES FOR YOUR PORTABLE RADIOS WHICH MUST BE RECHARGED?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
NO ANSWER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
YES	313	90	39	83	36	84	33	80	72	94	73	94	45	98	15	94
NO	35	10	8	17	7	16	8	20	5	6	5	6	1	2	1	6
TOTALS	348	100	47	100	43	100	41	100	77	100	78	100	46	100	16	100

Table 25 A

IF YES TO 9:
25.A. HOW LONG CAN YOU USE THE BATTERY BEFORE IT MUST BE RECHARGED?

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
HOURS								
MEAN	8.02	8.71	5.70	4.99	10.23	9.22	9.18	8.36
MAXIMUM	50	24	48	30	50	24	24	50
MINIMUM	1	1	4	4	4	1	6	7
MODE	8	8	8	8	8	8	8	8
DONT KNOW	11	1	4	1	1	4	0	0
NO ANSWER	41	9	8	10	7	5	1	1

Table 25 B

IF YES TO 9:
25.B. HOW LONG DOES IT USUALLY TAKE TO RECHARGE THE BATTERY TO A POINT WHERE IT CAN BE USED AGAIN?

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
HOURS								
MEAN	5.63	7.59	3.97	2.31	6.27	6.93	8.78	3.95
MAXIMUM	24	24	24	18	16	24	16	16
MINIMUM	1	1	1	1	1	1	1	1
MODE	8	8	***	***	8	***	8	***
DONT KNOW	10	0	4	1	1	4	0	0
NO ANSWER	43	10	9	10	6	6	1	1

Table 25 C

IF YES TO 9:
25.C. HOW LONG DOES IT USUALLY TAKE TO FULLY RECHARGE THE BATTERY?

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
HOURS								
MEAN	9.21	13.29	6.49	4.90	10.68	10.75	12.22	6.45
MAXIMUM	48	24	48	25	24	24	24	24
MINIMUM	1	6	1	1	1	1	1	2
MODE	16	16	16	16	16	16	16	8
DONT KNOW	11	0	4	1	3	3	0	0
NO ANSWER	43	9	8	10	8	6	1	1

Table 25 D

IF YES TO 9:
25.D. HOW LONG CAN YOU USUALLY USE THESE BATTERIES BEFORE THEY MUST BE REPLACED?

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
MONTHS								
MEAN	16.70	28.27	6.60	7.86	17.47	22.10	25.13	11.58
MAXIMUM	60	60	60	60	60	60	60	60
MINIMUM	3	12	12	12	3	12	6	10
MODE	24	24	12	36	36	24	24	24
DONT KNOW	58	2	11	12	16	10	2	5
NO ANSWER	49	10	11	11	8	7	1	1
NEVER NEEDED TO REPLACE	26	4	8	1	6	4	0	3

Table 26-1

26. WHAT ARE YOUR MOST CRITICAL COMMUNICATIONS NEEDS?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
FREQUENCIES (MORE)	187	44	27	57	28	41	28	36	38	44	36	46	22	48	8	35
NEW EQUIPMENT	192	45	21	45	34	49	40	51	35	41	34	43	20	43	8	35
RELIABLE EQUIPMENT	88	21	9	19	15	22	15	19	21	24	12	15	12	26	4	17
PERSONAL TRANSCEIVERS	184	43	10	21	23	33	27	35	41	48	37	47	34	74	12	52
PORTAMOBILE VOTING	33	8	2	4	5	7	1	1	1	1	6	8	18	39	0	0
SCRAMBLERS	146	34	8	17	26	38	25	32	39	45	30	38	11	24	7	30
STD. ALL EQUIPMENT	163	38	24	51	25	36	22	28	36	42	27	34	20	43	9	39
OTHER	48	11	11	23	8	12	4	5	7	8	12	15	5	11	1	4
NO ANSWER	15	4	2	4	2	3	6	8	1	1	2	3	0	0	2	9
TOTALS	1056	248	114	241	166	241	168	215	219	254	196	249	142	308	51	221
NUMBER OF RESPONDENTS	428		47		69		78		86		79		46		23	

Table 27-3

THOSE DEPARTMENTS WHO INDICATED ELECTRICAL/MECHANICAL INTERFERENCE AS ONE OF THEIR MOST SERIOUS PROBLEMS WITH COMMUNICATIONS EQUIPMENT (QUESTION 27) COMPARED WITH THEIR FREQUENCY CATEGORY.

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
30-50 MHZ	35	7	12	4	6	6	0	0
150-174 MHZ	45	10	4	4	7	15	4	1
450-470 MHZ	3	0	0	0	0	3	0	0
OTHER	1	0	0	1	0	0	0	0
TOTALS	84	17	16	9	13	24	4	1
NO ANSWER	0	0	0	0	0	0	0	0

Table 27-4

COMPARISON BETWEEN INADEQUACY OF EQUIPMENT (POWER: RANGE) PROBLEM AND NEED MOBILE REPEATERS AND/OR FAVOR VOTING SYSTEM.

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
NEED MOBILE REPEATERS	16	0	4	1	6	4	0	1
DONT NEED MOBILE REPEATERS	14	0	2	1	5	1	4	1
UNFAMILIAR WITH VOTING SYST	22	0	4	2	9	3	1	3
FAVOR VOTING SYSTEM	7	0	0	0	2	2	3	0
DONT FAVOR VOTING SYSTEM	3	0	2	0	0	0	1	0

Table 28-1

28. WHAT ARE YOUR MOST COMMON EQUIPMENT FAILURES, WHETHER ENTIRE UNITS OR SPECIFIC COMPONENTS?

RESPONSE	DEPARTMENT TYPE															
	ALL DEPARTMENT TYPES		STATE		COUNTY		CITY (1-9 OFFICERS)		CITY (10-49 OFFICERS)		CITY (50 OR MORE OFFICERS)		FIFTY LARGEST CITIES		TOWNSHIP	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
TUBES, TRANSISTORS, AND CAPACITORS	109	18	24	35	13	14	14	16	19	16	18	15	19	21	2	8
SPECIFIC COMPONENTS, NORMAL WEAR AND TEAR	79	13	8	12	17	19	13	15	16	14	15	13	8	9	2	8
MIKE CABLES, CONNECTIONS, WIRING	64	11	5	7	6	7	6	7	16	14	21	18	8	9	2	8
ANTENNAS, RELAYS, CABLES	40	7	10	15	3	3	1	1	7	6	7	6	12	13	0	0
SWITCHES/FUSES (CIRCUIT BREAKERS)	39	7	3	4	6	7	3	3	10	8	6	5	7	8	4	17
XMITTER PROBS/FAILURES	31	5	2	3	6	7	4	5	6	5	8	7	4	4	1	4
PORTABLE/MOBILE RADIOS AND ACCESSORIES	25	4	0	0	6	7	2	2	9	8	6	5	2	2	0	0
CRYSTALS, TRIMMERS - FREQ PROBLEMS	38	6	3	4	6	7	2	2	8	7	12	10	6	7	1	4
POWER SUPPLIES, VIBRATORS, INVERTERS, REEDS	18	3	0	0	3	3	3	3	3	3	3	3	6	7	0	0
OTHER	31	5	5	7	2	2	2	2	5	4	4	3	12	13	1	4
NO FAILURES	52	9	2	3	7	8	16	18	10	8	12	10	1	1	4	17
NO ANSWER	68	11	5	7	15	17	21	24	9	8	6	5	5	6	7	29
TOTALS	595	99	68	98	90	101	87	98	118	101	118	100	90	100	24	99

Table 27-5

THOSE WHO INDICATED UNAUTHORIZED MONITORING AS ONE OF THE MOST SERIOUS PROBLEMS WITH COMMUNICATIONS EQUIPMENT (QUESTION 27) COMPARED WITH THOSE WHO EXPRESSED NEEDING OR NOT NEEDING A SCRAMBLER SYSTEM (QUESTION 17).

RESPONSE	DEPARTMENT TYPE							
	ALL DEPARTMENT TYPES	STATE	COUNTY	CITY (1-9 OFFICERS)	CITY (10-49 OFFICERS)	CITY (50 OR MORE OFFICERS)	FIFTY LARGEST CITIES	TOWNSHIP
NEED SCRAMBLER SYSTEM	16	0	3	2	4	6	0	1
DONT NEED SCRAMBLER SYSTEM	1	0	0	1	0	0	0	0
TOTALS	17	0	3	3	4	6	0	1

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