

VOLUME 37



NUMBER 3

MARCH 1971

~~Clarence A. Piz (II)~~
~~1204 Euclid Drive~~
~~Indianapolis, Ind. 46219~~

AKGUTHRIE

JOURNAL OF PUBLIC-SAFETY COMMUNICATIONS

APCO

THE ASSOCIATED PUBLIC-SAFETY COMMUNICATIONS OFFICERS, INCORPORATED



SPECIAL HISTORICAL ISSUE

"INVENTING THE CITY"

HIGH SPEED SYSTEMS

APCO REVISITED

It has been quite some time since I last addressed my APCO friends through the medium of this page — a location reserved by Motorola for many years. This special historical issue of the BULLETIN offers a most opportune moment to introduce a new series of communications. I shall hope to be here again in the near future.

COMMUNICATION ART FORMS

There is much to talk about. Two-way communications as projected into the future may become a strange and exotic art form compared to our straightforward systems. Problems of the past will continue to relate to message handling, but the solutions will extend into new and different embodiments.

URBAN AREA PROBLEMS

Everybody is very busy inventing the city of the future. New transportation, new communications, new crime controls and even new people (trained by a half dozen agencies) are in the plans of a whole new generation of experts. The crowding of people into urban areas and the instant distribution of information from the worldwide sources has produced an incredibly high density of complex interaction and interdependence among all the environmental systems and subsystems and among all of the people.

PERMEATING NOISE

The result is a high "noise" level. In every large city, the saturation of the communications systems is the by-product of the high interaction-density which produces the interfering "noise" level. "Noise" is not audio noise, it is defined as any irrelevant, biased, incorrect, or unimportant information. It generates confusion in the information selection and structuring processes necessary for effective decision making. The permeating "noise" accompanies the paralyzing, inundating flow of information which overloads all of our processing systems, including our brains, and totally vitiates the validity of intuitive decision-making.

Eventually, we shall develop the use of high speed mature electronic information processing systems to aid our brains in the decision-making process. The impact of such brain extension systems may not be significant for another ten years. Obviously, we can't wait that long, but unfortunately there are no magic solutions. Time is required to evolve successful systems and we may be forced to weather a rather long and rough interim period of transition.

RESPONSIBILITY AND PRESSURES

Undoubtedly, the police, as they pace the influx of projected changes, will be confronted with rising responsibility, increasing pressures, and greater complexities than ever before. Since police efficiency relates to communications efficiency, this all adds up to a very special job and heavy responsibility for city radio communications engineers.

COMPUTER ASSISTANCE

Some cities are attempting to solve the special problems of coordination by establishing computer-aided command centers which will provide inputs from the police, fire, health, and water departments, and other agencies which may become involved in riot control or public safety activities. Presumably, the mayor or his assigned deputy will evaluate center inputs and issue the necessary coordinating directives to all of the cooperating forces on duty. The command centers must be designed to deal, at high speed, only with selected essential information. May I hope that experienced APCO engineers will prevent the "over-engineering" of the systems by non experience-oriented designers.

Sincerely,
MOTOROLA, Inc.



Daniel E. Noble, Chairman
Motorola Science Advisory
Committee

T.P.E. provides exactly what you want



City of Spokane, Washington

Consoles, for example —we make them from small, single position consoles to multiple consoles for control centers. T.P.E. equipment will work perfectly with any manufacturer's equipment.

Recent Installations:

Aurora, Colorado
Dallas, Texas
Visalia, California
Des Moines, Iowa, Highway Patrol
Kansas Highway Patrol
Spokane, Washington
Jacksonville, Florida
Tulsa, Oklahoma
Mississippi Highway Patrol

Control Equipment, for example — we supply tape recording and reproducing facilities, integrated paging systems, closed circuit TV surveillance, C.R.T. display, Conveyor systems, special controls.

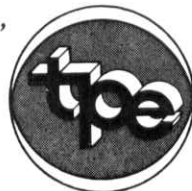
Installations In Progress:

Illinois Toll Road
Chula Vista, California
Albuquerque, New Mexico
Disneyworld, Florida
Akron, Ohio
Kalamazo, Michigan
Eugene Springfield, Oregon
Macomb County, Michigan

If you have Communications Control Center requirements, call us collect.
We will be glad to help.

"Competition creates finer products"

Technical Products Engineering Company



11845 WICKS STREET
SUN VALLEY, CALIFORNIA 91352
TELEPHONE: (213) 768-5160

THE APCO BULLETIN

J. RHETT McMILLIAN, JR., EDITOR.
P.O. BOX 669 NEW SMYRNA BEACH, FLORIDA

PHONE AC904/428-8700
32069

Annual Subscription \$4.00 (non-member)

Membership dues include subscription price for all classes: Active, Associate, Sustaining,
Commercial. Ask for application form. Join APCO **today!**
Second Class Permit Paid at New Smyrna Beach, Florida

Printed by Florida Graphic Printing Company in Daytona Beach, Florida.

Vol. 37 No. 3

March, 1971

CONTENTS

FEATURE ARTICLES:

In The Beginning	Staff	10
The Bad Guys, The Good Guys and the Telephone Company	John Shepherd	14
From Hertz to Megahertz	John McCormack	24
The Bulletin Played A Part	Staff	28
R.C.A. and Police Radio	D. O. Reinert	30
A Productive History	F. V. Machin	34
Past, Present and Future	Dan Noble	38
Resolutions	Officers	44
To Bee or Not To Bee	Herb Wareing	46
Evolution of the Alternator	Harold J. Zuske	48

DEPARTMENTS:

President's Desk	Bernard Flood	6
Public Safety Beat	Bob Brooking	18
Glancing Back	C. E. Dengler	42
Chapter Meetings	Chapter Secretaries	64
Operating Point	Operating Committee	80
APCO Operating Manual	Staff	81
Editorial	Rhett McMillian	82

OTHER:

APCO Advertisers	4	
Our Cover	4	
Special Interest	4	
Thought For The Month	4	
Conference Exhibit List	Don Ridenhour	59
Coming Meetings	75	

Special Interest:

In The Beginning
page 10

THOUGHT FOR THE MONTH:

The only thing to be learned
from history is that you don't
learn from history. . . .

Monthly publication of

THE ASSOCIATED PUBLIC-SAFETY COMMUNICATIONS OFFICERS

INCORPORATED

President: Bernard H. Flood, P. O. Box 6714, Phoenix, Arizona 85005
President-Elect: William M. Lee, P. O. Box 1299, Richmond, Virginia 23210
First Vice-President: Robert E. Brooking, Apt. J, 1813 Scott Road, Burbank, Calif. 91504
Second Vice-President: Lt. Irving E. McAndrew, 12 Downes Ave., Barre, Vermont 05601
Secretary-Treasurer: J. Rhett McMillian, Jr., P. O. Box 669, New Smyrna Beach, Fla. 32069
Executive Secretary: J. Rhett McMillian, Jr., P. O. Box 669, New Smyrna Beach, Fla. 32069
Phone 904/428-8700 and 428-4015

1971 Conference Chairman: Richard H. Moore, 171 W. Mission St., San Jose, California 95110
(San Francisco)

1972 Conference Chairman: Leroy Hunter, Boston Police Department, Boston, Mass. 02100

ADVERTISERS

Kindly mention our APCO Bulletin
to advertisers. Helps them decide which
media gives best results.

APCO Operating Manual ..	81
APCO Story	37
Carter Motor Company	65
Capital Scientific Corp.	59
Cushman Electronics	29
D. B. Products	55
Farinon Electric	33
Gautney and Jones	63
General Electric Co.	84
Hallcrafters	15
Hammarlund	11
Hawaii Cruise	19
Hazeltine Corp.	27
International Crystal Co. ..	5
International Microwave Co.	31
E. F. Johnson Company ...	47
Lampkin Laboratories	57
Leece Neville Co.	25
Leo G. Sands	65
Micro Communications	51
Mieco	79
Motorola C and E	2-17-83
Phelps Dodge	13
PIC	29
Piezo Technology	53
R.C.A.	21
R. J. Communications	35
San Mateo	63
Stancil Hoffman	49
Stanwick Corp.	71
Shure Brothers	7
Sylvania	9
Technical Products Co.	3
Xerox	22-23

COMING CHAPTER MEETINGS

37th Annual National Conference, Hilton Hotel, San Francisco, California, August 9 - 12, 1971. Dick Moore, Chairman; Communications Department, City of San Jose, California, 171 West Mission Street, 95110.

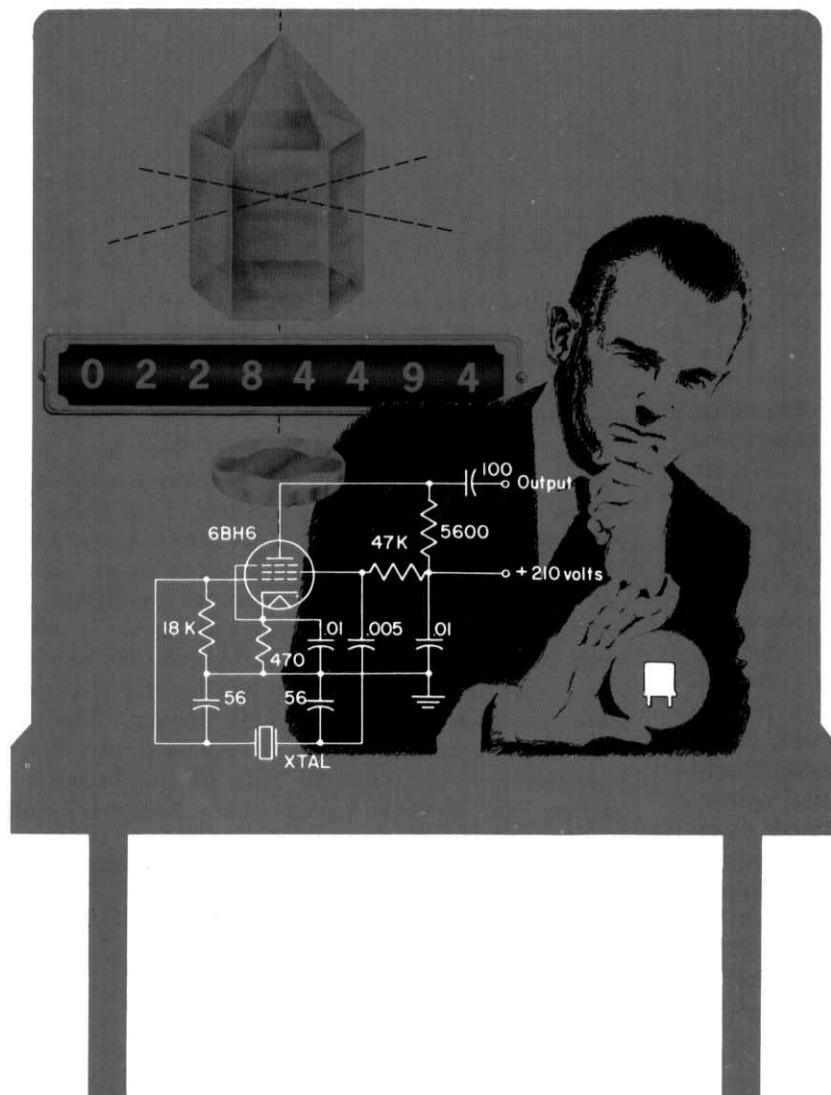
Michigan Chapter:

Muskegon, May 20, 1971
Dickerville, July 15, 1971
Livonia, September 16, 1971
Frakenmuth, October 28, 1971

OUR COVER:

Not quite so early as it appears . . . vehicle used by Fred Link's company during WW-2 in NYC where powered vehicles were not permitted.

There Is a Difference In Quartz Crystals



Space age communication equipment demands a crystal that meets all standards of technical advancement. Crystals that were acceptable some years ago do not meet present day specifications. As a general rule, your crystal must be selected from the best quartz . . . (no throw off cuts). Tight tolerances demand selected angles of cut. The x-ray is important in making this selection. The crystal should be preaged with stress cycling. It should be checked for frequency change vs temperature change. It must be checked for optimum spurious response. It should be calibrated to frequency with the correct oscillator. International Crystals are manufactured to meet today's high accuracy requirements. That's why **we guarantee all** International crystals against defective materials and workmanship for an unlimited time when used in equipment for which they were specifically made.

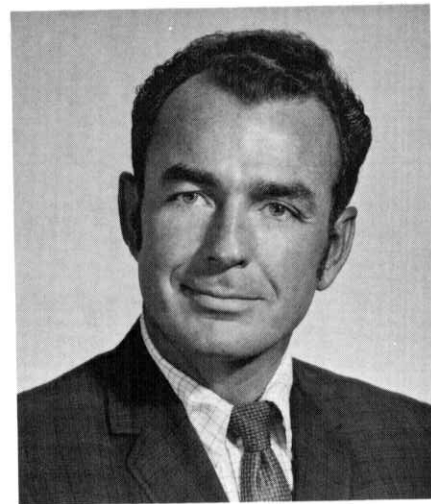
WRITE FOR CATALOG



INTERNATIONAL
CRYSTAL MFG. CO., INC.
10 NORTH LEE
OKLAHOMA CITY, OKLA. 73102

From the

PRESIDENT'S DESK



BERNARD H. FLOOD

Here it is March already! This month marks the eighth month of my term as President of APCO; I am about two-thirds of the way through the year. This is the month for our Western Regional Conference which will be held at the Cosmopolitan Hotel in Denver, Colorado, on March 22nd through 25th. This is also the month that our APCO Project III Steering Committee will hold its final review session of the Police Telecommunications Manual that is being prepared by the Illinois Institute of Technology Research Institute under APCO direction.

The National Officers and other key members of the Project III Steering Committee are planning to hold our final review session in Denver. We hope to be able to approve the Police Telecommunications Manual in its final camera-ready copy form for delivery to the Law Enforcement Assistance Administration. In fact, it is our plan to turn the manual over to officials of the Law Enforcement Assistance Administration at the Western Regional Conference. From that point, the LEAA officials will have the manual printed up — and probably distributed — by the U. S. Government Printing Office.

In my message last month I told you that I had appointed Rhett McMillian to fill out the remainder of the Secretary-Treasurer's term for this year. I also mentioned that we were trying to establish the Secretary-Treasurer's office as a full-time, staffed office, to help us better meet the needs of our members and the public safety organizations we represent. We are progressing along this line and, hopefully, the office will be a complete reality in the very near future.

The funds of our Organization have been transferred to a new banking account in New Smyrna Beach, Florida. Rhett has obtained bonding in accordance with the requirements of our Constitution and Bylaws. He is presently working with an accounting firm to help us in setting up our financial records in a manner that will enable us to have a better picture of our sources of income, and how most of our expenditures are made. This should help us prepare annual operating budgets for consideration by the Executive Committee in future years. I don't believe that we will have sufficient information put together for consideration at the 1971 Conference, but if at all possible, we will. Rhett, Bill Lee and I will work real closely this next several months in an effort to put the budget together, along with other programs that will be presented to the Executive Committee for their consideration.

We have leased our office building, hired our secretary, and started getting the office set up. The new office address is 105½ Canal Street, New Smyrna

Beach, Florida 32069. Correspondence to the Secretary-Treasurer can be mailed to Rhett at that address. Should you wish, you may still write to Rhett at the post office box address listed in the BULLETIN.

Rhett has hired his wife, Vivian, to work as secretary in the new office until it is firmly established. We hope to have the office "up-and-running" in sufficient time to make a detailed report to the Executive Committee and the Quorum at our 1971 Conference in San Francisco. Along this line, I have asked Rhett to document everything that is being done to set up the operation in this more business-like manner. With sufficient documentation, it will be possible to make more orderly transitions of the office in the future — should it be desirable or necessary.

Your Officers and Executive Secretary are fully aware of our responsibility to make sure that the duties of the Secretary-Treasurer and those for the Executive Secretary are kept sufficiently separated. If a majority of you do not approve of my decision to set up our office in the manner described, we can eliminate the full-time office, or move it elsewhere, with little difficulty. In other words, we are going to make sure that you are not left feeling that you don't have a choice to make on this matter. The choice is yours! If you disapprove of my actions, this can be changed now by majority vote of the Executive Committee; or changed later at the National Conference by vote of the Quorum.

Because of the importance of this move, I urge all chapter officials to consider it very carefully, and to direct any questions or comments — pro or con — to me now. I will try and answer your questions right away. Along this line, if you have any questions at all regarding the financing of this office, or any of our other financial transactions, let me know. I will answer them for you. You can also obtain the information from your Chapter Executive Committee member;

(Continued on Page 8)



We rise to the occasion.



We at Shure know that sooner or later, a "bargain" microphone will be called upon to deliver more performance than it's designed to give — and that it's going to get caught with its economy showing. Those are the times that make you glad you traded a small savings for the unmatched reliability that's built routinely into every Shure Mobile Microphone. Shure designs mobile microphones with the stamina and reliability to function in a crisis — to get the *important* message through when the chips are down! Even if it has been abused for years, a microphone that says Shure on the back will rise to the occasion.

Shure Brothers Inc.,
222 Hartrey Ave., Evanston, Ill. 60204.



FROM THE PRESIDENT'S DESK

(Continued from Page 6)

I have already sent him a report on the financing of the Secretary-Treasurer's office.

I intend that establishing the new office be one of my topics for discussion when I attend future chapter meetings and the regional conferences. You may rest assured that if I sense a majority feeling against this move, that our actions along this line will be reversed. However, I personally feel that this is the right move and the right time to make it—I hope this is your feeling also.

While on the subject of finances, I would like to remind all of our members that this is the time for renewing your APCO memberships. Our Constitution and Bylaws state that the chapter dues will be payable as of October 15th for the calendar year beginning on the following January 1st. It also states that the chapter dues will be past due as of March 1st and delinquent chapter members dropped from the roll as of April 1st each current calendar year. If you have not paid your 1971 dues, or have not been invoiced by your Chapter Treasurer, please make arrangements for payment of your dues as soon as possible. All too often we have situations where the Chapter Treasurers have not forwarded chapter dues to the National Secretary-Treasurer by the March 1st date. With our new office established, and a number of programs planned that require financing, it is most important that we have chapter dues in as early as possible.

In last month's message I mentioned that I had signed a contract with ARCATA Information Services, whereby APCO would receive \$5.00 for each Radio Frequency Book purchased from ARCATA when APCO was an influence in the purchase of the book. Please remember to mention APCO when you send in your purchase orders for these books so that we can receive some of the revenue from ARCATA'S service. This arrangement is mutually beneficial to APCO and ARCATA.

The planning for the National Conference is progressing quite smoothly. Over 70 exhibit booths

have already been assigned to the various commercial organizations involved in the manufacture and sale of communications equipment used in the public safety radio services. You will have an opportunity to see more state-of-the-art communications equipment at this conference than at any previous conference in history. The ability to see all of these fine exhibits alone—a list of the conference exhibitors appears elsewhere in this BULLETIN—would make the time, money, and effort spent to attend the conference worthwhile. However, we have an excellent program being prepared for all of us who plan to attend. Try your best to be with us!

Last month I mentioned that MANAPCO night was going to be a real swinging affair. I am sure that you will agree with me on this matter. Our Conference Chairman, Dick Moore, and his Entertainment Committee Chairman, Arnold Carver, have told me that the ocean liner SS President Cleveland is going to be in port at the time of the conference. They have also informed me that for MANAPCO night, they are going to commandeer this ship and rechristen it the SS Bernie Baby. MANAPCO night will be held in the grand ballroom of the SS President Cleveland. There will be cocktails, hors d'oeuvres, and other refreshments for our members and guests. In addition, there will be orchestra music for those wishing to dance and roving musicians for those not in the dance area. It sounds great!

The Conference Chairman and his Entertainment Committee Chairman also tell me that the entertainment program for the banquet night is coming along great, too. A full hour of top-notch entertainment is being scheduled. The splendid entertainment, combined with the fine conference program being scheduled, and the full line of equipment exhibits are necessary ingredients of a successful conference. The only other ingredient required to make the conference a complete success is attendance and participation in the conference by our members. Plan to attend this conference and become a more knowledgeable public safety communicator and APCO supporter.

Before I get off the subject of the National Conference, remember that Nate McClure of the Illinois Chapter is working very hard to get the post-conference charter trip to the Hawaiian Islands off the ground. This will be a seven-day, six-night round trip which will probably include a tour of three of the islands. The tentative \$270 per person fare will include all transportation, meal and lodging expenses for the trip. Nate has to make a go or no-go decision on this trip shortly after May 1st. If you are interested in making the trip, drop him a line at the Winnebago County Sheriff's Office, Rockford Illinois 61104 and let him know. I can't think of a better way to top off an excellent conference than with a trip like this.

I met with our National Officers when we were all in Chicago for a Project III meeting during the week of January 3rd. Naturally, most of the discussions in the Officers' meeting concerned the progress and problems connected with establishing our full-time office. Other items that were discussed at the meeting included a review of the progress in the Project III work; a new exhibitors' index to be used in determining booth space priorities at future National Conferences; resolutions currently being prepared or under study; the publication of the regional conference programs and conference events in the BULLETIN issues; the need for conference photographers at the regional conferences; progress on the Frequency Coordinator's Manual; and a number of other less important items concerning the operation of National APCO.

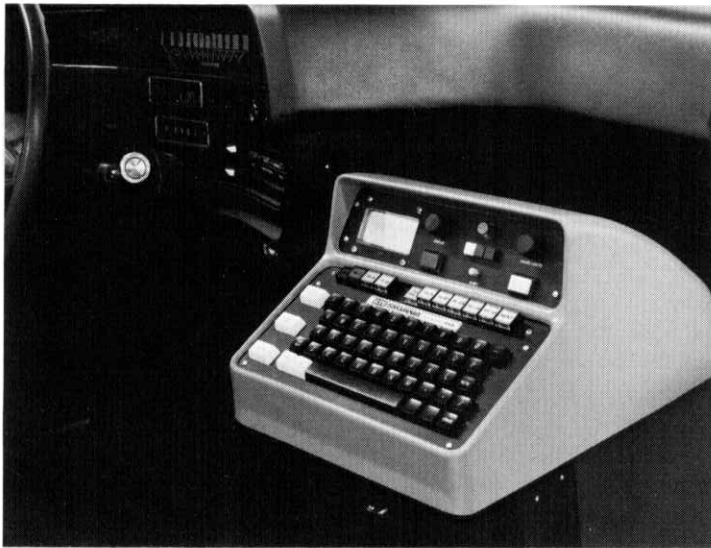
On January 15th I participated in the CPRA Chapter meeting at Torrance, California. Most of my discussion at this meeting was about how we are setting up the new Secretary-Treasurer's office; some of the frequency coordination problems we've been having in some areas; and a number of the programs that we have planned for the future.

During the week of January 17th I attended the Florida Chapter meeting in Jacksonville, Florida. Again, my participation at this

(Continued on Page 52)

Who needs digital communications?

They Do...



SYLVANIA /digicom 300

■ Two-way digital communication providing:

- Reduced radio channel congestion
- Automation of routine status changes
- Automated license plate and want/warrant checks
- Improved officer protection and safety
- Increased information exchange
- Improved data to support management information systems

■ Features:

- Uses existing radio equipment without modification
- Non-interference with voice transmission
- Alpha-numeric display with a 64 character message capability
- Full alpha-numeric keyboard
- Emergency request for assistance button
- Rugged, modular design

... And We've Got It!

SOCIOSYSTEMS LABORATORY

Total Communications for Law Enforcement

P.O. Box 188, Mountain View, California 94040/(415) 966-3373

GTE SYLVANIA

Vignettes:

IN THE BEGINNING - - -

Of Progress

January 16, 1935

Mr. Everitt E. H. Fischer
Radio Supervisor
Station K6PC
St. Louis Police Department
St. Louis, Mo.

Dear Sir:

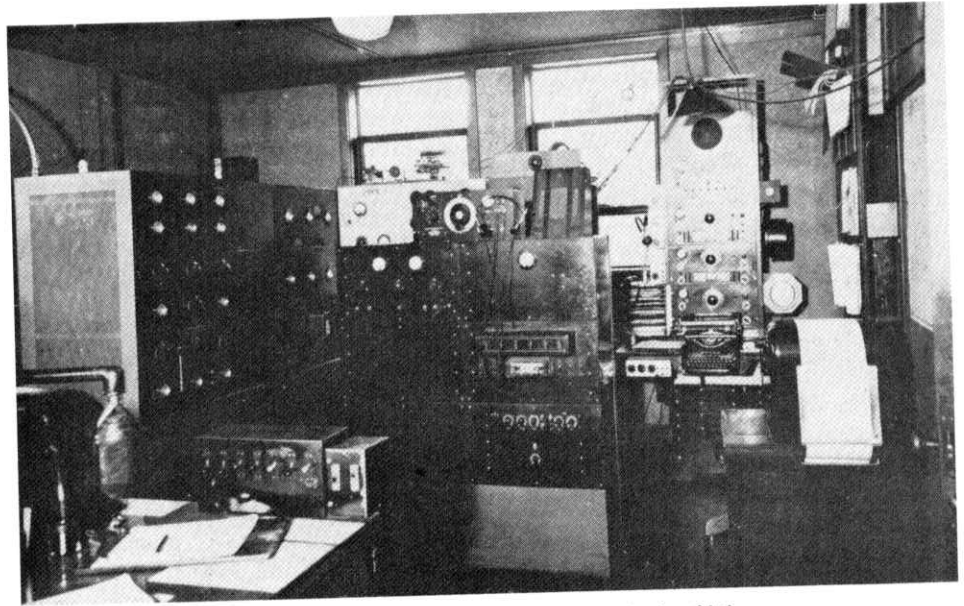
I am in receipt of your form letter to WRDS, WPDE, and WPKD regarding the organization of an Association of Police Communication Officers.

I wish to state that I am heartily in favor of such an Association and will attend the first meeting January 21 to 24 inclusive. You are to be congratulated on starting such a movement. I have thought of this for a long time and discussed it with Lt. Jett of the Radio Commission in April, 1933. He said "you fellows should get organized. You wouldn't be to first base if we didn't go to the front for you." In the past several months I have seriously considered it but have been too busy to do anything about it. Heres to you, and if I can be of any assistance let me know.

I discussed the thing with Chief Michael F. Morrissey, who stated that he considered it very much worthwhile and he might even come along to St. Louis.

You have mentioned several benefits which would be derived by such an Association, but as you say, "they do not scratch the surface." As it is now, all of us must do duplicate work in our development, tests, comparisons, etc., almost completely isolated from other departments.

We, for example, ran tests of four (4) makes of receiver tubes for life, noise, and general reliability. We found some astonishing results. This is one of many things



Indianapolis Police Radio Division's station in the thirties.

that all of us have each had to work out for ourselves. Nevertheless, salesmen visit us misrepresenting what the other fellow is doing, as to troubles, results, and particularly the use of his line of goods. For example, a tube man recently called on us selling tubes who stated that a certain city used 500 of his tubes a month, which is impossible even if they made a complete change of tubes in each receiver every month.

I have known several cases where cities purchased inferior equipment or at high prices because their radio engineer was unable to convince his city officials over the high pressure salesmanship and misrepresentation of the patent infringement situation, etc.

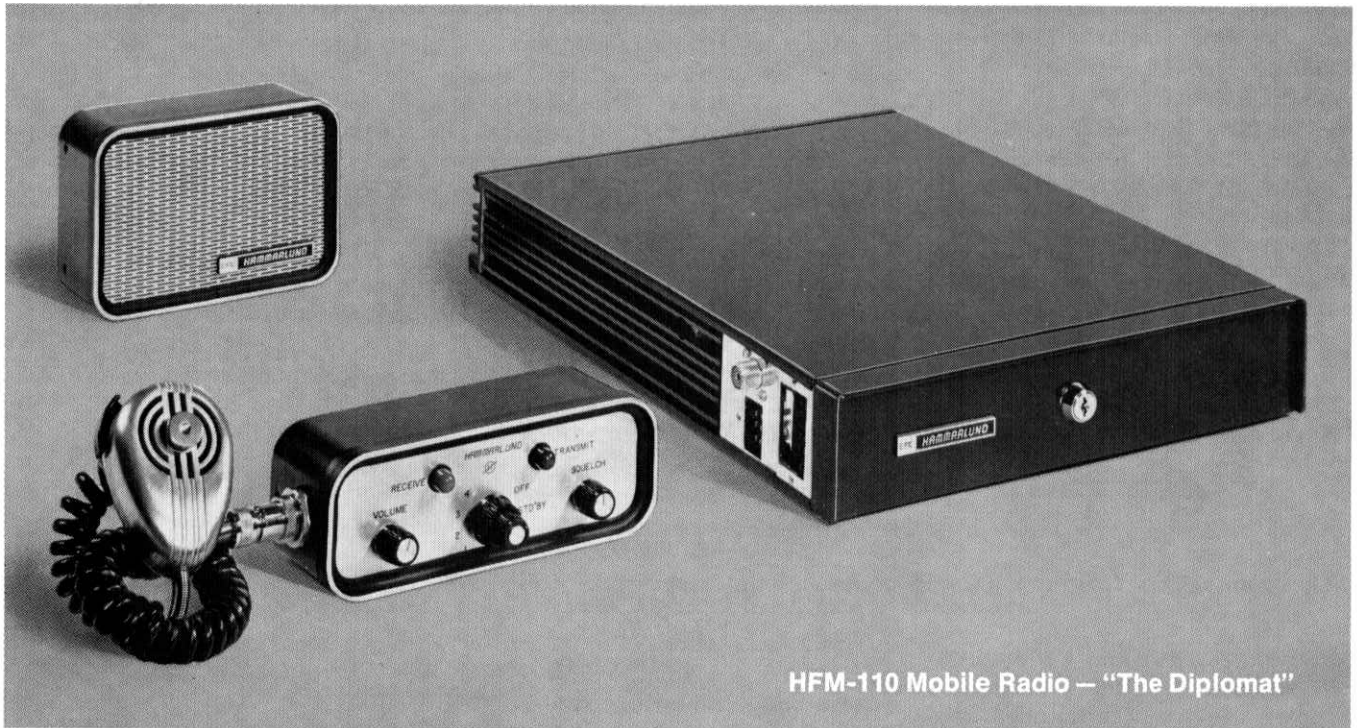
Such an Association should be formed with the ideals that it will be permanent and always progressive, not a means for individuals to explode their pet grouches and then "fold up." It should be aggressive but not antagonistic. For one thing, I have found many of the men feel that the Radio Commis-

sion (ex), has been unfair, has not appreciated the value and needs of Police Radio and has done a poor job of handling the situation as to power and frequency assignments in general. This, I think, is not true.

Police Radio has spread very rapidly, it was a new thing, and there was no basis on which to start. There is no doubt that some improvement in assignments could be made, but there are a few cases where a city does not obtain proper local coverage if they have done their own engineering correctly as to location and number of transmitters, etc. Inter city and state communication is still another thing. I believe that eventually we will use such frequencies that we may have 24 hour contact with any section of the United States, probably using CW instead of phone. The point is, that we can accomplish far more if we try to maintain pretty high standards in our dealings with the Commission,

(Continued on Page 12)

Fill in those "dead areas" with 110 watts of Diplomatic power.



HFM-110 Mobile Radio — "The Diplomat"

Every city has certain areas where radio transmission just seems to give out. Downtown, behind "the hill", even out in the neighborhoods. We're filling them in. With the Hammarlund HFM-110 Transistorized Two-way Mobile Radio. It puts out 110 watts of crystal clear FM that powers its way through the dead spots. The receiver has a dual-conversion IF strip, with separate band width filters in both high and low IF circuits for maximum selectivity and

rejection of adjacent channel interference.

This equipment has been designed primarily for professional or industrial communications, where only the finest, most rugged systems will do. It has been FCC Type accepted for Public Safety, Industrial and Land Transportation. The Diplomat operates on the 25-54 Mhz band, with up to four frequencies and tone controlled squelch available as options. Write us for complete technical information.



The **HAMMARLUND**
Manufacturing Company Incorporated

A subsidiary of Electronic Assistance Corporation
20 Bridge Avenue, Red Bank, New Jersey 07701

(Continued from Page 10)

manufacturers, and with whomever we come in contact. Sincere co-operation is always better.

I have been in this game since it started in 1928 and have visited many police radio stations from Washington, D. C. to New Mexico. I have found to some extent in each case the feeling that their setup was about the best in the country and of rivalry in sense that what the other fellow is doing does not necessarily fit in his case. But, I believe that the game is now old enough and stable enough that this attitude will give way to one of genuine cooperation. We have at Indianapolis one of the most complete, at least, layouts in the country, but we continually try to improve. We will be very glad to attend this Convention and expect to profit by it.

You might send an application blank to Mr. Roy E. McConnell, Chief Operator at the new Evansville, Indiana, two-way Police Radio Station.

You have a big job on your hands getting this thing started. I will see you the 21st.

Yours very truly,
Capt. Robt. L. Batts
Supervisor Radio WMDZ

February 18, 1935.

Mr. Communication Officer:—

Enclosed you will find a summary of the minutes of the meeting of Associated Police Communication Officers which adjourned on January 24th, after a four-day convention. Please read it over and I'm sure you'll agree that the time spent by the attending delegates wasn't wasted. Besides the regular business of the meeting, there were many talks on radio equipment and the displays were a revelation to all of us.

Now, the reason for this letter and enclosure is obvious: We want you in the A.P.C.O. Frankly, don't you think that you belong with us? If you are being paid as an officer engaged in police communication

work, you certainly shouldn't pass up the opportunity to join an association which excludes every one from active membership, who is not employed as a police communication officer. It is an organization created by police communication officers for the betterment of police communication systems in every phase of the game.

We have a technical committee, which is willing and anxious to help fellow members with technical problems. Our executive committee is at your disposal for anything in the way of information you may request as a member. Our resolution committee will consider any changes in regulation you may suggest. We all want to cooperate with you, and we await the opportunity.

Do this, if you will . . . just drop a line to *any* member who belongs to the A.P.C.O. and ask him what he thinks of the organization. This isn't a "fly-by-night" scheme to get your money (if it were, we would charge more than \$2.50 per year). We want you because we want to cooperate with you and want you to cooperate with us.

We want you to thoroughly understand also that we will request no action from you which would serve to embarrass you with your department. Your action in all cases is dependent upon approval of YOUR superior officer. We will NOT attempt to regulate salaries, working hours or working conditions. It is an organization for the general advancement of police communications work and shall continue to be one.

Won't you think this over then and drop me a line? I'll be glad to answer any inquiries and to forward application blanks.

Very truly your,
Everett E. H. Fisher
Radio Supervisor KGPC.
President A.P.C.O.

Condensed Summary of Minutes of the First Annual Convention of the Associated Police Communication Officers

Held in St. Louis, Missouri
January 21 to 24, 1935 incl.

The meeting was called to order by Sergeant Everett E. H. Fisher, organizing member and acting

chairman. An address of welcome was given by Major Albert Bond Lambert, vice-president of the St. Louis Police Department's Board of Police Commissioners.

The meeting then "settled down to business" and the pre-arranged schedule was followed as closely as possible. Among the things discussed and decided upon during the convention are the following, in the order of their entry in the official minutes of the meeting:—

1. It was decided to retain the name of the organization, viz: "Associated Police Communication Officers."

2. A committee was appointed to draw up a constitution.

3. A committee was appointed to investigate the proposed insignia of the organization.

4. A committee was appointed to investigate the offer of free space in the "National Police Officer," after Mr. Charles Hahn, editor of the magazine made additional offer of 15% of money received for advertising, and \$2.00 subscriptions for fifty-cents, to members, if the A.P.C.O. would recognize the magazine as its official publication.

5. Talk on "Supreme" instruments by representative of Supreme Instrument Co.

6. Mr. E. K. Jett, of the Federal Communications Commission, addressed the assembly on inter-city communication.

7. A committee was appointed to investigate and recommend changes, where necessary, on inter-city communication.

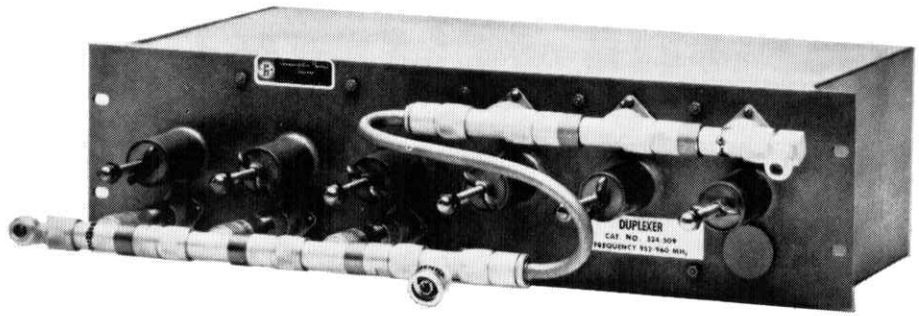
8. Visit to KGPC.

9. Address by Mr. E. P. Coffey, U.S. Department of Justice, Bureau of Investigation, in which he offered the cooperation of his division and expressed the sentiments of his Chief, Mr. J. Edgar Hoover.

10. Committee report and insignia was adopted.

11. General discussion regarding advisability of creating ordinances which would prohibit undesirables from having automotive receiving equipment which tuned to police frequencies. Mr. Donald Leonard, Detroit, Michigan, member of the radio committee of the International Association of Chiefs of Po-

(Continued on Page 54)



Duplexers.

Only ours have current carrying members of low loss copper plus a double compensation method of temperature stability control. That's important.

Also important are our matching antennas, reflectors and other components. Yes, we have cavity resonators, too.

Literature?

We hope you'll write or call so that we may give you all the facts about one of the most complete lines in the business.

PHELPS DODGE COMMUNICATIONS 
COMPANY

Route 79, Marlboro, New Jersey 07746 (201) 462-1880
3043 Rosslyn St., Los Angeles, Cal. 90065 (213) 245-1143

THE GOOD GUYS, THE BAD GUYS, AND THE TELEPHONE COMPANY



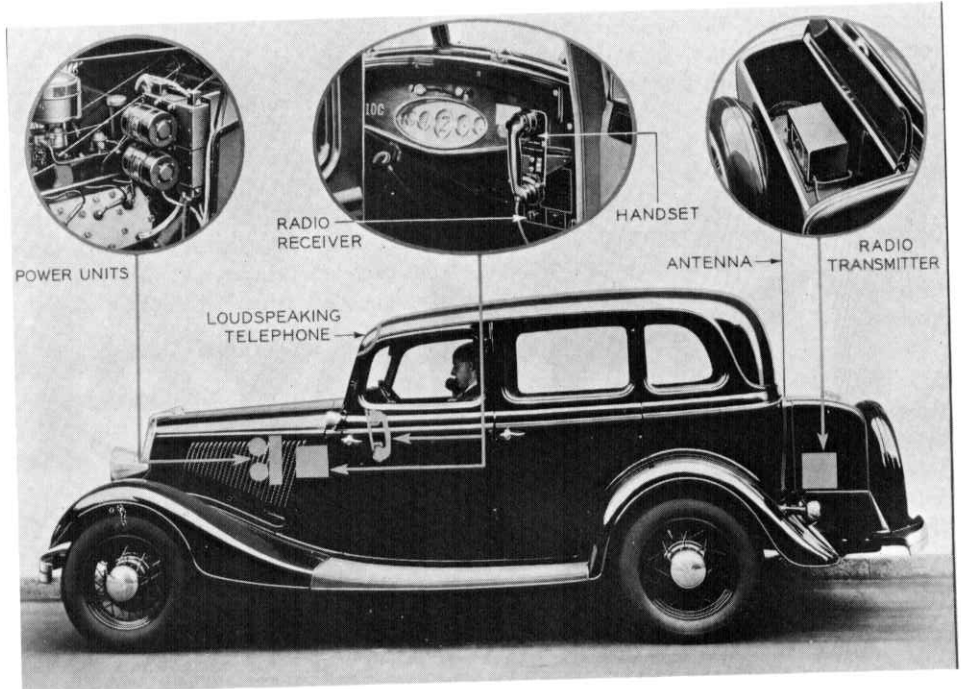
John Shepherd is presently staff supervisor, State and Local Government activities for the American Telephone & Telegraph Headquarters in New York City. He previously had a similar assignment in the Mountain Bell Telephone Company, Denver, Colo. He has been associated with APCO activities for the past ten years.

By John Shepherd

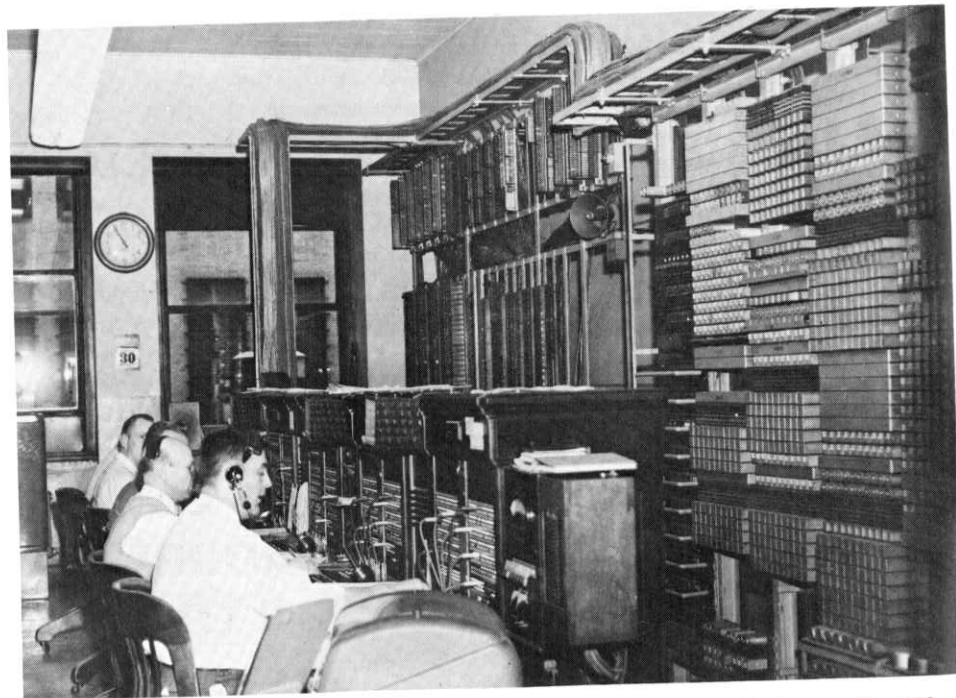
People don't think about it much any more, but "This is car three calling headquarters," "10-4," and "Dial 911" are all pretty new additions to the modern vocabulary of emergency communications. In times past, if a citizen called a policeman, he actually and quite literally had to do just that . . . and at the top of his lungs . . . HELP, POLICE!

In the 1870's Alexander Graham Bell's communications invention was beginning to catch on in the American public mind. The rich and those serving them began using the phone for purposes of status and prestige and faster service. But at roughly the same time the Astors and the Vanderbilts discovered that it was fun to talk to each other by wire, it was found that it was useful to have ordinary folk using telephones, too.

For example, in the 1880's, a New



Police Radio Telephone Equipment, Newark, N. J., radio equipped police car employing Western Electric 18A radio transmitter and 18B radio receiver.



Operating Room of New York Police Headquarters, Safety Building, 935 N. 8th St., January 30, 1963.

York State congressman named Murphy burst into print in the New York Sun to decry the fact that every precinct house in the city

was being supplied with four paddy wagons each, but not one of the

(Continued on Page 16)

**If you need another quote
on your fm 2-way system
call us collect.**

No matter where you are.

We'll take your requirements and specifications over the phone. Then be back to you with an attractive response before you know it. That goes for any kind of professional fm 2-way communications equipment you might need. Mobile. Base. Portable. Or Manpack. And the accessories that go with it.

You can be sure of all the equipment, too. You see, each piece is backed by a full service agreement and an organization that's been selling professional communications equipment na-

tionally and internationally for over 37 years.

So call us collect at 312-259-9600, and let us talk it over.

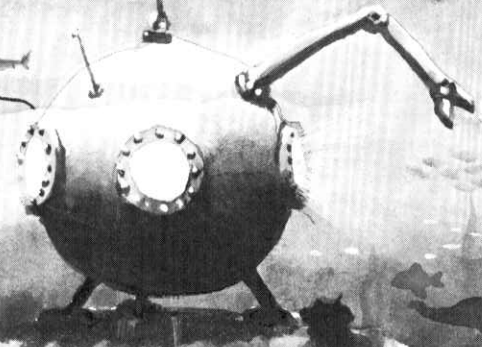
And, if the line's busy, try again or drop us a line.



the hallicrafters co.

600 Hicks Road, Rolling Meadows, Illinois 60008 U.S.A.

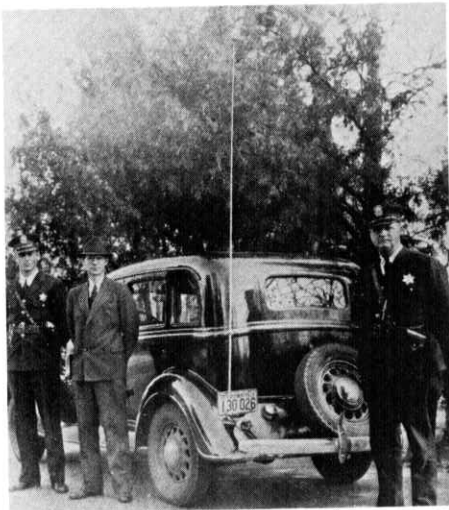
312..259.9600..
AND REVERSE
THE CHARGES



THE GOOD GUYS, THE BAD GUYS, AND THE TELEPHONE COMPANY

(Continued from Page 14)

precincts had a telephone. As part of his argument for widespread use of police telephones and the importance of rapid communications to help assure public safety, Congressman Murphy pointed to the



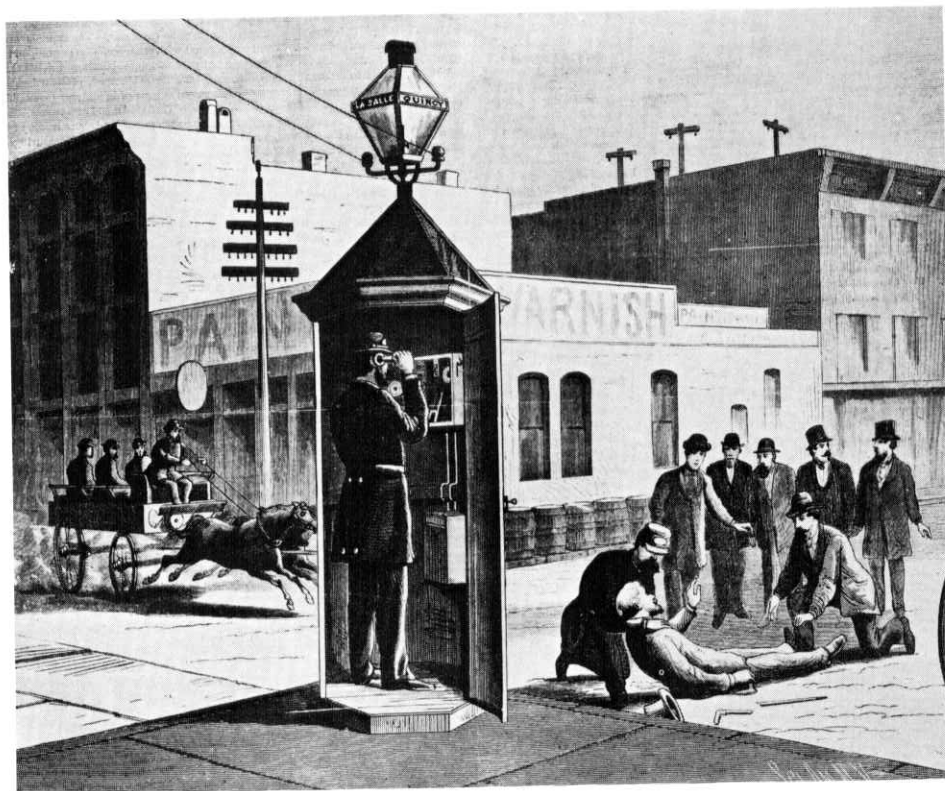
Inauguration of two-way radio equipped patrol car, Evansville, Indiana, 1935. Equipment built by Western Electric Company for the Bell System.

fact that Police Commissioner Byrnes had two official telephones for his own private use, one in his headquarters office and one in branch headquarters on Wall Street.

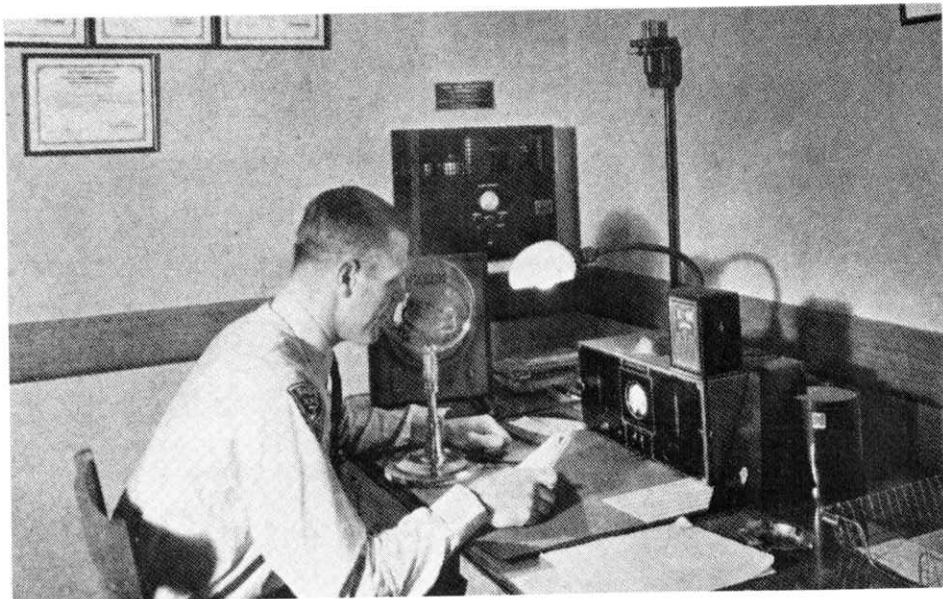
By 1886, the New York City Police force had a total of 900 street-located communications devices of various kinds. Some of these were telephones, others were simple telegraph units that could be used to summon help or signal all's well to the precinct house.

Other cities across the nation were beginning to climb on the telephone bandwagon as reports of reduced crime rates began coming in. By the late 1800's, the city of Boston was spending \$14,500 a year on police telephone services, and the heat was on the Commissioner to cut costs while supplying more phones. Presumably by the use of his detective force, the Commissioner found out that the telephones were being leased to an agent who in turn leased them to the city. The agent paid \$5.00 a year per unit to lease a phone and charged the city \$7.50 a unit for their use.

The Commissioner decided this was a terrible rate to pay and



Emergency value of telephone booth by Chicago police in 1881 is illustrated in this line drawing. This appeared in the April, 1881, edition of *Scientific America*. It depicts a forerunner of the telephone booth, then used by Chicago police.



Western Electric manufactured two-way radio transmitter built for the Bell System, installed in Newark, N. J., Police Headquarters in 1935.

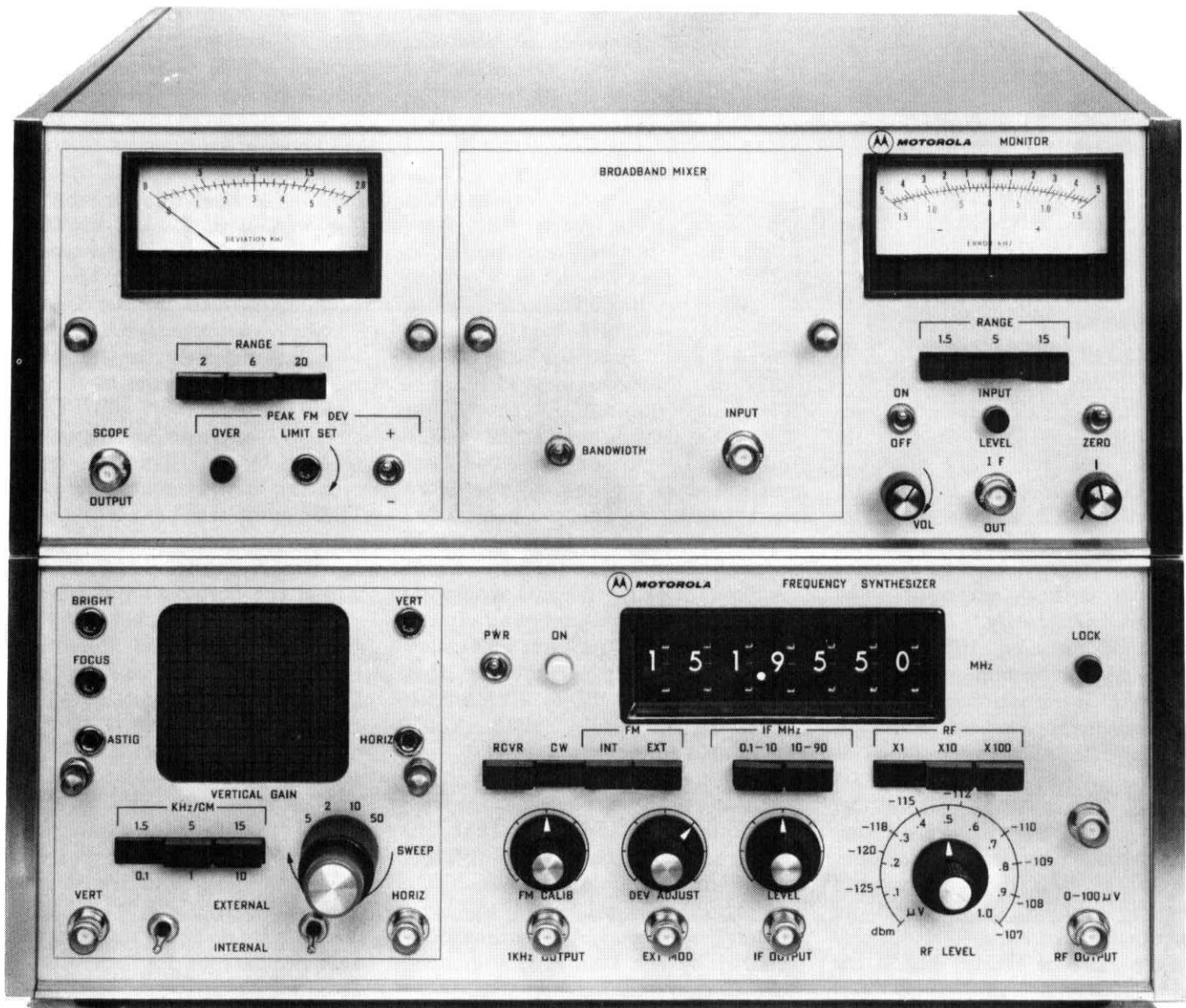
threatened to build his own telephone manufacturing company. He could, he said, build his own factory for \$32,000 and supply the city with phones for \$3.00 a year each. Exactly how serious the Commissioner was about manufacturing his own equipment is thrown into some doubt by the closing of his letter in which he requests another 300-

400 telephones made by American Bell to be delivered over the next 12 months.

With the introduction of the telephone, the bad guys suffered a terrible blow. Before its advent, it took an average of thirty minutes for the good guys to arrive on the

(Continued on Page 62)

The first total coverage, high resolution service monitor featuring plug-in modules for under \$4000.



Since we pioneered much of today's FM communications technology, it's only natural for us to bring out a first in test equipment.

We took all of the functions you need for accurate, high resolution measurements and made them available at a practical price. You get everything you'd expect. Plus more.

For example, our new service monitor is designed around a plug-in building block concept. This not only lets you tailor the instrument to your specific requirements, but also provides the flexibility to prevent obsolescence. The instrument is easily up-dated by plug-in modules.

We have a six-page brochure

that can answer all of your questions. For a copy, write Motorola Communications and Electronics, Department 94P, 1875 Greenleaf Avenue, Elk Grove, Illinois 60007

 **MOTOROLA TOTAL COMMUNICATIONS**

Communications' Buyer's Guide now available by request on company letterhead.

Public Safety Communications Beat



by Bob Brooking
Communications Engineer
City of Burbank, Calif.

"A HISTORY OF APCO IN THE REGULATORY FIELD"

From time to time questions are asked as to how APCO became involved in the regulatory activities of the FCC. Obviously the pat answer is that this was necessary for survival in today's real world; but there is a history to this development that is both interesting and important. Originally, APCO was founded in January, 1935, for the purpose of developing methods of exchanging information between law enforcement agencies by means of radio. This effort was aimed at the implementation of common language and message format between agencies and to the solution of numerous operational problems. Then World War II came along and again the problems were largely of an operational nature.

At the close of World War II the FCC decided that quite a few years had passed without a good look at what might be needed to meet Section 303(g) of the Communications Act of 1934, which calls for "the larger and more effective use of radio in the public interest."

The Radio Technical Planning Board was the established instrument which was advising the FCC in regard to professional and industrial opinion on frequency allocation matters. As a result, the Commission adopted new rules in 1948 which broadened the eligibility in the Land Mobile Radio Serv-

ices which made it possible for many businesses to begin using two-way radio. The inclusion of Land Mobile Radio came about largely as a result of pressure on the Commission resulting in addition of Panel 13 to the Board. While APCO members served on the Board, APCO did not participate as an organization. However, 1948 was a turning point in the use of two-way radio and it also serves as an excellent guidepost to measure our progress and problems.

Professional Public Safety communicators have, since 1948, been attempting to expand the radio communications facilities available to law enforcement to provide faster and more adequate field command and control. In 1948 there were 4,137 base stations and 32,166 mobile units licensed in the Police Radio Service. Whereas the use of radio by law-enforcement had been predicated in the past on the safety needs and the necessity for immediate communication with field forces to aid in the apprehension of fleeing criminals, now other important factors were becoming apparent. Taxicabs, truckers and other two-way users were proving that they could not only do a better job of serving the public, but they could do so at a lower cost.

By 1951 the land mobile allocations of 1948 were already proving inadequate. On July 18, 1951, the FCC requested that the Joint Technical Advisory Committee study the allocation of channels for the land-mobile services. A subcommittee chaired by the late Fred Budelman investigated thoroughly the possibility of splitting channels in these services: This subcommittee worked "under great pressure" and on May 23, 1953, submitted to the Commission its report that channel splitting was feasible in the 152-162 Mc/s band. The JTAC report indicated that interference-free operation could be accomplished in the same area with a spacing of 30 kc between channels. The use of 20 kc spacing would require making assignments with transmitters separated in the order of ten miles.

The Commission chose not to fol-

low the JTAC recommendation, stating:

"Considering all factors, it would appear preferable to list assignable frequencies on a 15 kc basis. Assignment of channels in the same general service area would be made on an alternate 15 kc basis, providing 30 kc separation. The interspersed 15 kc channels could then be assigned to other areas which did not substantially overlap the service areas of stations assigned to the first group of channels."

As a result of this decision by the Commission in Docket 11523, there were now four times the assignable frequencies available in the 152-162 Mhz band. Users in the Police Radio Service assumed that assignable frequencies gained through channel-splitting would accrue to the service whose channels were split. On April 3, 1957, a series of Dockets was released by the Commission to allocate the newly created frequencies. The Commission did adhere to its announced policy that the newly created frequencies would remain within the Services from which they were split and Docket 11990 dealt specifically with the Public Safety Radio Services. However, in this Docket the Commission proposed the creation of the Local Government Radio Service, the Interstate Highway Radio Service, and allocation to these services of frequencies in the 152-162 Mhz band. In spite of the obvious increase in the number of licensees and transmitters in the Police Radio Service, no additional frequencies were proposed for this Subpart or for the Fire Radio Service.

Comments were filed by a number of licensees in the Police and Fire Radio Services requesting assignment of additional frequencies, and several Public Safety user organizations submitted evidence of the need based on growth statistics, but in the Report and Order of May 8, 1958, the Commission made no change from its previous position although a number of new frequencies were left unallocated, waiting for some proposed new use. This

(Continued on Page 20)

POST CONFERENCE TOUR TO HAWAII

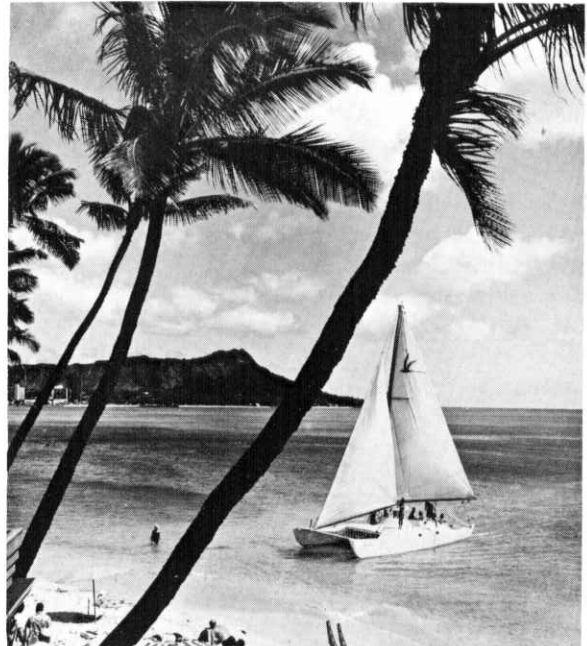
JOIN YOUR FRIENDS AFTER THE SAN FRANCISCO CONFERENCE
FOR EIGHT EXCITING CAREFREE DAYS IN BEAUTIFUL HAWAII

AUGUST 13 TO AUGUST 20, 1971

We will stay at the brand new Waikiki Beachcomber Hotel, departing San Francisco early Friday, August 13, returning to your home city August 20.

Included in our Hawaiian Holiday:

- Seven nights at Waikiki Beachcomber Hotel.
- Traditional Lei Greetings and transfers to and from Hotel.
- Sightseeing—including the Circle Island Tour, Mt. Tantalus Tour, Oceanic Sea Life Park and the Pearl Harbor Yacht Cruise.
- Optional Tours to the Outer Islands can be arranged.



SAILING AT WAIKIKI—Catamarans like the one pictured take visitors for hour-long rides beyond the reef at Waikiki Beach. Sailing is a favorite year-round sport in Hawaii.

(Hawaii Visitors' Bureau Photo)

TOUR PRICE \$120.00 per person

Based upon two people sharing Twin Room

SINGLE ROOM \$150.00

TRIPLE ROOM \$110.00 Per Person

AS SPACE IS LIMITED AND RESERVATIONS MUST BE MADE BY MAY 1, 1971, PLEASE SEND COUPON AND DEPOSIT OF \$100.00 TODAY.

By making your arrangement to travel by scheduled airline through the APCO TRAVEL COMMITTEE, you will be able to take advantage of the round-trip tour basing coach class air fare from your home city to San Francisco and then on to Honolulu. Some examples of the savings available are shown below:

HOME CITY	Tour Basing to * San Francisco & Honolulu	Round Trip Coach to San Francisco	THRIFT FARE San Francisco-Honolulu	TOTAL	SAVINGS
CHICAGO	\$310.00	\$232.00	\$170.00	\$402.00	\$ 92.00
NEW YORK CITY	366.00	308.00	170.00	478.00	112.00
MINNEAPOLIS/ST. PAUL	310.00	204.00	170.00	374.00	64.00
ATLANTA	329.00	270.00	170.00	440.00	111.00
MIAMI	355.00	316.00	170.00	486.00	131.00
HOUSTON	278.00	220.00	170.00	390.00	112.00

*Plus Taxes. ALL FARES QUOTED ON TARIFFS IN EFFECT AT TIME OF PRINTING.

As space is limited and reservations must be made early to secure hotel accommodations, fill out and send coupon to:

NATHAN McCLURE, CHAIRMAN TRAVEL COMMITTEE

P. O. BOX 4281

ROCKFORD, ILLINOIS 61110

Yes, I plan to go. Please make reservations for (number of people). Enclosed please find \$. as deposit. Make check or money order payable to NATHAN McCLURE, CHAIRMAN TRAVEL COMMITTEE. \$100 minimum deposit per person. Final payment due June 1, 1971.

NAME _____ PHONE _____

STREET _____

CITY _____ STATE _____ ZIP _____

NAMES OF OTHERS IN RESERVATION AND AGE OF CHILDREN AS OF AUGUST 13, 1971.

I understand my deposit is refundable in full up to May 31, 1971. If necessary to cancel after that date there is a \$25 cancellation fee.

PUBLIC SAFETY BEAT

(Continued from Page 18)

was due largely to the opposition of all Public Safety users to the creation of the Interstate Highway Service.

Because of this action by the Commission it became apparent to the Associated Police Communication Officers, Inc. (APCO), now known as the Associated Public-Safety Communications Officers, that the Federal Communications Commission had not been persuaded that the Police licensees had a real need for additional frequencies. As a result APCO decided in August, 1958, that it was necessary for the organization to retain legal counsel in Washington, D. C. and to assume a more aggressive posture in the battle which was beginning to develop for frequencies in the Land Mobile Radio Services.

How did this come about? Well, the man responsible was William Gamble, who became President of APCO in August, 1958, and we quote his statements here:

"As this issue of the BULLETIN goes to press, I find myself engulfed in two vital matters that confront our organization, and which require action on or before October 1st, 1958. These are FCC Docket No. 11997, and the AT&T transmittal No. 5780, filed with the FCC August 15th, 1958. I am deeply concerned about these two matters, especially the first one (Docket No. 11997) which may well have a far reaching effect upon the future of Police and Public-Safety radio communications services for many years to come. Practically all of the systems operated by these services are located within this part of the spectrum (25-890 mc).

"I have spent many hours in conference on this matter, both at meetings in person and by telephone, and I am convinced that APCO should make the very best presentation possible before the Commission, as this will be our last opportunity to do so before the International Conference starts in 1959. It is my opinion and firm belief that APCO should be represented by legal counsel, someone authorized to practice before the FCC, so that we may feel our organization is making every effort to pre-

sent a true and effective case before the FCC. Since I have not had ample time to appoint new members to the various committees, I contacted all the officers and am now polling the executive committee for their feelings on the matter. As of this date all members polled have agreed this is the right course to take. I realize time is running out, so I have taken preliminary steps in engaging counsel, one qualified to present the fact of our needs before the FCC.

"In so doing I have not lost sight of our financial responsibility and since it was the feeling of the officers, committee members, and myself that IACP has an interest in these proceedings, I met with representatives of the IACP to explain the need for a unified approach to this case, and also to solicit their financial support to help defray the expenses of counsel. It will be submitted to the officers and executive committee of the IACP at their National Conference in Miami, Florida, October 26 to 30, 1958.

"As outlined in the last issue of the BULLETIN, members of the Executive Committee were polled on the matter of APCO being represented by legal counsel before the FCC with reference to Docket No. 11997. I am happy to report that all members, with one exception, agreed with me on this very important decision. The filing date on Docket No. 11997 has been extended until October 31st. This allows added time to prepare our testimony for presentation in the 25-980 mc. proceedings.

"The International Association of Chiefs of Police, through their Radio Committee Chairman, have notified the FCC that APCO will represent the IACP on all agenda pertaining to Docket No. 11997. I am confident that we will receive financial assistance from the Chiefs' organization, as they are very much aware of the importance of future police communications hinging upon the verdict of these hearings. Personally, I am confident that the combined efforts of IACP and APCO will be far more impressive as a users group before the Commission, inasmuch as our associations are directly responsible for Police and Public Safety Communications.

"When we pause to read the list

of users in the 25-890 mc region and the large number of services that will be affected by the outcome of the hearings, it causes one to realize the extreme proportions of the problems facing the FCC in the upcoming hearings. Undoubtedly, we shall be confronted with the sternest type competition that can be mustered from ranks of the legal and engineering profession to represent large industries and services. Therefore, I am convinced it is necessary for our association to have the very best evidence, witnesses and testimony possible, under guidance of capable legal counsel for presentation before the FCC."

Under the guidance of Counsel Kittner, APCO presented its testimony, a carefully prepared offering by Colonel Charles W. Woodson, Superintendent of the Virginia State Police; Chief John A. Lyddy of the Bridgeport, Connecticut, Police Department; Bob Brooking, Chairman, Public Safety Planning Committee, APCO; and President Gamble of APCO. It represented the entry of APCO into the regulatory field.

At this time the number of base stations in the Police Radio Service had increased to 11,300 and mobile units to 150,000 and congestion was a fact in several large metropolitan areas. APCO participated in the following regulatory dockets:

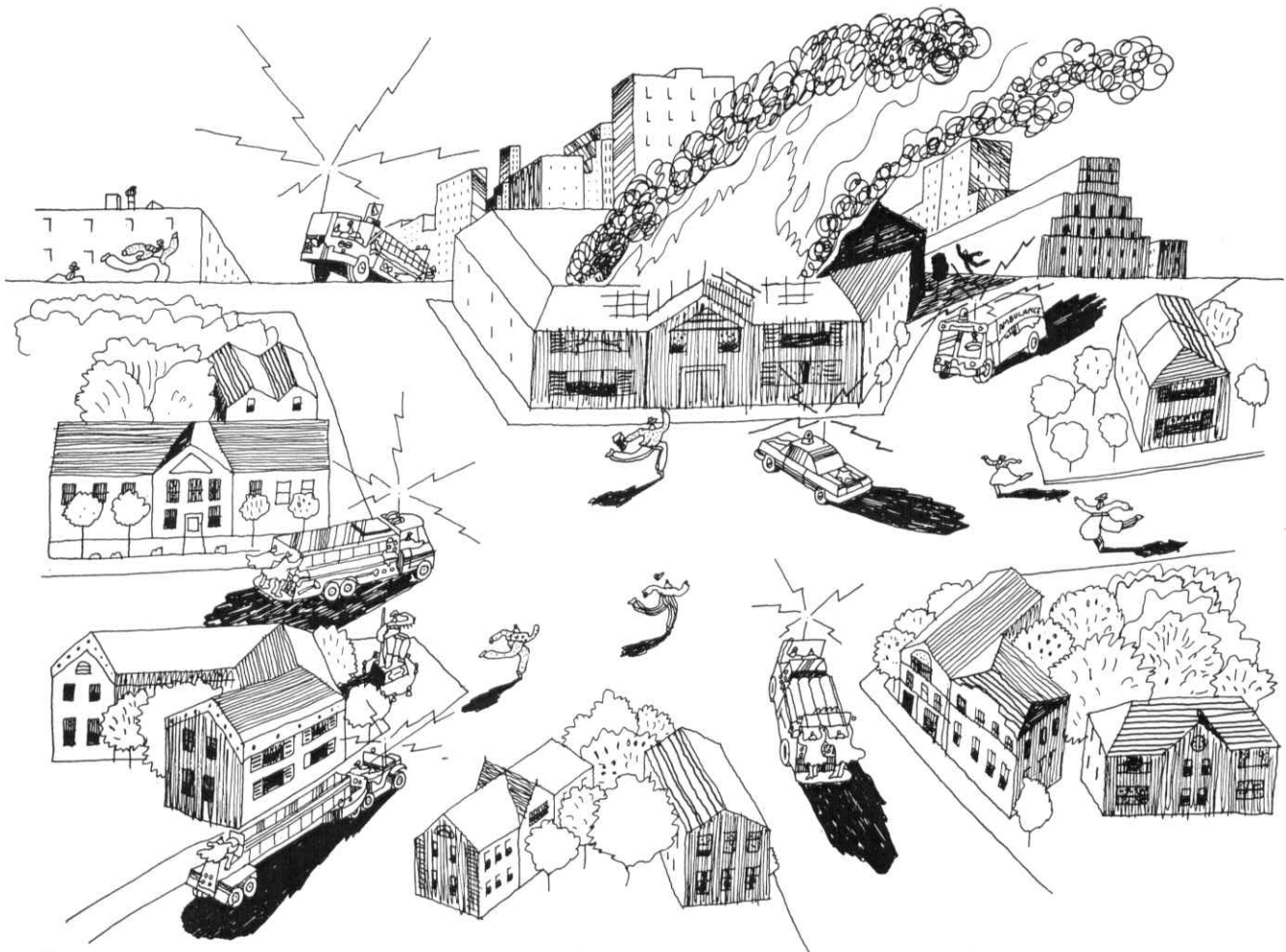
- 11866—Allocation of Frequencies Above 890 mcg
- 12295—Change Effective Date of Narrow Banding
- 12747—Mobile Relay
- 13083—Technical Standards for Microwave
- 13273—Additional Frequencies for Police, Fire, Highway Maintenance and Special Emergency
- 13754—Assignment of 150.8 - 152 Mhz
- 13847—Splitting 450 - 470 Mhz to 25 KHz
- 14028—Use of Vehicle Radio for Man to Base Relay
- 14503—Splitting Channels in 25 - 42 Mhz
- 14507—Establishing Fees for Licensing

There were others too numerous to mention. Then on March 26, 1964, the FCC released its Report and Order in Docket 11997 which

(Continued from Page 57)

Public safety spoken here.

At RCA we have a big word for effective public safety—
Communi-capability.



The need is a simple one: to communicate with the people you need, when you need them.

Our solution is a simple one, too. The right combination of RCA mobile communications equipment that can give you an individualized communications system using sophisticated standard equipment.

You can, for example, mix or match units from RCA Series 700 and Series 1000 mobile radio equipment to build just the system you need. For maximum reliability and optimum performance.

Anyway you go, you don't get the bother of tubes or mechanical relays. And you do get automatic temperature protection, voltage regulation,

multi-frequency capability, and continuous duty operation.

All controls, cabling, options and accessories are interchangeable between the 700 and 1000 Series, so you can increase your mobility without increasing your operating costs.

For the last word in public-safety communications systems, play it safe.

Write for details to RCA Two-Way Radio, Dept. 000, Building 15-5, Camden, N.J. 08102.



RCA
Total Communications



DRIVER'S LICENSE - 1945 CHEV 5D BLUE
VIN 488675115644
DRIVING FORD '61 BLU 5D

LIC NO NY 5971CH
ROBBINS, THOMAS K.
255 ELOYER STREET 14618
CMP 12/28/65
1945 CHEV 5D BLUE
VIN 488675115644

REPORTED STOLEN 8-45PM 9/17
VICINITY PARK AND ELWOOD

DRIVER'S LICENSE - 1945 CHEV 5D BLUE
VIN 488675115644
DRIVING FORD '61 BLU 5D

XEROX MOBILE PRINTER

XEROX IS A REGISTERED TRADEMARK OF XEROX CORPORATION.

A secretary in every patrol car.

Now Xerox has a way for patrolmen to get the message even if they're too busy to get the message.

The Xerox Mobile Printer will take it down. And print it out at 280 words a minute. That means, the Communications Center can send a message once and for all. And it can send more messages, more quickly and more accurately than ever before.

The Mobile Printer simply hooks up to any two-way radio. And fits right on the seat next to the

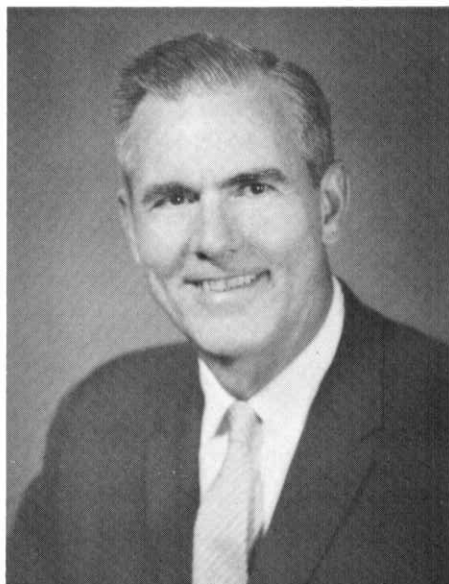
driver. There it stays, silently making good, clear records of everything sent. Never even taking a break for lunch.

For more information about the Mobile Printer, call Paul Crann at (716) 442-1810 or write Xerox Corporation, Dept. MLP, Rochester, N.Y. 14603.

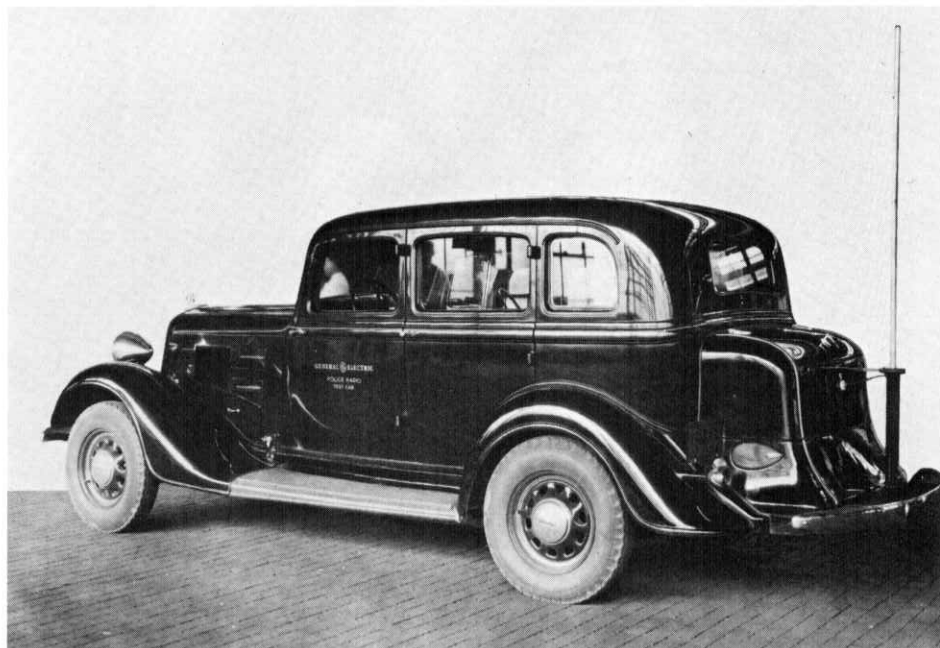
XEROX®

FROM HERTZ TO MEGA HERTZ

In Public Safety Communications



By J. A. McCormick
Communication Systems Division
General Electric Company
Lynchburg, Virginia



Police-radio test car, for use in development and test of ultra-high-frequency police car receivers and transmitters. Receiver mounted under dashboard and using regular car antenna. Transmitter in rear trunk, vertical antenna shown. 1934. (Fig. 2)

The early history of Police radio would not be completed without reference to the dawn of radio itself. It all began with the discovery of Hertzian waves by the German physicist, Heinrich Hertz, in 1888. Hertz demonstrated that energy could be transmitted by electromagnetic waves with the same velocity as light waves, a phenomenon which had been mathematically predicted by the Scottish scientist and mathematician James Clerk Maxwell. We honor Hertz today by referring to power and radio frequencies in terms of so many Hertz, rather than in cycles per second.

The development of the radio industry is both interesting and inspiring, but these are indeed weak descriptive words for a series of events and contributions which have profoundly changed the world.

If one were skilled enough to convey an understanding of the early history of radio in a presenta-

tion of reasonable length, any reader — even an informed one — would be spellbound. It is difficult to comprehend that the entire development of the radio/electronics industry, from the first rudimentary components to the highly complicated and sophisticated systems and services today, took place within the lifetime of many of us.

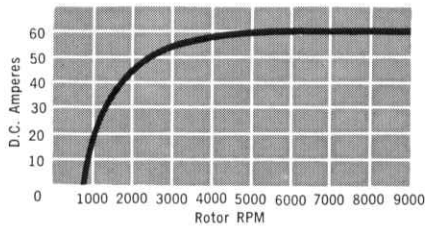
A great many people presume that the science of electronics, of which radio is one part, began with the advent of the electron tube. This seems logical because, for a great many years, the tube was unquestionably the keystone of the industry. The electron tube began in 1883 with Thomas A. Edison, one of the founders of the General Electric Company. However, at the time, he was completely unaware of his contribution to what would become a great industry and which, among other things, would one day make his mechanical talking ma-

chine appear as antiquated as the Pyramids. The "Edison effect" was his discovery that "something" was given off or emitted by the heated filament of an electric lamp. Edison determined that this "something" *must* consist of negative charges by placing a cold filament in the lamp, which when made positive, attracted the charges given off by the heated filament.

At a later date, it occurred to J. Ambrose Fleming of the Edison Electric Light Co. of London, an early contributor to wireless, that there might be a way to make use of the Edison effect. He reasoned that if the incoming Hertzian waves of a wireless system were applied to the cold filament or plate — as it came to be known — a current would flow from the filament to the plate when the latter was positive and stop when it was

(Continued on Page 26)

Leece-Neville builds police alternators. Specifically for the stringent demands of police work. We've built them for years. And they're built for years of service.



The 6600A keeps your police cars supplied with ready electrical power. Batteries stay charged to run lights, radios and other electrical equipment running on the scene for extended periods.

Cost is low and they're easy to specify . . . as original equipment or replacement units on all popular police cars. Several models to choose from . . . universal mounting and interchangeability. They're compact. Ruggedly constructed. Simple to maintain.



Matching regulators are also available. The 5016R regulator with germanium transistors. The 5022R for high temperature operation. Field relay 6014R fits both types.

On call or cruising, Leece-Neville provides the electrical power for rugged duty. Police duty. Write for complete technical information: The Leece-Neville Company, Emergency Vehicle Department, 1374 East 51st Street, Cleveland, Ohio 44103. Dept.

When duty calls Leece-Neville's Police Alternator answers with power



FROM HERTZ TO MEGA HERTZ

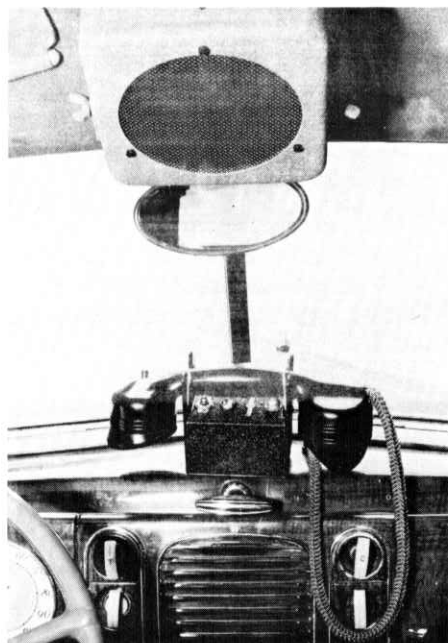
(Continued from Page 24)

negative. The idea was sound, and in 1904, Fleming invented the Fleming valve, a rectifier, or diode, which was superior to the various detectors being used in wireless telegraphy at that time.

In 1906, after years of experimenting, Lee deForest conceived the brilliant idea of adding a third element to the Fleming valve. This was a grid-like electrode between the filament and the plate for controlling the flow of current between the two. Thus was born the "audion," or triode, one of the truly great inventions of this century. The audion was by far the most sensitive detector to date. However, it was the mistaken belief of deForest and many of his contemporaries that the action of the audion was due to the presence of gas in the envelope and that such a phenomenon would not occur in a vacuum. The deForest audion was a vast improvement over the Fleming valve but it was very erratic and afflicted with short life.

In 1900, six years before deForest's audion, the General Electric Company, visualizing the progress that could be made by subsidized scientific research, organized the world's first industrial research laboratory under the leadership of Dr. Willis R. Whitney, who guided its destinies as Director for 32 years. In almost no time, the wisdom of having such a laboratory was demonstrated by Whitney's discovery of the metallized carbon filament which reduced the nation's light bill by three to one in 1905. This was followed in 1910 by Dr. William D. Coolidge's development of the ductile-tungsten filament which reduced the light bill another two-thirds and prolonged the life of the lamps. It is estimated that in 1914, the people of the U.S. achieved a saving of two billion dollars from what the same amount of illumination would have cost with the metallized carbon filament.

In 1909, three years after the audion, Dr. Irving Langmuir joined the General Electric Research Laboratory. He began at once his study of gas-filled valves or tubes, and also those with high vacuum. In doing this, he developed proc-



G-E model 4MC2B1 control unit and Automatic Electric Co. monophone hand set installed on dash of Ford 1938 automobile. For use with model 4G1B1, 15-watt crystal-controlled ultra-high-frequency mobile transmitter. 1938. (Fig. 4)

esses for obtaining a much higher vacuum than his contemporaries thought possible. He demonstrated that thermionic currents *would* flow readily in a high vacuum and, best of all, that such a vacuum tube would stand up under much higher voltages than if it were gas-filled. Dr. Langmuir learned that a heated filament in a high vacuum caused the tube to become gassy because of gas liberated from the filament and the glass. He found ways of overcoming these difficulties and was then able to produce the first reliable, fully satisfactory, electron tubes.

Despite the magnitude of their contributions, it was not Edison, Fleming, deForest, Coolidge, or Langmuir who can be considered the founder of the radio industry. This honor must always be reserved for Marconi. Here indeed was a man of vision — an engineer, a practical inventor, salesman, and promoter, rather than a scientist. In his day, and even before, there were many experimenters who managed to transmit and receive Hertzian waves within the confines of a laboratory. It is not known now what end results these individuals had in mind, but it seems clear that they failed to appreciate that they had a new means of communication within their grasp. Only

Marconi had the vision of a wire-system of telegraphy, and he managed to put together an array of components which enabled him to communicate outdoors and over a considerable distance. At that point, he went to England to obtain financial backing for developing a ship-to-shore system.

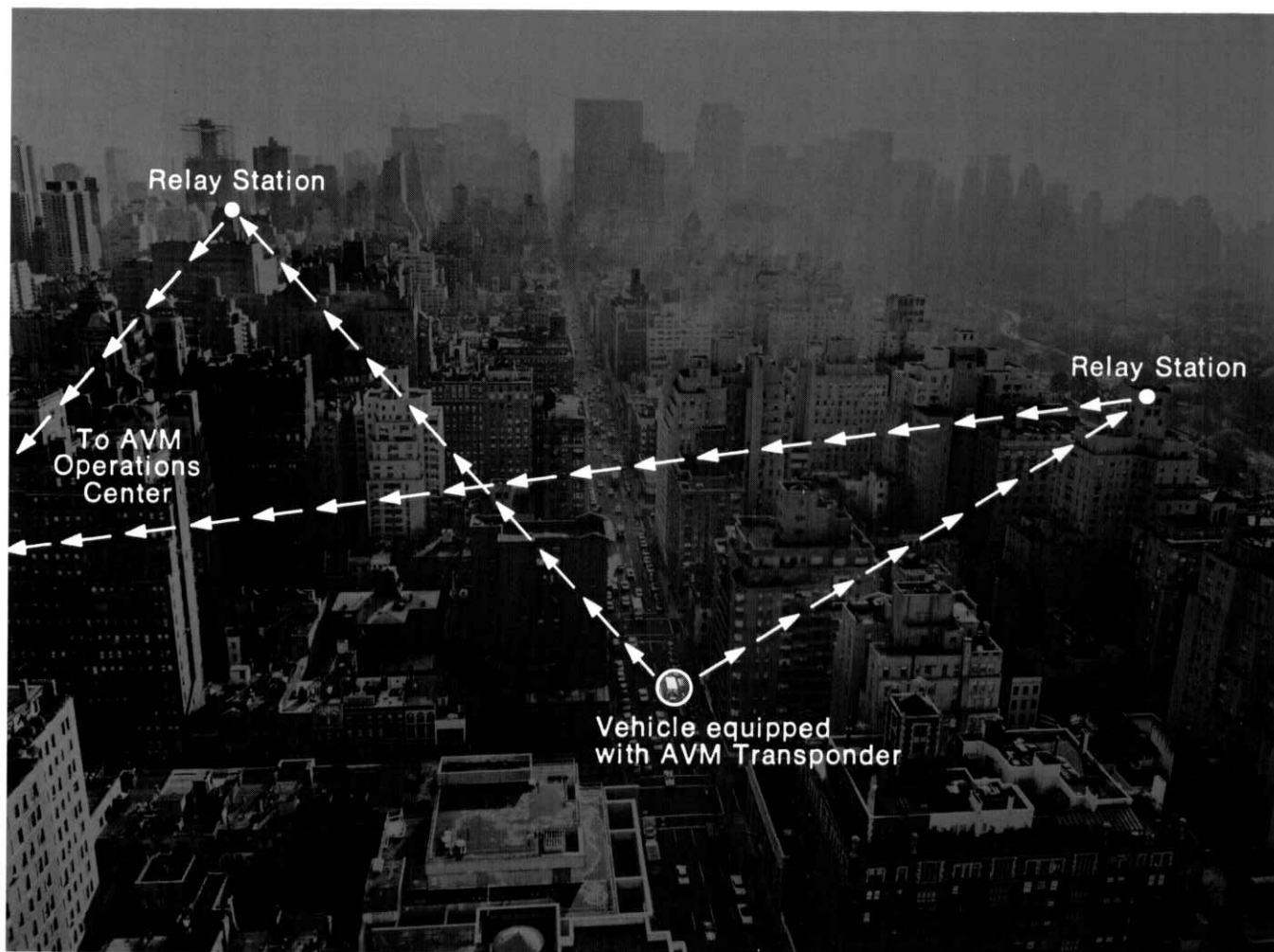
It has been my very good fortune to know some of the GE Radio Pioneers personally, among whom is Colonel Irvin R. Weir, who is still residing in Syracuse, New York. I believe you will be interested in what Colonel Weir had to say at his retirement party in September, 1962, about a meeting he had with Marconi. I quote Colonel Weir as follows:

"The application of the first high power water cooled tube in 1922 stirred the imagination of many Radio Pioneers. Dr. Alexanderson saw the possibility of putting all motor generators out of business, even his own Killowatt High Frequency Alternator. It was not long before he obtained authorization for the development of a 200 K.W. transmitter using water cooled tubes. I was assigned by the Radio Department to help develop the 200 K.W. tube transmitter at the RCA Station, Rocky Point, Long Island. This development was a cooperative venture between RCA and General Electric — GE was to furnish the tubes and the transmitter; RCA was to provide the station and antennae at their new Rocky Point Station.

"We finally got about 120 Kilowatts into the antenna. The newspapers were given the story as a tube set replacing the large Alexanderson alternator. This feature caught the eye of Marconi, whose yacht *Electra* was anchored in New York Harbor. The news of a water cooled tube putting out a 120 kilowatts excited him, so he asked for a couple of the UV 207 tubes through General Electric for experimental purposes. He wanted such power for his experimental work back in England. I was instructed to deliver these tubes to Marconi with the admonition that I must get a receipt from Marconi personally for the two tubes.

"As soon as I got aboard the

(Continued on Page 66)



PINPOINTED!

By electronic and computer techniques.

Coming soon. For all types of vehicles, public and private.

Police cars. Fire-fighting apparatus. Ambulances. Sanitation equipment. Buses. Taxis. Trucks. Armored cars. Utility vans.

Automatic Vehicle Monitoring (AVM) will improve their operational safety and efficiency, wherever they are and whatever their environment.

Yes, AVM is coming soon from Hazeltine—for better reporting, command and control.

Police, Fire, Ambulances—Response time *reduced*.



Trucks—Operating costs *cut* through improved dispatching efficiency. Thefts *reduced* by automatic “silent alarm” feature. (Hijackers beware!)

Buses—Operating efficiency *increased* by better schedule adherence. No more “bunching up.”

While providing all these benefits, Hazeltine AVM will not add to but will *actually reduce* voice channel loading!

For more information on Hazeltine AVM Systems, please contact: Hazeltine Corp., Industrial Products Div., Little Neck, N.Y. 11362. Phone (212) 321-2300.

Hazeltine AVM

It Played a Part

THE BULLETIN

An Historical Summary

June 24, 1957

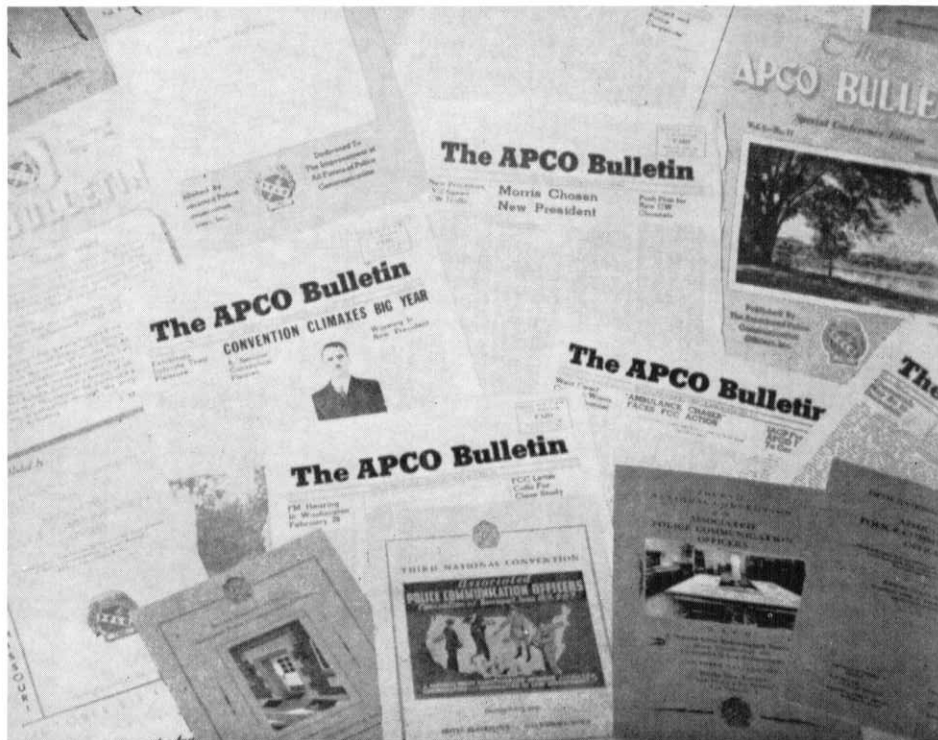
Mr. Robert A. Mason
Secretary-Treasurer APCO
Daytona Plaza Hotel
600 North Atlantic Avenue
Daytona Beach, Florida

Dear Mr. Mason:

Ever since I left APCO and police work in December, 1945, after having been editor of the APCO BULLETIN from October, 1938, I have intended to get to one of the conferences and see many old friends. But it seems as if our vacation time never works out so conveniently.

During my 7-year term as editor, I kept bound copies of the BULLETIN, and I am looking back to the October, 1938, conference in Houston, Texas, where we might say the work of a few farsighted police communications men culminated in the adoption of the motion to incorporate, and to elect a BULLETIN editor. Up until that time an occasional mimeographed sheet was used to keep the small group informed. Following that convention, the BULLETIN appeared in printed form with paid advertising (November, 1938), and for the first four years or more it was strictly a "labor of love" — no pay, no expenses. J. W. Bryant, now of GE, whom most of you know, did much of the hard work and was chiefly responsible for really getting the BULLETIN going, along with President Harry Duncan. We wrote the copy, proofread it, arranged the layout, and even on occasion helped set type in the small print shop where the printing was done.

In those days, while we mailed out several hundred BULLETINS per month, very few who received it paid dues or helped in the actual work, and it was a constant effort to get BULLETIN material. It might amaze you to know that



in January, 1939, two months after a large and successful Houston convention, we had 29 paid-up members, 8 of whom were my men in the Missouri State Highway Patrol. Then as police and emergency communications men began to see how the new president, Gerald S. Morris of the New York City Police Telegraph, and all the new officers were working, we began to grow.

Our advertisers in the first issue were Collins Radio of Cedar Rapids, and RCA. Then followed Eidson's of Temple, Texas; Peel Sales Engineering Company (many of you remember Ed Peel); Wincharger Corporation; TEMCO of New York; Bliley Electric Company; Galvin Manufacturing Company (Motorola); Fred M. Link; Doolittle & Falknor, Inc.; Lampkin Laboratories; Blaw-Knox Company; Western Electric; Indian Motorcycle Company; Taylor Tubes. These

were the firms advertising in the 1938 and 1939 issues that gave the BULLETIN its start, and if it hadn't been for their paid advertising, we definitely could not have had the BULLETIN. Then Onan, Mallory, Carter, Finch Telecommunications, Eicor, Inc., Hallcrafters, Shure, Kohler, these were the regular advertisers who took us through the 1938-1941 years, after which we were on our way.

For the early groundwork of APCO (I became a member in 1935, attended my first conference in 1936 at Davenport, Iowa), you must go back to late 1933 and 1934, and the old-timers?? Everett Fisher of St. Louis, Ed Denstaedt of Detroit, Bob Batts, Indianapolis, Maurice O'Neil of New Orleans, Herb Wareing of Milwaukee, Roy DeShaffon of Kansas City (my memory fails me on some of the others). Then came Gerald S. Morris of New York

City; Martin Joyce of Massachusetts; Victor Gettys of Youngstown, Ohio; Don S. Leonard of Michigan; Lawrence Geno, Buffalo; George M. Kinsey, Ohio State. At the time we started the first regular BULLETIN in 1938 and shortly after we became incorporated, your president was Gerald S. Morris of New York; E. F. (Gene) Brown of Iowa, first vice president; Robert E. Franklin of Houston, second vice president; Frank Morrow, Indianapolis (S.P.), secretary-treasurer; Chas. B. McMurphy, Oakland, California, sergeant-at-arms; and I was the BULLETIN editor.

In 1940 we held our conference in Orlando, the first one in Florida. Jim Virden of Orlando, who was elected secretary-treasurer at that conference, was host, and he, D. C. Bailey of Tampa, and others of the Florida group really put on a top-notch meeting. I believe it was then that I decided that when I retired I wanted to live in Florida, and next month I shall be in Florida looking for that spot.

You have gone a long, long way since these early days, and with expanding technical, organizational and personnel problems, I heartily concur in the suggestion of your president in the last APCO BULLETIN that the time has come when the increasing load requires a full-time paid secretary or secretary-treasurer. I am certain the former "wheel horse" secretary-treasurer Ero Erickson will concur. He nearly worked himself to death just writing for the BULLETIN in my last two years as editor.

My best wishes to Bob Mix, who inherited my monthly dead-line jitters and does a so-much-better job, and my best wishes to all of you for a very successful conference. I shall look forward to attending one of them one of these days.

Sincerely yours,

J. M. WHERRITT
(First BULLETIN Editor)

Ω

Specialized Public-Safety Systems
Design & Maintenance

P-I-C COMMUNICATIONS, INC.
Brookfield, Illinois
PHONE 312-352-8660



CE-3

CE-7

two ways to monitor 2-way



plug-in flexibility

Either instrument does it all. The versatility of plug-in modules permits one man and one CE-3 or CE-7 to:

- Measure FM deviation and frequency error simultaneously
- Listen to incoming carrier modulation
- Generate calibrated CW or FM Signals
- Monitor base stations up to 50 miles away
- Identify interference sources
- Troubleshoot receivers

The CE-3 is direct reading on three bands: 20-80 MHz, 120-180 MHz, and 450-512 MHz, including frequency and deviation measurement capability for proposed frequencies now assigned to UHF TV channels 14-20. The CE-3 generates these frequencies, right up to 512 MHz, without the need for an additional signal generator.

The CE-7 provides the same versatility on channel frequencies between 20 and 1150 MHz (23 crystal controlled channels). In addition, it can provide I.F. generation on a maximum of 10 different I.F. frequencies.

One of our monitors is your best way to maintain 2-way radio. Buy the plug-ins you need now, add others as your needs change. Write now for our brochures.



CUSHMAN
ELECTRONICS, INC.
166 San Lazaro Avenue
Sunnyvale, California 94086
(408) 739-6760

A wholly owned subsidiary of Dana Laboratories, Inc.

R. C. A. POLICE RADIOS

In Public Safety Communications



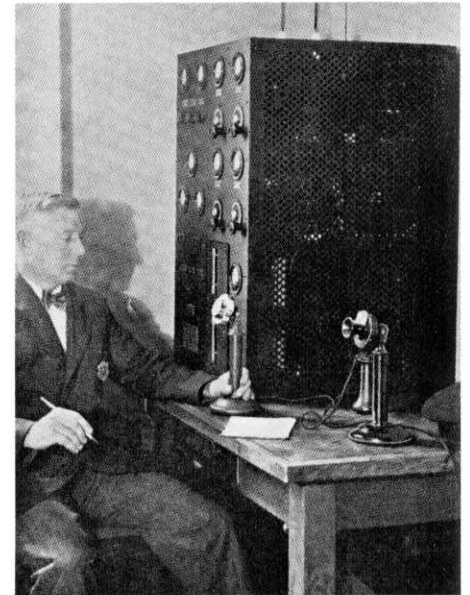
By D. O. Reinert
Manager
RCA Mobile Communications Sales

It wasn't always a two-way street. One-way radio came first and it was introduced by RCA (at least, according to the records we've been able to uncover) for police use in 1929. This first equipment of record was the ET-3670 Police Alarm Broadcast Transmitter for installation at headquarters and a companion AR-1182 Police Communication Receiver for in-car use. The system was operable over a range of 1590 to 3200 kilocycles. This range covered all of the frequencies available for police alarm broadcasting at the time as well as the emergency fire alarm frequency of 1596 kilocycles. Thus, a city could install the system and utilize it for both police and fire department one-way communications.

But one-way radio wasn't around very long before substantial inroads were being made in the development of two-way equipment. In fact, RCA in 1932, made a double breakthrough with the introduction

of the ET-5000 High Frequency Transceiver — a *portable* unit providing *two-way* voice and telegraph communications. Compact for its day, this granddaddy of all portable radio equipment, consisted of two units — a transceiver weighing 8 pounds and a battery box weighing in at 15 pounds. While you couldn't very well strap the system on your belt, (although we do have unconfirmed reports that some police officers attempted to do just that and, as a result, were responsible for starting the sartorial style of wearing both a belt and suspenders), the system was ideal for field use in point-to-point two-way communications applications. In fact, some pioneering police departments put it to use in cars for special emergency operations. The ET-5000 could do the job, too, since it was successfully used in communications tests from an autogiro (remember those forerunners of the helicopters) to a police car, and from a car to a subway train racing along beneath the roadways separated by 200 feet of solid rock. Results of the tests were termed "amazing considering that the maximum power is two tenths of a watt."

The use of radio was growing by leaps and bounds and by 1932 there were a reported 60 cities using mobile radios in police operations. An interesting sidelight reported at the time indicated a growing problem with the public called "radio insomnia." It seems that while the local citizenry was quite happy with the improved police service they were getting with the advent of mobile communications, there were a few complaints about police cars stopping in front of homes in the "wee hours of the morning with their radios blaring forth loud masculine monotones." The Federal



ET-3670 Police Alarm Transmitter was first RCA one-way radio system introduced in 1929.

Radio Commission even got a complaint which was referred to the local police department.

Of the 60 cities using radios at the time, 50 responded to a survey conducted by the Federal Radio Commission. The total response showed that in a typical month there were 155,656 radio calls answered, resulting in 12,676 arrests. Stolen property recovered was valued at \$386,953, and the speed of radio got police on the scene in an average of one minute, two seconds.

Innovative radio equipment was constantly being developed and in January, 1933, RCA introduced the first practical "belt radio." Comprising two units, a receiver and battery pack, the equipment weighed only six pounds and operated for 12 to 15 hours.

Some of RCA's early police mobile installations included St. Louis, Baltimore, Reading, Pa., Lexing-

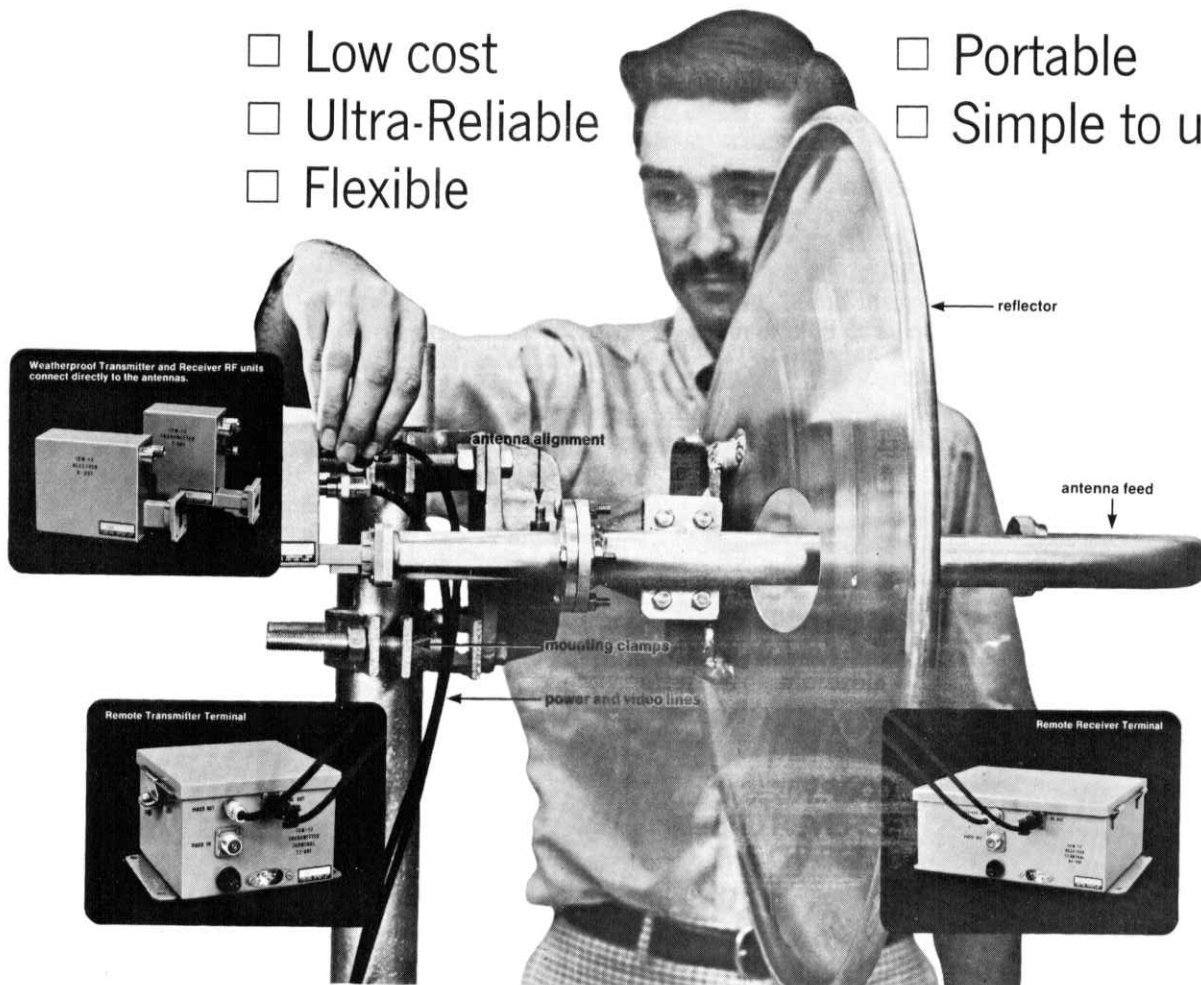
(Continued on Page 32)

At last:

MICROWAVE TV TRANSMISSION for the non-technical user.

- Low cost
- Ultra-Reliable
- Flexible

- Portable
- Simple to use



FOR: TRAFFIC CONTROL ■ RIOT CONTROL
■ SECURITY-SURVEILLANCE
■ CRIME CONTROL

*A portable microwave crime control system for temporary installation in crime problem areas which can provide hard evidence for convictions and crime prevention.



International Microwave Corp. 33 River Road, Cos Cob, Conn. 06807/203-661-5924/TWX 710-579-2925

R.C.A. POLICE RADIOS

(Continued from Page 30)

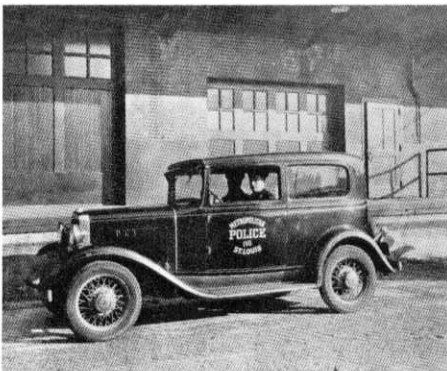
ton, Knoxville, Des Moines, Kansas City, St. Petersburg, Miami Beach, Amarillo, Englewood, N. J., and Durham. Baltimore had a sizeable system with 25 radio-equipped cars and perhaps the first illuminated status board showing which cars



Close-up view of St. Louis Police Department's RCA radio dispatch desk with condenser microphone and transmitter control unit. (1932).

were in service, on call, or out of service. Grand Rapids with 41 radio cars and Fort Worth with 28 cars were other large RCA systems of the day.

RCA was of course involved then, as now, in providing total communications from system planning, to installation, to on-air operation. And accomplishing that task in the early 30's wasn't easy, even for a small system like the five car radio network sold to the Huntington, Long Island, Police Department in early 1934. The system was scheduled to go into service at midnight



One of St. Louis Police Department's radio-equipped scout cars. (1932).

on a Sunday and two RCA technicians were working feverishly around the clock Saturday and Sunday to get the job completed on



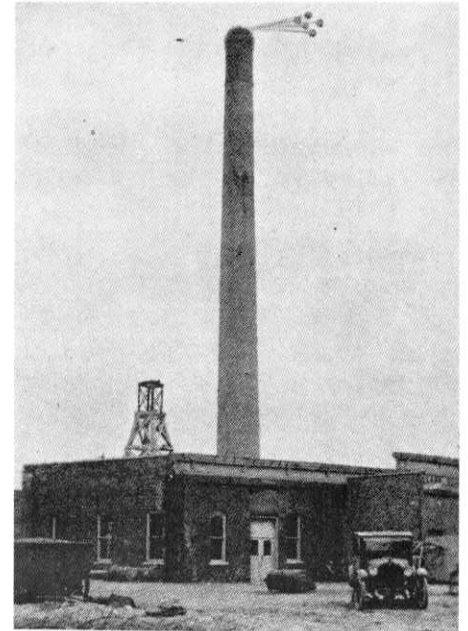
First practical "belt radio" was unveiled by RCA in 1933. Receiver is on left, battery pack on right. Antenna was encased in shoulder strap.

time. Only the antenna on the top of City Hall remained to be installed and the system would be on-the-air. Time was growing short and our dynamic duo were starting to get just a little panicky, but Huntington's fire lads came to the rescue with their hook and ladder truck and a battery of flood lights so that the work could proceed after dark. Our two dedicated technicians scaled the dizzying heights to the top of the City Hall dome using the Fire Department ladders.

Everything was going along smoothly until a fire alarm was sounded. Out went the flood lights and down went the ladders. Huntington's fearless firefighters dashed off to fight the blaze and our two tenacious technicians were left atop the dome in chilling total darkness. They had to sit tight until the fire was under control and the ladder truck returned. Fortunately, the installation was finished on time and Huntington became another RCA radio-active police department. Our two technicians, however, decided that they should make other ar-

rangements for lighting and ladders in the future.

Another interesting antenna installation problem occurred a year or so later when RCA was installing a police radio system for the city of Chicago Heights, Illinois. The ideal site for the antenna was atop a city-owned smokestack that stretched 175 feet above ground. There weren't any facilities for climbing the stack and the cost of building a scaffold would have been prohibitive. One of the RCA engineers working on the installation came up with a unique solution — have some hydrogen-filled balloons carry a line up through the stack and out



Hydrogen balloons aided in antenna installation of RCA Terra-Wave transmitter for Chicago Heights Police. (1935).

the top. So five balloons, each 16 inches in diameter, were floated up through the flue trailing a light cord. All went well to 140 feet when the balloons stopped their ascent. It seems that the cool air being drawn into the top of the stack was contracting the gas in the balloons. A few oil-soaked rags were ignited at the bottom of the stack and up, up and away went the balloons. Heavier lines were spliced on to the cord and eventually the antenna and transmission line were hoisted to the top of the stack. The balloons? Oh! They were carried well out southward over the city and a sharpshooting police officer brought

(Continued on Page 61)

**This year
our bag
is
even
bigger!**

FREQUENCY BAND	CHANNEL CAPACITY						
	6/12 24/36/48	60/72	120	300	420/600	960/1200	NEW! VIDEO
72 - 108 MHz	PT80	-	-	-	-	-	-
132 - 174 MHz	PT150	-	-	-	-	-	-
216 - 328 MHz	PT300 TR300	-	-	-	-	-	-
400 - 470 MHz	PT400/450 TR450	-	-	-	-	-	-
890 - 960 MHz	SS900	SS900	SS900	NEW!	-	-	-
1700 - 2300 MHz	TR2000	← SS2000W-02 → UP TO 125dB SYSTEM GAIN		-	-	-	-
2450 - 2500 MHz	TR2500	-	-	-	-	-	-
3700 - 4200 MHz	SS4000	SS4000	-	SS4000	SS4000	SS4000	SS4000
4400 - 5000 MHz	-	-	-	SS4500	SS4500	SS4500	SS4500
5945 - 6425 MHz	-	-	-	SS6000	SS6000	SS6000	SS6000
6575 - 6875 MHz	-	-	-	SS6000	SS6000	-	-
6875 - 7125 MHz	-	-	-	-	-	-	SS6000
7125 - 7750 MHz	-	-	-	SS7000	SS7000	SS7000	SS7000
10550 - 13250 MHz	-	-	-	SS12000	SS12000	SS12000	SS12000 NEW!

NEW!
FR2000 REPEATER FOR ALL 2 GHz SYSTEMS

Farinon Electric, 935 Washington St.,
San Carlos, California 94070
(415) 593-8491
Farinon Miltech, 2995 Copper Road,
Santa Clara, California 95051
(408) 732-3921
Farinon Electric of Canada, Ltd.



A PRODUCTIVE HISTORY

Of Cooperation



By F. V. Machin
Vice President, Marketing
Shure Brothers, Inc.
Evanston, Illinois

My first APCO convention was 27 years ago in Madison, Wisconsin. As a relatively new member of the Shure sales force without a great deal of experience in safety communications, I was somewhat apprehensive of confronting a group of recognized authorities in the field.

A few days in Madison left me much more experienced in the technical demands of safety communications and totally impressed with APCO's ability to accept a newcomer into its ranks with genuine enthusiasm. While memory fails to recall all of the names of the members I met for the first time at that 1943 convention, I shall never forget it was that grand and courteous gentleman, Gene Goebel, who took me under his wing and throughout the convention generously "sponsored" my introduction to the wide variety of activities that have made

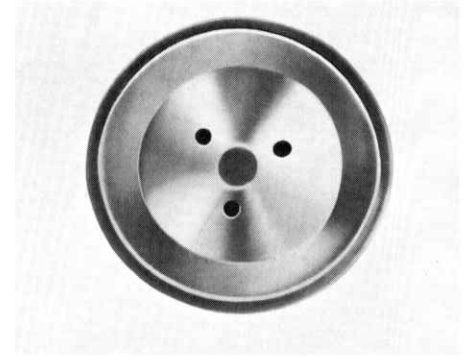
every APCO convention so "stimulating."

Since my initiation into the organization in 1943, I have had the pleasure of representing Shure at every subsequent convention but one. This record indicates the interest Shure has had in helping to maintain APCO's growth and success. It also strongly supports our belief that APCO members are the most authoritative and knowledgeable people in the two-way communications field.

This is not an idle plaudit. It is a fact that can be proved by tracing any number of new or improved product developments in the communications field directly to cooperative efforts of APCO members and manufacturers. Shure is a noteworthy example.

Our history in the two-way communications field is replete with examples of interaction between APCO and Shure. Meaningful interaction that has resulted in our engineering and developing a number of products especially to fill an industry need transmitted to us by an APCO member.

For example, my strongest recollections of post-war involvement with APCO include the consistently expressed desire by members for a mobile communications microphone with the same technological sophistication as transmitting equipment then available. It caused us to take a serious look at the carbon hand-held microphones in wide use at the time in comparison to a microphone with a Controlled Magnetic structure we had developed for the Navy during the war. The Controlled Magnetic unit provided better speech intelligibility and was more reliable inasmuch as it did not suffer from problems of aging (loss of sensitivity, noise, etc.) that is common to carbon



(Top) Carbon microphone cartridge; (Below) Controlled Magnetic cartridge.

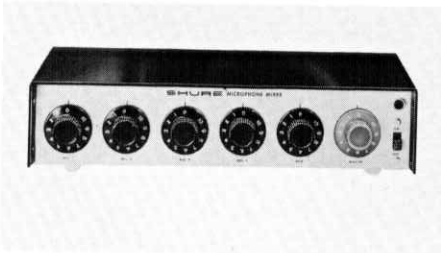
microphones. Moreover, it was equally as rugged as the carbon microphone and able to withstand exposure to extreme weather conditions.

Our APCO-motivated research into carbon vs. Controlled Magnetic microphones for mobile communications led me to make what has been perhaps my most brash move in all the years I have been associated with APCO. At the 1946 convention in Buffalo, N. Y., despite my well-deserved standing as an APCO novice, I chose to deliver a paper on the subject of Controlled Magnetic microphones.

When I look back upon the occasion, I cannot help but compare it to a rookie patrolman advising a combined assemblage of traffic engineers on how to solve New York's traffic problems. I can remember recklessly concluding the paper with the prediction that "while the carbon microphone was now the

workhorse of the mobile communications field, its end was in sight!"

After shakily leaving the rostrum, I searched the audience for some indication of agreement. None was forthcoming, and I left the meeting room with my confidence severely damaged. As I approached the elevator, however, I felt a friendly hand on my shoulder. I turned to face no less a distinguished member of APCO than Daniel Nobel, then



Shure M68 Microphone Mixer, which also has an APCO-related origin.

head of Motorola communications and a pioneer in the development of two-way radio. Dan buoyed my faith in myself and Controlled Magnetic microphones by saying he heartily agreed with my prediction about the demise of the carbon types.

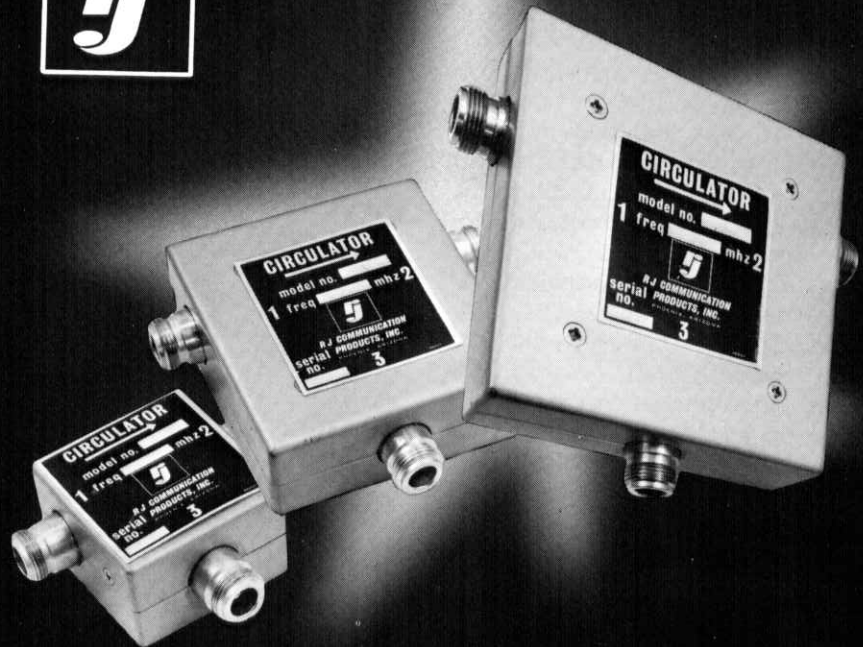
The next year at a convention in Los Angeles, we introduced a new Shure Controlled Magnetic mobile communications microphone, and it went on to become the standard for the industry.

This started a long history of other APCO-motivated Shure products or product improvements. Individually, they may not have been earthshaking, but in total they do represent significant contributions to the historical advancement of two-way communications.

One such improvement, I recall, resulted from a discussion with Paul Franklin, of Houston, during the 1947 convention. Paul drove home the problems of foot-tangling and other nuisances associated with the long "straight" cords then in use on mobile microphones. As a result of this conversation alone, we immediately began testing the feasibility of using coiled cords on these microphones. In 1948, Shure was the first to introduce mobile communications microphones equipped with coiled cords, a move

(Continued on Page 36)

**new
FROM**

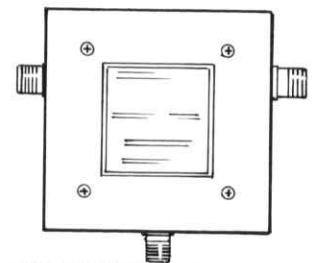


Low Cost, Low & Medium Power FERRITE CIRCULATOR / ISOLATOR

You are looking at RJ Communication Product's new line of miniature Ferrite Circulators/Isolators now available to eliminate the intermodulation problems associated with the low power transmitters used in the Mobile Communications Industry.

These units supplement our existing line of high power models and when used in Transmitter-Combiner Service break the barrier of additional antenna costs by permitting interference-free, multiple transmitters on a single antenna.

Our established position as the leader for the past 5 years in this segment of the Mobile Communications Industry is your guarantee of performance and reliability. Write today for descriptive data.



- 150 and 450 MHz bands
- 0.7 db maximum insertion loss
- 20 db minimum isolation
- 100, 50 and 20 watts capacity
- -10°C to +40°C operating temperature range



R J COMMUNICATION PRODUCTS, INC.

9827 N. 32nd ST., PHOENIX, ARIZONA 85028 • PHONE (602) 948-6310

A PRODUCTIVE HISTORY

(Continued from Page 35)

that went on to set another standard for the industry.

Thanks, Paul!

Later, in the same year, Howard Black, of Mobile, Alabama, called concerning the problem of loss of sensitivity in his carbon base station microphone. My answer to him was to shake it like he would a cocktail. If that didn't work, I advised him to hit it with a rubber mallet. Not a very technical-sounding solution, I must admit, but one which most old-timers will agree solved this typical problem, at least temporarily.

Howard's call, however, did lead us to recognize that because base station microphones were seldom shaken or jarred like mobile units, the problem caused by the carbon particles packing was indeed more prevalent in base station microphones than mobile units. We reckoned, then, that certainly there was good reason to adapt Controlled Magnetic structures to base station use. And thus, in 1948, we introduced the first Controlled Magnetic base station microphone, adding still another product development to the growing list motivated by APCO.

During this same 1947-48 period, we also began doing extensive work with several APCO members on the problem of background noise at the base station interfering with intelligible transmissions. Specifically, I can remember working with Jim Evans, of the Michigan State Police; Ero Erickson, Illinois State Police, and Bill Whiting, of the Bakersfield, California, Police Department, on the testing of our Unidyne II unidirectional microphones for this purpose.

I recall spending many pleasant and informative hours with these gentlemen, comparing the intelligibility of Unidyne II transmissions with that of other types of microphones. We purposely called for doors to be slammed, typewriters to be operated and countless other typical base station noise-producing activities until it was proved conclusively that the Unidyne II's unidirectional qualities were adequate to solve the background noise problem completely. It is not diffi-



Shure Unidyne II unidirectional Microphone in typical base station use. (Note APCO Signal Card)

cult to still find many original Unidyne II's on the job, although most of them have been replaced with the more technically refined Unidyne III.

In 1952, I recall delivering a paper at an APCO convention for the second time since joining the organization. Anyone who attended the convention in San Francisco is certain to remember my appearance as one of the comedy hits of the season. Certainly it will be remembered by Bill Whiting, who took advantage of an embarrassing situation to sharpen his questionable talents as APCO's "heckler at large."

My paper carried the imposing title, "The History of Communications." In keeping with its broad scope, I had liberally spiked the opening paragraphs with illustrations of man's first attempts to communicate (i.e., smoke, flags, heliograph, even tom toms).

About midway into my detailing the difficulty of using smoke signals under high wind conditions, my attention was distracted by a man walking back and forth across the darkened stage holding a lamp. He

looked much as Diogenes might have when looking for the honest man. The audience was quick to recognize the symbolic association between the lamp-carrier and myself, and they reacted typically. After a few minutes of this "upstaging," I finally stopped the lamp-carrier on one of his passes across the stage and asked him what the hell he was doing.

"I'm looking for someplace to put it," he replied.

Indeed, he was the hotel handyman answering someone's request for more stage lighting. But the bedlam his reply evoked was uncontrollable. And it remained so throughout most of my talk, thanks to Bill Whiting's biting ad libs and a thoroughly confused slide projectionist who did his best to provide Bill with good material by inserting slides upside down and out of order.

In other ways, however, Shure-APCO cooperation during the 1950's was much more productive than this one experience might indicate. For example, my historical file indicates it was in the mid-

(Continued on Page 51)

THE APCO STORY

The Associated Public-Safety Communications Officers, Inc. (APCO), a nonprofit institution since January 21, 1935, is the world's oldest and largest public safety radio user group and is composed of administrators and communications technical, operational, and command personnel.

The purpose of APCO is to foster the development and progress of the art of Public Safety Communications and to promote greater correlation of the communications activities of towns, cities, counties, states, and federal agencies; to assist in the development of channels, methods, systems, and other media for the rapid and accurate collection, exchange, and dissemination of public safety communications; to represent such agencies before the Federal Communications Commission and other regulatory bodies.

APCO publishes a regular monthly magazine, THE BULLETIN, which is the official voice of APCO. It is the oldest and most revered magazine of its type and its subscription cost is included in Association dues. Its basic format includes special articles dealing with such subjects as emergencies, highway and traffic problems, conservation matters, regulatory and legislative news, and technical and operational articles.

APCO each year holds the largest land-mobile public safety radio conference in the world, featuring exhibits of industry leaders in the field. This annual event gathers together the administrators and communications personnel of Police, Fire, Highway Maintenance, Civil Defense, Forestry-Conservation, and Local Government radio services around the globe.

APCO's twenty-five chartered chapters meet regularly across the nation to carry on the purposes of APCO at the local level, featuring seminars and lectures by top-flight leaders in the field, as well as new products from the suppliers. The combined local chapters form the body of the national Association. Membership classifications are: Active, Associate, Commercial, Sustaining, Honorary, and Governmental.

APCO is the official national frequency coordination body for the Police Radio Service and is the largest coordination body for the Local Government Radio Service. It retains a Washington, D. C., attorney licensed to appear before the F.C.C.

APCO's Project Series Foundation has produced four nationally acclaimed projects: a color movie film explaining the frequency crisis, the world-renowned Standard Communications Operating Procedure Manual which was funded by the Justice Department, the Chicago Study — another Justice funded project which models the most advanced communications techniques, and the publication of the Official APCO Ten Signal Cards.

IT IS APCO'S PRIVILEGE TO SERVE; IT IS THE PUBLIC SAFETY RADIO USER'S DUTY TO BELONG

_____ Chapter

ASSOCIATED PUBLIC-SAFETY
COMMUNICATIONS OFFICERS, INC.

APPLICATION FOR MEMBERSHIP

Date _____, 19 _____

Name: _____

Mailing Address: _____

Zip: _____

Occupation: _____

Title: _____

Employer: _____

Nature of your duties: _____

Do you receive a regular salary from City, County, State or Federal Agency for your occupational services? _____

Are you engaged and/or interested, financially or otherwise, in the promotion of any company or individual engaged in the manufacture, sale or service of merchandise or systems applicable in public safety communications? _____

Having personally executed this application, I hereby apply for membership of the appropriate class in the ASSOCIATED PUBLIC-SAFETY COMMUNICATIONS OFFICERS, INC. I agree to abide by the bylaws of aforesaid Association, and to cooperate with its membership in the attainment of its purposes.

Signed: _____

WELCOME!

PAST, PRESENT AND FUTURE

Public Safety Extensions



By Daniel E. Noble
Vice Chairman of the Board
and Chief Technical Officer
Motorola, Inc.

My paper on the history of land mobile radio communications was published in the fiftieth anniversary issue of IRE Proceedings in May 1962. I will use a bit of the early history from that paper. It so happens that the history of land mobile radio communications pioneering is largely the history of early police work in the field. The police were genuine innovators in the communications field and information supplied to me by Bob Batts indicates that, as early as 1877, the Albany, N. Y. Police Department installed five telephones in the mayor's office connected to the five precinct police stations. This is extraordinary when you consider the fact that 1877 is only two years after Alexander Graham Bell developed the telephone.

Then, in 1880, the Chicago Police Department installed the first police call box on the street and, three years later, the Detroit, Mich-

igan Police Department installed one police telephone, at a time when there were only seven telephones in the entire city. They looked to the possible use of radio early also. In 1916, the New York Harbor Police used radio spark transmitters to communicate with their boats and other boats in the harbor. The Pennsylvania State Police installed point-to-point radio telegraph between headquarters and posts, on 250 kc (that's almost audio frequency in today's technology). That was back in 1923.

It wasn't until 1909 the police began to use their first motorcycles and, in 1917, the Detroit police began using automobiles, with two men per car, parked at police telephone booths along the street. They did not patrol; they stayed in the booth between calls. A telephone in each booth supplied communications, and a pot-bellied stove in one room and a coal bin in another took care of the winter temperatures. The need for direct communication to moving police automobiles was clear to any man of vision and such a man was Commissioner William P. Rutledge of the Detroit Police Department.

In 1921, only four years after the city pioneered the use of automobiles for police work, Commissioner Rutledge purchased a Western Electric 1-A 500 Watt broadcast transmitter and installed it in the police headquarters. This was before the days of crystal control, and the unit was a self excited oscillator modulator combination with two WE-212D's as oscillators and another pair as modulators and with a 1,500 volt motor generator for the power supply. Commissioner Rutledge and his organization attempted to develop a practical one-way transmission system for voice communication to the

moving cars. The point of failure was the receivers. They continued efforts over a period of six years during which they battled a fantastic merry-go-round of license changes.

In 1927, Commissioner Rutledge finally closed down the station but it is interesting to note that he did not give up. You must remember that, back in 1927, most home radios used B and C batteries and storage A batteries. It wasn't until 1930 that the car broadcast radio made its appearance. It was Motorola — of course. Short wave radio was still considered to be two hundred meters (1.5 mc) and Commissioner Rutledge was actually pressing the state of art with his proposed 144.8 meter system.

Now, we come to one of the great pioneers in the field of police mobile radio communications. I refer to Robert L. Batts. He deserves a very special place in the history of police radio communications. It was during the summer of 1927 that Bob Batts, who was a Purdue University student at the time, worked at a radio parts store in downtown Detroit. In those days, there were a great many do-it-yourself customers and Bob was a great favorite with the customers who bought do-it-yourself kits. Kenneth Cox, a motorcycle policeman in Detroit, was one of his customers and he and Bob talked about the possibility of making a radio receiver work in a police car. Bob had been using a super-het receiver with a loop in a Dodge truck for tracking radio interference, and he thought the problem was simple.

When Bob went back to Purdue in the fall, young Cox continued to communicate by mail with Bob and Bob sent back suggestions and sketches for the construction of a police radio receiver. Late that fall,

Cox went to Commissioner Rutledge and told him he could make a radio work in a police car. He had built a breadboard model thoroughly cushioned with foam rubber and he deliberately dropped the receiver on the floor of Rutledge's office to show how rugged it was. According to the story, the receiver still worked after the drop. Commissioner Rutledge gave Cox the assignment



Motorola's first "Permak" filter which made split channel operation possible.

to develop the receiver and also started a campaign immediately to entice Bob Batts to Detroit from Purdue. On February 4, 1928, a new construction permit was granted to move the equipment to Belle-Isle for operation on 144.8 meters and later, on 94 meters, for the starting of the new test. We might say that 94 meters was really the ultra high in meters. That is, the UHM of the early days.

Commissioner Rutledge finally brought Bob Batts back to Detroit as a patrolman (that was the only way Commissioner Rutledge could pay him) and Bob started to work on the development of new receivers. The Detroit station, W8FS, first went on the air April 7, 1928 transmitting to a new receiver and cruiser number 5, and the systems worked. The receiver stayed tuned and the reception was satisfactory all over the city. After nearly seven years of persistent effort, Commissioner Rutledge's dream had come true and the improved communication systems soon proved its value for the apprehension of criminals.

With the initial success to cheer him on, Bob Batts carried on an extensive program of field testing and built new and improved receivers to equip a fleet of police

cars. The Cleveland Police Department was next. They went on the air in 1929 with the second system. Bob Batts moved to Indianapolis in 1929 and he soon had that city's police department on the air, the third on the air.

Then, Lieutenant Vincent Doyle decided that the police needed two-way communications. So, the Bayonne, New Jersey Police Department set up the first two-way radio system in 1933 using Rel Am equipment on 33.1 megacycles. Four police cars were equipped. The units used super-regenerative receivers and non-crystal controlled master oscillator power amplifier transmitters with a pair of 210's in a final.

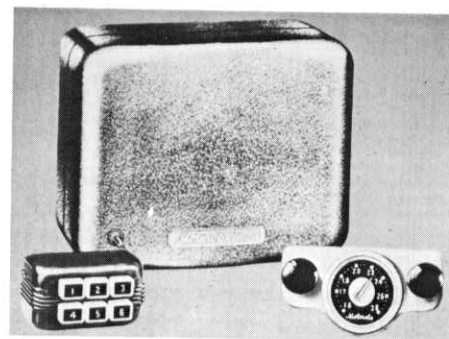
Of course, as you would expect, Bob Batts hadn't lost his pioneering spirit and in 1933, he had the Indianapolis Police Division on the air with a 200 watt base station and two 20 watt mobile two-way units. The mobile transmitter units were high powered compared to the others used in the initial installation in other parts of the country. Bob teamed his 20 watt transmitters with six tube VHF-AM superhets of good sensitivity with six volt tubes. The base station was equipped with a 100 ft. high antenna and very reliable two-way communication was established despite the fact that quartz crystal were not available for either the transmitter or the receiver control. Eventually, the industrial people became aware of the potential market in the police field and, in 1936, RCA and G.E. offered mobile radio equipment with FM Link following shortly afterward. Motorola began selling police radio receivers in 1937.

The Federal Communications Commission issued order #19, dated October 13, 1937 which allocated 29 VHF channels to police departments in the band 30.580 megacycles to 39.9 megacycles. This order was a milestone in the development of two-way VHF police communications. The use of crystal control for both transmitters and receivers became universal and, in 1938, the FCC established the maximum allowable frequency tolerance of .05% on frequencies above 30,000 kilocycles. That's a quick look at the police pioneering with AM two-

way radio communications systems.

While much of this pioneering was going on, I was teaching electrical engineering and mathematics at a college in Storrs, Connecticut which grew up to become the University of Connecticut. I had built and operated a crystal controlled broadcast station at the University in 1923 and starting in 1936, I began experimenting with FM. In order to relay radio programs from college campus to the Hartford Broadcast Stations, WTIC and WTRC, I designed and built a 100 megacycle transmitter system using a high gain directional antenna pointed toward Hartford. Although I did not know it at the time, this was the first practical use of Tropospheric Scattering. We succeeded in relaying programs from the college campus to Hartford, about 25 miles away, on a regular scheduled basis using the FM transmitter at Storrs.

Later, WDRC became interested in FM broadcasting and I designed and built an FM broadcast station, WLXTW, on Meriden Mountain in



1939 Police cruiser radio.

Connecticut for WDRC. In connection with field checking of the FM broadcast installation on Meriden Mountain, I traveled around the entire state in a car equipped with signal strength measuring equipment and an FM receiver. From this measurement work, I gained an excellent first-hand knowledge of the potential coverage of FM for the State of Connecticut. When Commissioner Hickey of the Connecticut State Police approached me to design a police radio system for the state, I naturally thought of FM. The original proposal for

(Continued on Page 40)

PAST, PRESENT AND FUTURE

(Continued from Page 39)

the state system as proposed to me was a one-way broadcast system using several broadcast stations including 5 kilowatt transmitters operating on (if I remember correctly) about 1.6 megacycles.

I promptly threw this whole idea out and said that if I was to handle the system, I would set up a two-way communication system, and I

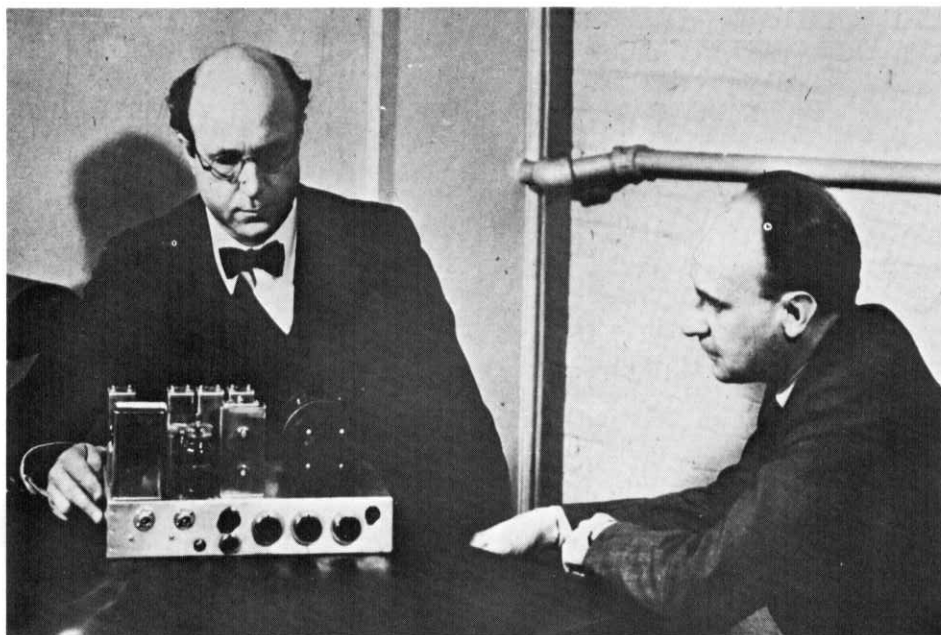
office and questioned me about my proposal for the two-way FM system. Finally, he looked at me sharply and he said: "I am going to back you, but you understand that if this system fails, you'd better be on a fast boat for China." Not at all dismayed, I looked back at the Commissioner and said: "Thank you, but you don't fool me, because I know that if I am on that fast boat for China, you will be standing right alongside of me."

Early on, I must acknowledge

beautifully clean wiring. The company was small and completely flexible and I was immediately impressed by the engineering capability and enthusiasm of Fred Budelman, the Chief Engineer of the Company. Fred agreed to build the equipment to my design and we also agreed that we could superimpose the FM circuitry on the basic AM chassis layout. This decision, of course, cut the development time and it wasn't very long before I had equipment with which to carry out my survey testing.

General Electric was experimenting with FM communication at this time also, that is in 1938 I believe, and I witnessed a demonstration at Schenectady and later rented one of their base station transmitters to run some tests. The transmitter was not directly crystal-controlled, (it used an AFC discriminator-stabilizing system) and the frequency stability was inadequate. Of course, G.E. later changed to direct crystal control. I'll skip the details but, working with Fred Budelman at F. M. Link, the equipment was developed and tested and ten base stations were installed on the lowest noise locations I could find for each troop area. The antenna used was a coaxial, mounted on the top of a 180 foot guyed steel pole. You know that the system worked, and I'll end the commentary on this system by reciting the list of innovations.

First of all, the system used phase modulation rather than frequency modulation since phase modulation provided 6 DB improved signal-to-noise ratio per octave over the frequency modulation system. All modern mobile FM systems are actually phase modulation systems. Second, I decided that the selection of a low noise receiving location was a good way to conserve mobile power since the receiver base location with half the noise level would provide the equivalent service which would be achieved by increasing the power of the mobile transmitter four times. Third, I ran signal strength tests on mobile antenna systems and determined that the back-of-car antennas were directional toward the front, but roof-top antennas would provide uniform transmission in all directions at a level equal to the best



Dan Noble with one of first FM two-way radios.

would use FM. My previous experience with mobile communications systems was the design and installation of a two-way AM radio mobile system for the Connecticut State Forestry Department. There was no FM equipment available on the market at the time. At the time I proposed to build a two-way State Police system, there were no two-way State Police radio mobile systems in operation. I was advised by some very top engineers that I couldn't possibly set up the system in the time allowed, but this was one case where I did not know enough about the difficulties to understand that the job couldn't be done, and I was very lucky to find many dedicated people to help me get the job done.

I shall always be grateful to Commissioner Hickey for his courage and his confidence. At the time the decision was to be made, Commissioner Hickey called me into his

the wonderful support and very capable engineering work of Sid Warner who, as a qualified engineer, was assigned to help me with the system and who continued as Chief Engineer in charge of the system. A young trooper, Ed Scheeler was assigned to me and together, while Sid Warner nearly froze to death on the selected hill tops with the hurriedly erected temporary base station feeding an antenna on the top of a tower made up of window-washer's ladders, Ed Scheeler and I cruised the entire countryside and tested every one of the ten troop base station sites to be used for the system. That is, we selected a site for each of the ten troops of the State Police system.

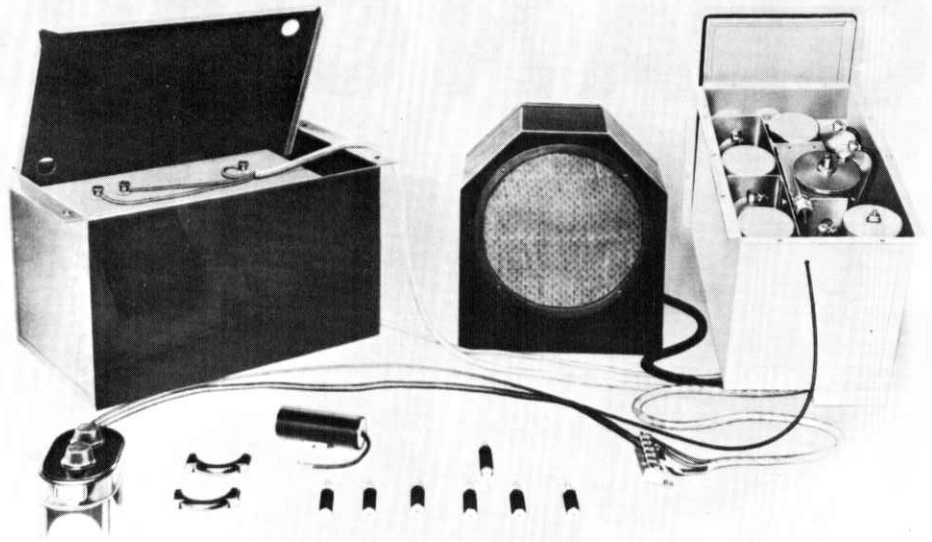
In my search for an equipment manufacturer I finally ended up with F.M. Link and I think my reasons were very practical ones. I found the company building AM equipment of excellent design, with

direction for the back-of-car antenna.

So, I looked for steel fishing rods which would have good bending and impact characteristics and mounted the rods on the roof with a spring-mounting and with a feed at the base through a coaxial cable to the equipment and finally, I set up a two-frequency system rather than a one-frequency system. This decision was absolutely essential to the success of the Connecticut System. With one frequency, there would have been continuous interference with mobile units among the ten independent troop systems. Every time one base station went on the air, it would block out reception from the weak mobile units on the same frequency in all the other stations in the system. By separating the base station transmitter frequency and the mobile transmitter frequency, the base station at any barracks could talk out to a mobile unit without interfering with the mobile transmitter units in other areas attempting to talk back on another frequency to their base stations.

Every base station in the state could be heard by every other base station, but, because of the FM takeover or capture characteristics, the ten station operated successfully without undue interference and, in order to provide car-to-car communications, we also put a base station crystal in the mobile transmitter with provisions to switch over for car-to-car communications on the base station transmitter frequency. If you conclude that there were good reasons other than the use of FM for the success of the Connecticut System, you are right. The selected high elevation, low-noise area sites, the use of two frequencies, and the use of roof-top antennas contributed substantially to the success of the system.

The capture effect of FM was a great help in making it possible for the ten troop systems to operate independently and simultaneously. There were minor operating weaknesses in the set-up. For example, we retained the old AM squelch system and it would open readily for noise. Also, the front end of the receiver was too noisy and the receiver sensitivity was really not very great. Two design innovations



Motorola's First Mobile Radio (1930).

which I introduced later were the development of a low noise front end for receiver which permitted 20 DB quieting on a tenth of a microvolt and the invention of the differential squelch which balanced noise against signal in such a way that the receiver would not open in the presence of noise and would open in the presence of signal only when the signal to noise ratio was at the threshold speech level or better.

Over the years, the further developments have been concerned with reduction in spurious responses of the receiver and spurious radiation in the transmitter, reduction of transmitter noise and the introduction of instantaneous deviation control to prevent modulation splatter into adjacent channels, the development in the receiver of designs for limiting inter-modulation and saturation interference, and finally, the radical improvement in size, weight, reliability and standby power consumption made possible by the use of semiconductor devices. And in portable equipment, we have come a long way from the original egg-crate battery tube unit which would work once in awhile to the modern semiconductor portable unit with vastly improved reliability and power output, and with the size only slightly larger than a package of cigarettes. So that's a very sketchy outline of what has happened. The next question, obviously, is what is going to happen. My best answer is that I

don't really know but I am going to tell you what's going to happen anyway.

Before projecting the future of mobile radio communications, I should like to give you a quick review of the Federal Government controls. The first rules in the format as we know them today, Part 10—Emergency Radio Service, and Part 2—Miscellaneous Radio Services, were adopted October 3, 1933, by the Federal Radio Commission. A year later the Federal Communications Commission was established. The definitive standards for FM in the Land Mobile Services were not adopted by the FCC until the Commission implemented the Atlantic International Treaty of 1947. The treaty was ratified by the United States on June 18, 1948. These technical standards were the same as those incorporated in our present day rules up to the time of the Split-Channel Ruling Proceedings of 1958. The 1948 rule making established the Land Mobile Services on a fully licensed basis, extended the qualifications for licenses to many new users, and in general, established the foundation upon which the modern mobile communications industry has grown. You will remember that the rule making was brought about by the FCC in cooperation with the Radio Technical Planning Board, and Panel 13 of the Board made the presentations before the FCC

(Continued on Page 76)

GLANCING BACK



By C. E. Dengler — W2LK
51 Westfield Street
Rochester, N. Y. 14619
APCO Historian

How High Is Up?

This question has been asked for years without receiving an acceptable answer. Now there is another question equally as frustrating: How far is back?

For this special anniversary and historical issue of the APCO BULLETIN this "Glancing Back" column should carry some of the historical highlights leading to the establishment of successful public safety communications and the founding of APCO.

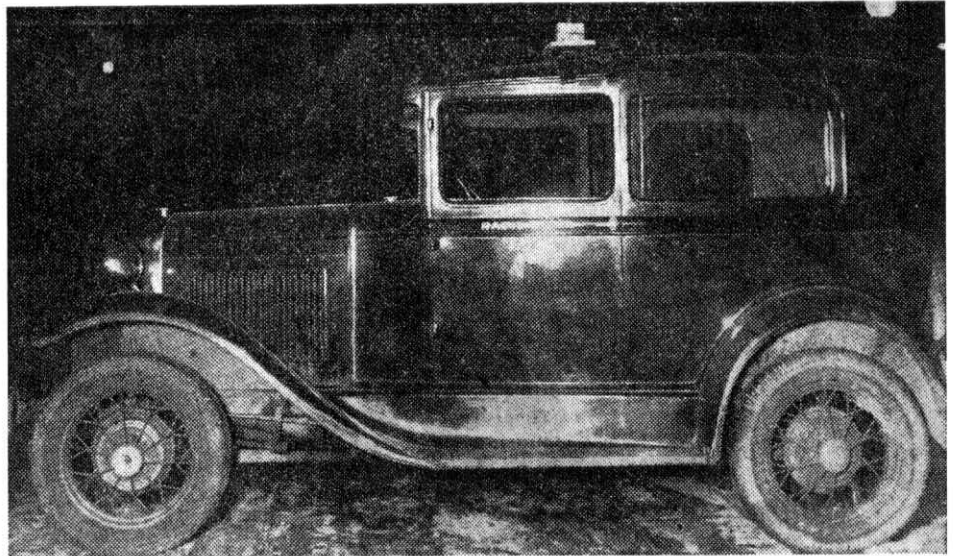
Where did it all start? Certainly not in Detroit with successful reception of radio messages in moving police cars in 1928 or with the quite generally accepted fact that two-way police radio operations were used successfully in Bayonne, New Jersey in 1933.

These were modern achievements of relatively recent years.

How Far Is Back?

When we search for the real beginning, just where do we start? Is it with that fellow Thales, who in 600 B.C. discovered the peculiar properties of amber from which the word "electricity" was eventually to be derived? However it was not until fifteen hundred years later that Dr. William Gilbert came along with the word "electrica" but it was another forty-three years, after Bill's death, before the present word "electricity" appeared in 1646.

During the next three centuries



ON THE AIR! It was Christmas Eve 25 years ago that this racy-looking city police car launched the department's mobile communication system. The first radio-equipped vehicle on the force, put into service in 1929, paved the way for faster, more efficient crime control and prevention in Indianapolis, Indiana.

many experimenters were to offer many diversified theories regarding the nature of electricity.

There were fellows like Mike Faraday, an Englishman, and a Scotsman, Jim Maxwell who published a book in 1873 on electricity and magnetism.

We shall never forget Heinrich Hertz (or forgive him) for pre-empting our cycles, kilocycles and megacycles until it really hertz. But in 1886 it was really something to get a spark to jump across an airgap between the ends of two wires without solid connections to the power source. So Hertz was able to verify Maxwell's earlier theories.

Wireless In The U. S. A. In 1865

There were many unsung heroes in this search for knowledge, but most pertinent to radio communications were experiments conducted in the mountains of West Virginia way back in the summer of 1865.

On a mountain top a group of men were flying an oversized kite with a large square of fine copper screening attached to its surface. A fine copper wire led to the earth below.

Eighteen miles away on another

mountain a similar kite was flying high in the air while a Washington, D. C. dentist Mahlon Loomis and his workers watched closely a galvanometer connected to the wire from the kite and a coil of wire buried in the earth.

Using only the natural static for power the Doc was able to cause the needle not only on his own galvanometer to fluctuate but the needle on the meter eighteen miles away. This was truly wireless signaling.

Only in recent years and too late to enjoy is Dr. Loomis beginning to receive some recognition for his work though he labored faithfully through many setbacks until his death in 1886. He preceded all others by twenty years in the use of an "aerial" which he so named. It could be that with the trend in names our antennas and aeri-als will soon be known as a loomis.

Recognition And Money Too

During the years that followed an Italian father and an Irish mother gave the world, on April 25, 1874, a son named Guglielmo Marconi.

At twenty years of age Marconi was engaged in experiments that led to the successful use of wire-



less telegraphy and eventually to the radio we have today. It is said that he did not invent any new device but adapted and improved the inventions of many others into a workable communication system.

In 1896 he filed patent applications in the British Patent Office creating chagrin and resentment from the many bearded scientists who had been working on the problems for many years. There is a question regarding Marconi as the real inventor of radio but he was able to bring it out of the laboratory and into use as a valuable life-saving device for ships at sea.

From Out Of deForest

One of the most valuable and important advances in radio was made possible by our own Lee deForest when he added a third element to the valve or vacuum tube in 1905. Receiver sensitivity could be greatly increased and the improved device permitted the transmission of a continuous wave carrier required for radiotelephone operation.

Not Bad For A Portrait Painter

Long before any consideration had been given to the use of wireless and radio by the police and fire departments of our nation, Sam Morse in 1835, was able to concoct a magnetic telegraph system that soon became a vital instrument to many law enforcement officers and organizations.

In the larger cities a number of devices using variations of the original telegraph instrument were installed to provide communications between police stations.

What is claimed as the first fire alarm telegraph system was installed in Boston in 1851. Eighteen years later, New York City installed its first fire alarm system. By 1881 the fire alarm systems had reached a high stage of development.

The first electric powered police telegraph system was installed in 1867. The progress of police communications had been delayed because of the ancient belief that the chief duty of a constable or policeman was thought to be walking his beat, suppressing crime by his

presence or apprehending such criminals as he might catch in the act.

Basic differences between fire and police operations led to the early creation of fire alarm systems to bring the alarms to the fire stations.

And The Wire Wasn't Hollow

With the invention of the telephone by Alexander Graham Bell in 1876, many police departments soon made use of this new means of communication, talking through a solid wire.

Only two years later the Washington, D. C. police were using 15 telephones in its precincts and headquarters. In 1882 Brooklyn had a usable telephone system in operation in the police department. Chicago quickly took advantage of the telephone to greatly increase the efficiency of its department by the installation of more than 1000 telephones in street boxes in 1893. Departments in every part of the country were soon making use of this marvelous new device.

Telephones and the replacement of horse-drawn patrol wagons by automobiles about 1900 enabled the police to better cope with the criminals who were already using speedy motor cars to make their escapes from the locations of their crimes.

But there was no communication to the police patrol cars and it was necessary to hold a number of units in the precinct stations to answer emergency calls.

A Whole New Show For The Police

New York City police also used patrol boats in its busy harbor. To maintain contact with these units a spark transmitter was installed at police headquarters and suitable equipment on the patrol boats. Operating on the marine channels of 450 and 600 meters, emergency wireless communications could be maintained not only with the small patrol boats but also with

(Continued on Page 72)

PROPOSED RESOLUTIONS FOR 37TH CONFERENCE

For Your Consideration

The following Resolutions have been prepared as an aid to the membership as it looks forward to the San Francisco Conference. These Resolutions are in draft study form only. As may be seen in the President's Desk column in this issue, President Flood is going to speak on these matters as he tours the remaining chapter meetings, and, he wants your thoughts in time to assist him in determining if there is interest, to what degree and for what purpose, toward the end that these objectives will either be attempted or tabled.

37TH ANNUAL NATIONAL APCO CONFERENCE

August 9 - 12, 1971
San Francisco, California
RESOLUTION NO. 4

Title: Establishing an Operator Membership and Providing for Dues Structure.

Whereas: A need exists for the establishment of a class of membership to properly accommodate non-supervisory personnel who work as operators and dispatchers in public safety communications systems, and

Whereas: The present Constitution and Bylaws of this Association does not provide for such membership as a separately titled class, and

Whereas: Such a separate membership classification would serve to expressly recognize the importance of this particular communications function and thereby reflect the formal intent of this Association to adequately provide for the special needs of this significant sector of membership in accord with its recognized position in the organizational structure of public safety communications, now therefore be it

Resolved: That a new section be added to the Constitution Article II to wit: "Operator Members. The following persons shall be eligible as Operator members. Those non-supervisory persons who are employed full time by public safety organizations for the purpose of operating communications equipment for the purpose of dispatching information in operating systems. Candidates for Operator membership must be recommended by the appropriate supervisor of the communications systems where they are employed. Operator members will not vote at the National Conferences, shall not be eligible to hold National elected office, but may serve on the following specialized National committees: Civil Defense Radio Committee, Resolutions and Bylaws Committee, Operating Procedure Committee, Radio Tele-

graph Committee, and Historical Committee. Operator members may also serve on special committees and otherwise enjoy all benefits of the Association." And, be it further

Resolved: That Bylaws Article VI, Section 1, be amended to read: "Section 1. *Annual Chapter Dues:* Each group chartered by this Association shall pay annual dues to the Secretary-Treasurer in accordance with the following schedule: \$10 per calendar year for each paid up Active, Associate, and Commercial member; and \$5 per calendar year for each paid up Operator member. All members in military service are exempt from annual chapter dues. The current dues rate of each chapter shall be filed with the Secretary-Treasurer. Chapter Honorary membership dues, equal to the current BULLETIN contribution for Active members, shall be paid by local chapters in all cases where it is desired that the BULLETIN be mailed to chapter Honorary members." And, be it further

Resolved: That wherever otherwise necessary only to provide for this amendment of the Constitution and Bylaws its numerical and editorial content may be appropriately modified, and be it finally

Resolved: That this resolution become effective January 1, 1972.

37TH ANNUAL NATIONAL APCO CONFERENCE

August 9 - 12, 1971
San Francisco, California
RESOLUTION NO. 5

Title: Establishing an Engineer/Technician Membership and Providing for Dues Structure.

Whereas: A need exists for the establishment of a class of membership to accommodate non-supervisory technical personnel who are responsible for the design, installation, and maintenance of public safety communications systems, and

Whereas: The present Constitution and By-

laws do not provide for such membership as a separately titled class, and

Whereas: Such a separate membership classification would serve to expressly recognize the importance of this communications function and thereby reflect the formal intent of the Association to more adequately provide for the special needs of this significant sector of membership in accord with its recognized position in the organizational structure of public safety communications; now, therefore, be it

Resolved: That a new section be added to Constitution Article II to wit: "*Engineer / Technician Members.* The following persons shall be eligible as Engineer/Technician members: Those non-supervisory persons who are employed full time by public safety organizations for the purpose of designing and constructing communications systems, and for installing and/or maintaining communications equipment. Candidates for Engineer / Technician memberships must be recommended by their appropriate supervisor of the communications systems where they are employed. Engineer/Technician members will not vote at the National Conferences, shall not be eligible to hold National elected office, but may serve on the following specific committees: Civil Defense Radio Committee, Activity and Membership Committee, Resolutions and Bylaws Committee, Operating Procedure Committee, Radio Telegraph Committee, Historical Committee, Engineering and Research Committee, Teletypewriter Committee, and Frequency Advisory Committee. Members with this classification may serve on special committees and otherwise enjoy all benefits of the Association." And, be it further

Resolved: That Bylaws Article VI, Section 1, be amended as follows: "Section 1. *Annual Chapter Dues:* Each group chartered by this

Association shall pay annual membership dues to the Secretary-Treasurer in accordance with the following schedule: Active, Associate, and Commercial members, \$10; Engineer / Technician members, \$8; Operator members, \$5. No dues are required for members in the military service. The current dues rate of each chapter shall be filed with the Secretary-Treasurer. Chapter Honorary membership dues, equal to the current BULLETIN contribution for Active members, shall be paid by the local chapters in all cases where it is desired that the BULLETIN be mailed to chapter Honorary members." And, be it further

Resolved: That wherever otherwise necessary only to provide for this amendment of the Constitution and Bylaws its numerical and editorial content may be appropriately modified, and be it finally

Resolved: That this resolution becomes effective January 1, 1972.

37TH ANNUAL NATIONAL
APCO CONFERENCE
August 9 - 12, 1971
San Francisco, California
RESOLUTION NO. 6

Title: Redefining Active Membership.

Whereas: A need exists to redefine the requirements and privileges of the Active class of membership of this Association in order to more properly accommodate and provide for those persons who are responsible for the administration of public safety departments, and/or for their management personnel who directly administer non-supervisory employees who design, install, maintain and operate their communications systems, and

Whereas: The present language of the Constitution and Bylaws of this Association does not provide for these needs in a manner which most truly reflects the requirements of this significant sector of membership in accord with its recognized position in the organizational structure of public safety communications, now therefore be it

Resolved: That Constitution Article II, Section 2 be amended to read: "Active Member: The following shall be eligible for Active membership in accordance with Article I of the Bylaws: Administrative and supervisory people with responsibilities for planning, organizing, staffing, directing, and controlling functions required in the design, construction, installation, maintenance, command, and/or operation of public safety communications systems who are full time employed and salaried by the federal or state government or a political subdivision thereof. No person shall be eligible for

membership under any portion of this section who engages in the lease or sale of public safety communications equipment." And be it further

Resolved: That all persons who are paid up Active members at the time this resolution is adopted shall be permitted to retain their Active membership status and all rights and privileges pertaining thereto, until such time as they may no longer meet all requirements of an Active member that were in effect at the time they became an Active member of this Organization. And, be it further

Resolved: That Article VI, Section 1, of the Bylaws be amended as follows: "Section 1. Annual Chapter Dues: Each group chartered by this Association shall pay annual membership dues to the Secretary-Treasurer in accordance with the following schedule: Active, Associate, and Commercial member, \$20. No dues are required for members in the military service. The current dues rate of each chapter shall be filed with the Secretary-Treasurer. Chapter honorary membership dues, equal to the current BULLETIN contribution for Active members, shall be paid by the local chapters in all cases where it is desired that the BULLETIN be mailed to chapter Honorary members." And be it finally

Resolved: That this resolution become effective January 1, 1972.

37TH ANNUAL NATIONAL
APCO CONFERENCE
August 9 - 12, 1971
San Francisco, California
RESOLUTION NO. 7

Title: Change in Dues of Associate Membership.

Whereas: There is a need for this Organization to redefine its dues structure for the purpose of obtaining more income to finance the many ongoing projects of this Association, and to provide a higher level of service to our members, and

Whereas: The \$10 annual dues for the Associate member classification, defined in Article VI, Section 1 of the Bylaws, is no longer considered adequate, now therefore be it

Resolved: That Article VI, Section 1 of the Bylaws be amended to indicate the dues for the Associate member classification be increased to the amount of \$20, and be it finally

Resolved: That this resolution become effective January 1, 1972.

37TH ANNUAL NATIONAL
APCO CONFERENCE
August 9 - 12, 1971
San Francisco, California
RESOLUTION NO. 8

Title: Change in Dues of Commercial Membership.

Whereas: There is a need for this Organiza-

tion to redefine its dues structure for the purpose of obtaining more income to finance the many ongoing projects of this Association, and to provide a higher level of service to our members, and

Whereas: The \$10 annual dues for the Commercial member classification, defined in Article VI, Section 1 of the Bylaws, is no longer considered adequate, now therefore be it

Resolved: That Article VI, Section 2 of the Constitution be amended to indicate the dues for the Commercial member be increased to the amount of \$35, and be it finally

Resolved: That this resolution become effective January 1, 1972.

37TH ANNUAL NATIONAL
APCO CONFERENCE
August 9 - 12, 1971
San Francisco, California
RESOLUTION NO. 9

Title: Change in Dues for Sustaining Membership.

Whereas: Article II, Section 7 of the Constitution and Bylaws provides for the Sustaining membership classification with a minimum of \$50 being established as the value for the privilege of this type of membership, and

Whereas: In view of the significant contributions made by this Association to the art of public safety communications, and because of the rising cost and effort pertaining thereto, and

Whereas: In view of the present unrealistic evaluation of the dues structure for this membership classification in relation to the level of effort expended by other membership classifications of the Association, now therefore be it

Resolved: That Article II, Section 7 of the Constitution be amended to indicate the dues for this type of membership be increased to the amount of \$300, and be it finally

Resolved: That this resolution become effective January 1, 1972.

37TH ANNUAL NATIONAL
APCO CONFERENCE
August 9 - 12, 1971
San Francisco, California
RESOLUTION NO. 10

Title: Change in Dues for Governmental Representation.

Whereas: Article II, Section 9 of the Constitution provides for a form of Governmental Representation which allows a governmental entity to have two members in this Association at the minimum cost of \$25, and

Whereas: The minimum cost of \$25 may be insufficient in some cases, and too much in other cases, and

Whereas: There is a need to redefine the Governmental Representation to make it coincide more closely

(Continued on Page 71)

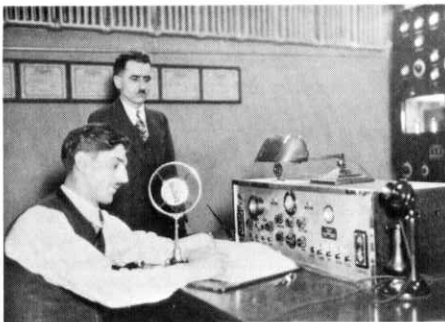
APCO's First Historian:

TO BEE OR NOT TO BEE!

Does Some Reminiscing

By Herb Wareing

Am enclosing a Dec. 1930 picture of me at the Radio Dispatcher's desk in the Headquarter's Alarm Office of WPDK. Under the desk was a big fire station gong which was tripped three times before every order over the air. The Chief insisted that the men in the cars had to be alerted before being required to listen to the radio. Then the radio operator at the station



Standing: Herb F. Wareing, W9NY Radio Engineer. Seated: Wesley Wiseman, W9OT Radio Operator. Final PA Linear, DeForest 520B, 5KW, Water Cooled. Fred M. Link was Tube Engineer for DeForest.

had to repeat the call twice more. Of course, we were plagued with dead spots and street car noise. Every 15 minutes the radio operator had to transmit a test call three times, so the squad crews would know their radio was working. The station's Western Union clock was rigged up with a tapper bell that sounded every 15 minutes to alert the operator to the test time.

We had six commercially licensed operators on duty at WPDK, all CW men, of course, and all hams. And KSA57 still operates CW on the police interzone net—since May 28, 1938.

As the BULLETIN'S first Historian, I thought a little dissertation about the "good old days" might be of interest to the "new-



Herbert F. Wareing at Radio Dispatcher's Desk, WPDK, 2952 Kc, 300W, December, 1930.

comers," while yet raising a tear or two from some of those who have been around for a while:

Early Mobile Receiver "B" Supplies

If you have never lain under a car, with dirty snow and melting ice dripping into your face while you held up a 50-pound box of B batteries with one hand and screwed on the mounting nuts with the other, then you are not really an old-timer in the mobile radio game. The sixteen mobile police receivers (2452 kc AM) which went into service for MPD (WPDK) in December, 1930, used "B" batteries for plate supply.

Battery Housing Problems

Three of the extra large heavy duty special 45 volt blocks were

housed in a steel box mounted under the car. These boxes allowed water, splashed from the street, or from the high pressure car-washing system used, to enter and soak the batteries. Subsequent installations were made by drilling over 100 holes through the steel floor of the car in front of the rear seat and dropping through a 14" by 8" by 6½" deep flanged steel box. This permitted changing batteries from inside the car and eliminated the splashed water problem. However, we still had some winter moisture problems from condensation and from snow carried in on the officer's boots.

Short Battery Life

The average life of these B batteries was less than one month in cars used for 24-hour patrol duty.

The price of a 135 volt block was \$6.18. Contributing to the short useable life was the fact that a "C" battery was used for bias, which caused the receiver to howl when the "B" voltage dropped below a certain value.

"No Bee" Unit

Some early makes of mobile receivers utilized dynamotors for plate supply. However, the continuous drain on the car battery aggravated the already serious problem of maintaining a charged condition with the types of car generators in use. So it was that the police radiomen of that time jumped at the chance to rid themselves of the problems resulting from the use of "B" batteries when the Karadio Corporation of Minneapolis announced the development of their "No Bee" unit.

"DC" Transformer

We were introduced to this type of "B" eliminator through B. T. Setchell in October of 1931. This was the first "DC transformer-vibrator"-rectifier-filter type of high voltage DC supply powered from a 6-volt battery which came to our attention. One was installed in one of the department's motorcycles as part of an installation we made in November, 1931.

Cost Advantage

The improved receiver performance resulting from a uniform "B" voltage, together with the obvious financial advantage of a one-time cost of \$13.50, as against a monthly cost of over \$6.00 made it possible for us to secure approval of a transfer of funds from "Supplies" to "Additional Equipment" early in 1932. Just for perspective — at that point in time, the U. S. was at the bottom of the depression, and any new municipal activity such as the radio system of the police department was at the bottom of the budget priorities list.

A police radio engineer spent more time and energy and got more headaches from fighting for funds in his budget than he did from working on the technical and operational problems which infested his system. And speaking of inflation, as all of us fixed pensioners are, some technical notes on these units were made during lunch hour on the back of the menu. The "Today's Special" featured Beef and Vegetable Stew with vegetable, bread, butter and beverage for 18 cents.

Exit Batteries

All "B" batteries were replaced by "No Bee" units during 1932 (32 cars — a 100% increase by that time), and all additional cars were similarly equipped, so that about 50 of them were in service by the middle of 1937. These units being only one-third the size and one-fifth the weight of the batteries greatly reduced the time and labor per installation. The drain on the car battery averaged about one ampere for the 135-volt 20 MA model. Vibrator contacts were made of a soft metal which wore away evenly with no pitting or sticking, although occasional replacement was required. The low frequency of the vibrator also contributed to long life. Every time we made an improvement in reliability we contributed to improved efficiency and

(Continued on Page 49)



Johnson's new FM two-way portables with built-in speech scrambler. *When lives are at stake.*

*The unintelligible gibberish above spells Johnson-Scrambler. It *looks* the way you *sound* to eavesdroppers when transmitting through the built-in voice scrambler in Johnson's new FM 541 portable.

Designed specifically for police stakeout and intelligence teams, narcotics surveillance squads and crowd control forces, Johnson's new Hand-Held Scramblers are completely unintelligible to all except your own scrambler-equipped units. This security preserves your element of surprise. Lets you take action swiftly, selectively and privately.

JohnsonScramblers may be set up on your choice of codes, and are fully compatible with base and mobile 2-way radios utilizing the PD 101 scrambling system.

The FM 541 Scrambler costs little more than other hand-held portables *without* scrambling capability. *It is available only to official law enforcement agencies.* We'd like to show you this exciting new law enforcement tool at no obligation, of course. You can arrange it with a quick call to the Professional Products Dept., 507/835-2050. Or, if you prefer, drop us a twx or a letter.



"Try Before You Buy." Johnson-Scrambler Portables are available to interested police departments on our Try Before You Buy Program. Complete information is available.

The
JohnsonScrambler
FM 541 hand-held
portable.



E. F. JOHNSON CO.
WASECA, MINN. 56093

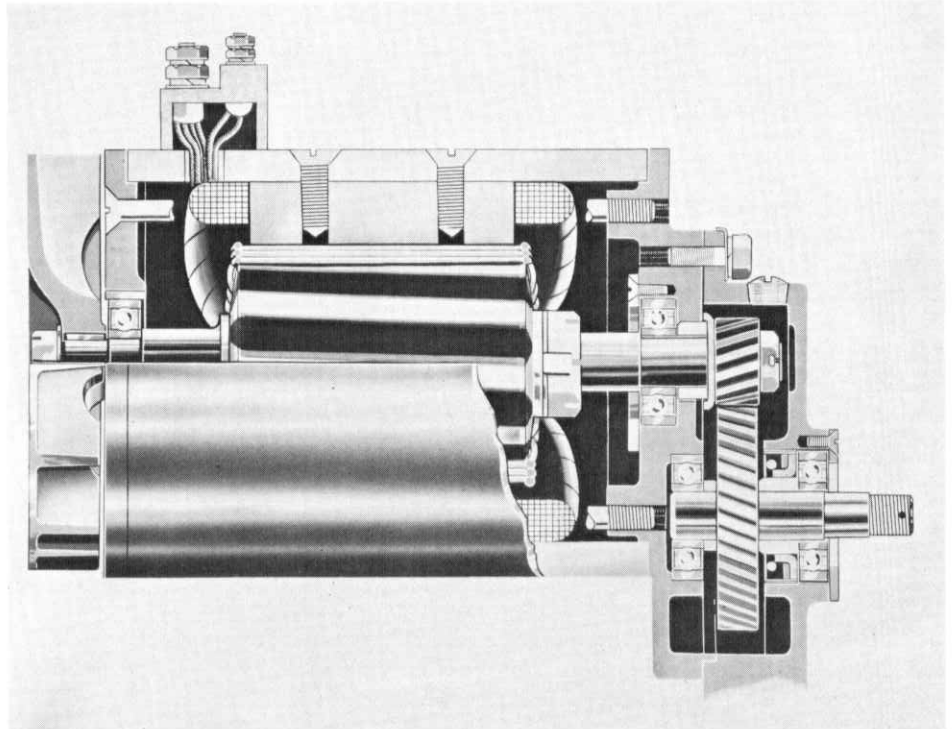
From 6 Volt Systems:

EVOLUTION OF VEHICULAR GENERATOR

To 12 Volt Systems



Harold J. Suske
Vice-President
The Leece-Neville Company



A. The original police alternator introduced in 1914. Of the inductor type, more familiarly known as a "flux cutter," it produced 60 amps at 7 volts. Note the geardrive designed to increase rotor speed to provide adequate output.

Dead batteries were a way of life for police cars across the country in 1944 because of the two-way radio. Radio communications technology had been highly developed during the war and was being transferred from the military to civilian police activity. It was good radio communications which was making the police patrol cars an effective means of law enforcement.

Lights and accessory devices plus the new two-way radios created electrical demands that were way beyond the capabilities of the 6 volt DC generators that were available at the time. The radios alone required twenty to thirty amps of current to heat the filaments of vacuum tubes and to power the motor/generator set required to produce AC current for the vehicle's transmitter.

The problem was further complicated by the duty cycle of the typical patrol car which frequently operated at idle for extended pe-

riods to be followed by periods of high speed operation.

Although the DC generator could be made to operate efficiently at any given speed it was difficult to provide a generator which could operate efficiently over a wide range of speeds. As a consequence, it was not uncommon to burn out generators rather regularly and to change batteries at the end of every shift.

With an eye towards solving this power generation problem, the Leece Neville Company introduced the first automotive type alternator in June of 1944. (Photo "A"). It was installed on a 1940 Ford police car operated by the Cleveland (Ohio) Police Department.

Leece Neville had been working on various types of alternators for a number of years and had supplied

numerous pieces of equipment to the military for use on combat aircraft. However, the operating conditions that prevailed for automobiles were entirely different from aircraft. Thus, Leece Neville spent many months and thousands of dollars developing an alternator suitable for police car use.

The alternator first installed on a police vehicle was called an inductor alternator or more familiarly a "flux cutter." (Photo "B"). The rotor of this alternator consisted of a fluted laminated iron core, which revolved inside a wire wound stator. AC current was produced when the flutes on the rotor cut magnetic lines generated by the stator. The AC output was rectified to DC by

(Continued on Page 50)

TO BE OR NOT TO BEE

(Continued from Page 47)

effectiveness of police patrol by keeping the squad officers on their beats instead of on trips to the radio shop for service.

Rectifier Tubes

Tube types available in 1931 suitable for use as high voltage rectifiers were the UV201A, UV112A and UV171A's at about 45 cents apiece. These had 5-volt ¼-ampere filaments which were not mechanically suited for use under the shock and vibration and variable voltage encountered in automobile service. A pair of tubes was used with the grid and plate of each tube tied together as the anode. The filaments, being at plus "B" potential, and of a different voltage rating than the car battery, were fed from a separate winding on the transformer. The short service life of these tubes required replacement of an average of 7 per unit per year.

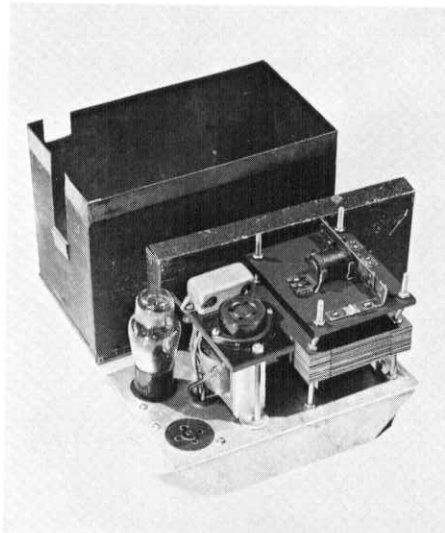
Improved Rectifiers

Late in 1932 some of the units were changed to use two Raytheon BR gaseous tubes. Some type 237 tubes were also used for a time. In April, 1933, we began substituting a single type 84 tube for the previously used pair of tubes, and by early 1934 all units had been changed to this type. The 84 was a full wave rectifier tube with 6.3 volt 300 MA indirectly heated cathode. This permitted connection of the filament directly across the car battery. However, fear of heater-cathode shorts caused us to continue feeding many of the heaters from the transformer. In some cases the decrease in filament drain raised the voltage enough for the 6.3 volt heater, in other cases a few turns were added to the filament winding. The average life of two years for this type of rectifier tube further increased the reliability of the "No Bee" units.

The idea of modifying the vibrator assembly to provide for synchronous self rectification of the secondary voltage occurred to us independently, and experimental work on one of the units was per-

formed in the police radio shop. While the idea worked, we did not follow it up.

The photograph of the No Bee unit shows one of the original units which was in use for five years



The "NO BEE" Unit

(not in a uniformed patrol squad). The original pair of 171A's was replaced by an 84 in 1933. The orig-

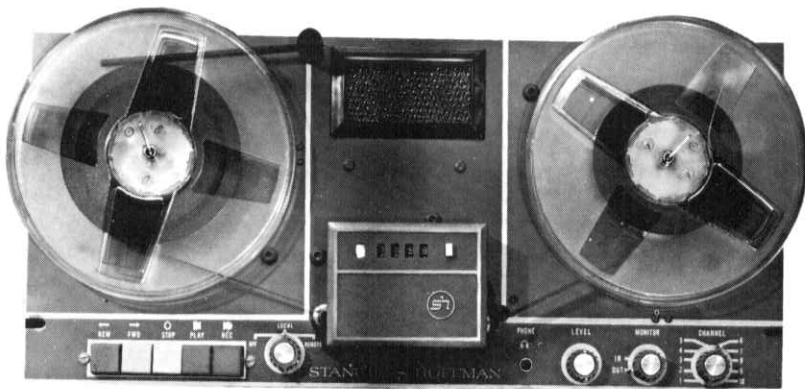
inal terminal strip was replaced when received by the four prong socket mounted above the filter choke. This provided for quick replacement of units, since all had been similarly modified. The 0.5 mfd bathtub condenser alongside it was added and connected across the DC output to improve filtering. Below the chassis were mounted an 8 mfd 300 volt, a 4 mfd 275 volt and three 20 mfd 25 volt electrolytic condensers. The vibrator, mounted above the power transformer on a 3¼" by 4" bakelite panel, is one of the originals — having never been replaced.

Retired To Limbo

"No Bee" units constituted 100% of the "B" supplies for our automobile receivers until 1937. At that time we started installing receivers of our own design and construction which included built in "B" supplies using commercially available plug-in vibrators and 6x5 rectifiers. All of these receivers lasted until they were replaced by FM equipment over a period of years. Ω

Don't Write It, Log It!

THE PERFECT MEMORY — STANCIL-HOFFMAN CRM-10
24 HR. 10 TRACK RECORDING



Full 24 hour log of all dispatches, telephones, interrogations—10 channels round the clock to cover your needs perfectly with 100% dependability—remotes, automatic operations, synchronous time injection, dozens of other functions handled by a remarkable new series of integrated circuit plug-in amplifiers. The complete 24 hr. 10-channel log on just one 7" reel of ½" tape. Join the electronics age with the most advanced logger ever, the Stancil-Hoffman CRM-10.

WRITE NOW FOR SPECIFICATIONS AND PRICES.

STANCIL-HOFFMAN CORP.

921 NORTH HIGHLAND, HOLLYWOOD, CALIFORNIA 90038

EVOLUTION OF VEHICULAR GENERATOR

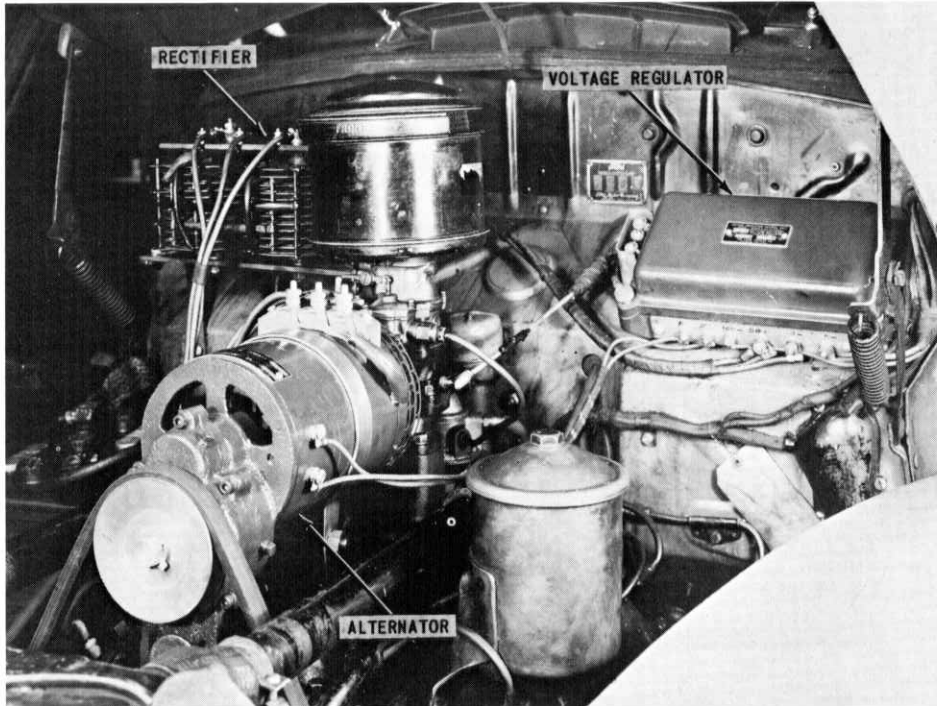
(Continued from Page 48)

means of a magnesium copper sulphide rectifier. In order to generate enough current it was necessary to use a step-up gear box to increase the rotor speed to about eighteen thousand RPM.

Although the inductor type of

automobile, which carried a number of special electrical gauges accurately illustrating the current producing capability of the alternator.

A favorite trick was to equip a police car with an alternator, then remove the battery and drive the car for an entire shift. These convincing demonstrations ultimately led to the use of the alternator as



B. The original "flux cutter" alternator installed in a 1940 Ford police car. This a 60 amps 6 volt model.

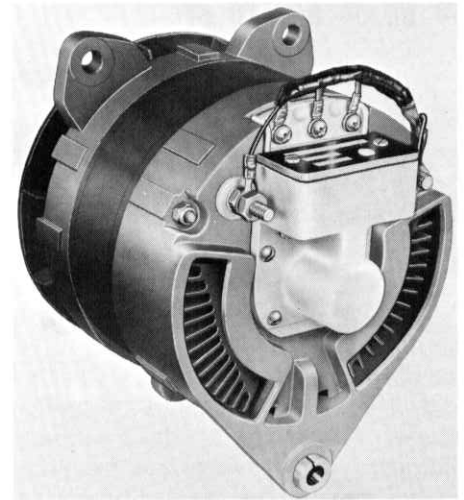
alternator was adequate to meet the demands of police vehicles, its cost and its operating reliability were not satisfactory. Thus in 1946 Leece Neville developed a new generation of alternator, using the so-called Lundell wire-wound rotor. It is this basic design which is currently in use today. The new alternator was tested extensively on Cleveland police cars and ultimately became standard equipment on the patrol car fleets of major police departments across the country.

Developing the alternator and selling it to police officials, however, was not without its pitfalls. Many problems were encountered, not the least of which was to convince police officials that the system really worked. As a result, all Leece Neville executives and all Leece Neville salesmen during the 1940's and early 50's were required to drive an alternator-equipped

the standard for police vehicle power generation, and of course the favorable experience of police departments subsequently lead to the use of the alternator as standard equipment to nearly all automobiles and trucks today.

Over the years Leece Neville has developed many innovations which have changed the alternator from a ponderous complicated set of equipment to a simple light weight and highly reliable electrical generating device. In 1954 the magnesium copper sulphate rectifier was replaced by the selenium rectifier, and in 1963, this was replaced by a simple solid state diode which was small enough to be built into the alternator itself. Of course, actual operating experience over the years has led to important increases in alternator operating efficiency in reliability and reduction in the size to weight ratio.

One of the most important ad-



C. This is the model 4400 JA, the latest design Leece Neville alternator, rated 75 amps at 12 volts. Note that both the rectifier function — the diodes, and the control function — the regulator are built-in. This alternator can produce 40 amps at a rotor speed of only 750 rpm and reaches rated output at 2,000 rpm.

vances in alternator technology occurred just recently when Leece Neville introduced the new 4400 slow speed alternator capable of producing 40 amps at normal engine idle speeds. (Photo "C"). The unit is designed to operate at half the rotational speed of conventional alternators. The resulting reduction in rotational speed makes possible a substantial increase in the life of bearings, belts and brushes. In addition, this alternator has the advantage of providing ample output at idle speeds and yet is not damaged by extremely high speed operation. Since it runs more slowly at high vehicle speed, the stresses that were characteristic of alternator operation are materially reduced.

Founded in 1909, the Leece Neville Company has been responsible for many innovations in automotive electrical systems. They developed the first practical two-unit starting and lighting system for automobiles in 1912. The company invented the first voltage regulating system and the 1921 Haynes automobile was the first to be equipped with a Leece Neville finger-tip starter.

The company was a leader in the manufacture of generators and voltage regulators for aircraft after the end of World War I, and in the 1920's developed cranking motors for busses, diesel engines and heavy-duty trucks. Ω

A PRODUCTIVE HISTORY

(Continued from Page 36)

fifties that we introduced a mobile Controlled Magnetic microphone with a builtin pre-amp. This product had its origin in conversations with Art Soule, of Reno; Bill Lee, of Richmond, and others, all of whom raised the possibility of developing a mobile communications microphone with a Controlled Magnetic structure that could be used in transmitters equipped with carbon microphone inputs. The microphone with the built-in pre-amp, of course, solved this problem.

It was also during the 50's that we introduced the Armo Dur case for all our mobile microphones. Here again, our research into this important development began as the result of conversations with two APCO members, Buck Sloop, of Raleigh, and Otto Rhoades, of Sterling, Illinois. They pointed up the fact that when closed up in a car on a hot day, die cast microphones were impossible to hold. Similarly, they were uncomfortably cold when closed up in an unheated car on cold days. Not only did Armo Dur solve this heat-and-cold retention problem, it proved to be unusually rugged. Remember the well-known Shure ad showing the microphone being dragged behind a moving car? You might say that Buck and Otto helped write it.

This type of testing, incidentally, has long been a part of Shure quality control procedures, and it is not surprising that many reflect APCO influence. Environmental testing of our push-to-talk switches, for example, contains one important feature that is directly attributable to APCO.

In 1963, our pride in our extensive testing program was severely injured by problems in the field with sticking switch buttons on our mobile microphones. In none of our environmental tests, however, could we make the buttons stick. Finally, after some astute detective work and help from some APCO members, we proved that Arizona sand was the problem. We immediately wired an APCO friend in Arizona for a barrel of true Arizona grit. Because of the easy availability of

(Continued on Page 57)



The microphone being used here is the Shure Unidyne III, successor to the Unidyne II as the favorite unidirectional microphone for base station use. (Note "Chicago Rain Static" Ero Erickson in background.)

What do you get when you pay more for an ultra high frequency Monitor Receiver?



MICRO
Communications
Co.
UHF Personal, Mobile, Fixed Systems

2452 W. 2nd, Denver, Colo. 80223
Ph. 303/936-3433

ultra high performance!

.35 mv sensitivity
80 db selectivity at 25 KHz

ultra high utility!

All common tone options
CCTS tone squelch
single pulse tone
two-tone sequential tone switch
for control functions
Single channel and eight channel
models - 406-486 MHz
Compact - 3¼ x 5½ x 7¼
117 VAC and 12 VDC cigar
lighter operation

Built for tough police, fire, public safety, remote control, wide area paging, and similar applications. Call or write for more information.

FROM THE PRESIDENT'S DESK

(Continued from Page 8)

meeting was primarily discussions of current events within APCO and some of the programs planned for the future. The meeting was very well attended and during portions of the meeting the members broke up into groups to discuss problems in their main area of interest: management, technical, and operation.

The workshop concept at chapter, regional, and national meetings is taking hold. The first chapter meeting that I attended where the separate workshop approach was used was the Atlantic Chapter meeting last October. The Florida Chapter's similar approach in their chapter meeting and the Western Regional Conference's workshop approach appear to be a recognition of the fact that APCO must be more diverse in our meetings and other activities if we are going to be truly responsive to our members.

In a number of previous President Desk Messages I have briefly touched upon our need to explore ways to meet our responsibility to all of our members. In talking about this, I normally referred to the lack of any programs — at the National level — for operators; for the engineer/technician; or for the manager/supervisor. I also mentioned that our chapters are constituted primarily of one type of member: operator/dispatcher, technician/engineer or manager/supervisor. Thus, the complaint in a given area is that APCO is too operator minded and not enough technical minded; too technical minded and not enough operator minded; or not advanced sufficiently to be of significant interest to management.

Recognizing that we have essentially three distinct groups of people within the Organization, and that we must gear our Organization, our programs, our information media (BULLETIN, etc.), and our membership classifications to meet our responsibilities to these people, I have asked that a number of resolutions be prepared to provide for the classification of our members in different categories. The resolutions appear elsewhere in this

BULLETIN and are mentioned here for comment only.

In all probability the proposed resolutions — in their final form — will be very similar to what you see in this issue of the BULLETIN. However, I am sure that the resolutions will be changed somewhat before they are introduced at the National Conference. Our reason for wanting the resolutions published now is so that we can discuss and vote on them informally at the regional conferences. This way, any weak or undesirable spots in the resolutions can be taken care of by time we get to the National Conference.

The resolution calling for the establishment of an Operator class of membership recognizes the need for APCO to try and induce more operators/dispatchers to become members of this Organization throughout the country. It also recognizes the fact that most operators have relatively limited income, have a very restricted interest in the communications field, and have little management support or backing for active participation in organizations like APCO which would require a considerable amount of their time for committee work or travel for the Organization.

The number of National Standing Committees that members of the Operator class would be qualified to participate in would be limited to committees (non-policy forming or technical Standing Committees) where their operational knowledge and abilities would be most welcome and helpful.

The Operator member's annual dues would only be \$5.00 to the National Organization. This would be half of what the present Active members' dues is now. \$5.00 is just about the break even point for a member to the National Organization. The \$5.00 covers the administrative costs of setting up the mailing list, sending the member the monthly BULLETIN, and other administrative costs associated with servicing each of our members. In other words, there would be no actual income (net gain) from a \$5.00 membership fee for the Operator member class.

The resolution calling for the establishment of an Engineer/Tech-

nician category again recognizes that we have many people in APCO — and in the public safety communications field — who are principally interested in the technical aspects of public safety communications. Like the Operator members, it is recognized that, most often, people in this category do not have the necessary backing of management to allow them to attend the National Conferences; to travel in the interest of APCO; or to spend a considerable amount of their time on APCO matters.

It is again recognized that most members in the Engineer/Technician category would not have sufficient organizational backing to permit them to attend the National Conferences each year. Consequently, it would not be feasible to have members in this category eligible for participation in the policy making Standing Committees of this Organization. In order to knowledgeable participate in a number of the Standing Committees: National Executive Committee, Administrative Research Committee, Public Safety Planning Committee, Resolutions and Bylaws Committee, Conference Committee, and the Nominating Committee, it is essential that members be in a position to participate in the National Conferences each year.

The annual dues for the Engineer/Technician would be set at \$8.00. This amount takes into consideration the fact that the Engineer/Technician member has a higher income than the Operator member; would be more participative in APCO functions; would benefit to a greater extent from APCO membership; and consequently would be expected to help finance some of the projects of the Organization. It could be expected that about \$3.00 annually would be used to help finance the many expenses of APCO.

The resolution redefining the Active membership classification does several things: recognizes the fact that the manager/supervisor is the one who normally attends the National Conferences; has organizational backing to contribute time for work and travel for APCO; is more knowledgeable in the whole APCO operation; and has the general administrative ability to serve

in the National Standing Committees that recommend policy for the Organization, is sufficiently conversant with the needs of the other classes of members and can thus effectively serve as officials of APCO. The contributions required from this class of membership — in time and money — will be considerably greater than the other membership categories. In fact, the greatest portion of carrying the financial burden of the Organization will lie with members in this category. The \$20.00 annual dues for this class of member would represent a 100% increase over the present dues.

It is very important to note that the resolution redefining the Active member qualifications recognizes the fact that there are many Active members of this Organization at this time who would not qualify as an Active member after January 1, 1972, if all of the resolutions were passed. Yet, many of these Active members have been and are great contributors to the success and progress of APCO. It would be totally unfair to disenfranchise these members when we were in the process of redefining the membership classifications. Recognizing this fact, the resolution for Active member has a clause in it which would allow those persons who are Active members at the time the resolution is passed to continue in that category for as long as they qualify to be Active members under the provisions of the Constitution and Bylaws as they now stand. In other words, these members would continue to qualify as Active members until such time as they were no longer employed by a public safety organization.

A number of other resolutions also appear in this issue of the BULLETIN. Some of these resolutions pertain to increasing the annual dues of the Associate and Commercial members of the Organization. One resolution calls for increasing the amount for Sustaining members from \$50 a year to \$300 a year. The latter figure is more in keeping with the amount that other similar type organizations charge sustaining members.

I urge all of you to study the resolutions very carefully, raise questions about them, and make

recommendations about them. Everyone is urged to attend the regional conferences, and be prepared to discuss all of the resolutions objectively and intelligently. It is your responsibility to APCO and to your chapter to do this.

As my discussion of the resolutions indicates, we feel that there is a very definite need for separate classifications to accommodate present and potential members in specific categories. This need has been and is being recognized at the chapter (grass roots) level by the workshop type of meetings that are starting to be held, and at the regional conferences where workshops aimed at the various types of members have been, and are being, planned.

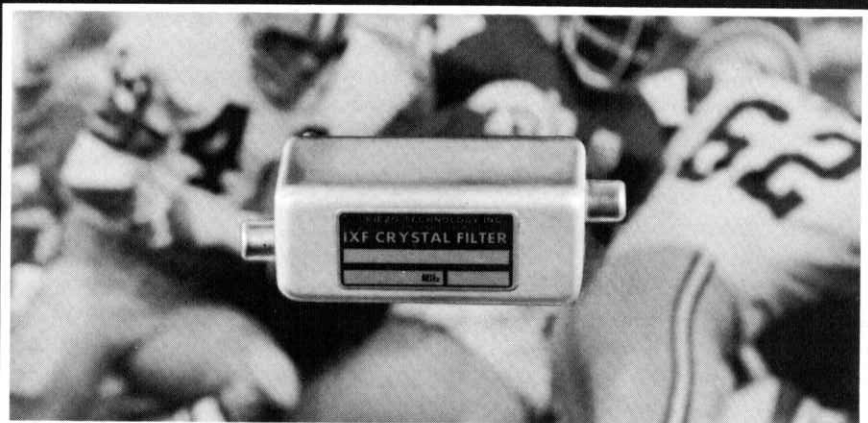
It strikes me that meetings where workshops of this type are conducted would be very appropriate places to also use some of the video tape programs available at last year's Annual Conference. The tapes are roughly one hour long and the content of the tapes has been described in a previous BULLETIN issue. We have not had one single request for any of the video tape recordings of events

at last year's Annual Conference. I regret to say, I think the Officers truly were out of tune with the Organization when we thought that this project (Project VI) should be established.

Many hundreds of man hours were donated to Project VI at a great expense to the Diamond Power Company and some of your APCO officials. At no little expense, crews were sent in to record the main events of our last National Conference. After that, many hours were spent in reviewing and editing the tapes so that they would be as interesting and action-packed as possible. (See details on Page 28 of the November issue of the BULLETIN).

There was some discussion about recording the National Conference at San Francisco too. However, based upon our results so far on the use of these tapes, I cannot in good conscience recommend that we pursue this project any further. I really believe this is most unfortunate, because most of our members never have the opportunity to attend a National Conference. Often they

(Continued on Page 59)



Block out interference

with new economical IXF® front-end filters

Put these monolithic crystal filters on your line. Block out interference in all VHF high and low band mobile sets as well as base stations. These new two-resonator models are proof that front-end filters don't have to be expensive.

- Monolithic Construction
- Accommodates ± 6 kHz frequency deviation
- Two-pole attenuation characteristic
- Stopband attenuation greater than 30 dB
- Operating temperature range -20° to $+70^{\circ}$ C
- Phono connectors for fast installation
- Hermetically sealed

Technical data and price list on request.
Quantity discounts. Dealer inquiries invited.

Pti

Piezo Technology Inc.

P. O. Box 7877 • Orlando, Florida 32804
(305) 425-1574 • TWX 810 - 850-4136

(Continued from Page 12)

lice, explained that this matter was being handled by the above committee, and it was decided that no action would be taken by this association.

12. Committee report and adoption of constitution.

13. Vote of thanks to Captain Donald Leonard for his assistance as advisor of constitution committee.

14. Visit to KMOX Station.

15. Committee report and rejection of offer of "National Police Officer."

16. Lecture on uses and theory of Cathode Ray tubes, by Prof. Roy S. Glasgow, Washington University.

17. Address on communications by Mr. J. M. Briggs, of the Gamewell-Westinghouse Co.

18. Address on advantages of two-way radio communications by Lieut. Jack Wilt, Kansas City, Kansas.

19. Nominating committee appointed.

20. Address by Mr. Allen S. Wise of Graybar-Western Electric Co.

21. Tour through Police Headquarters and visit to KMOX Studios.

22. Demonstration of two-way radio communication by Lieut. Wilt, and Sergt. Carr, Kansas City, Kansas.

23. Report on committee on inter-city communication. Ten objectives were listed, around which a definite plan of operation would be built. It was decided that members of the committee forward plans of operation to the chairman of this committee, who would coordinate them into one or more workable plans to be finally presented to the International Association Chiefs of Police as one plan, for approval and final legislation.

24. Telegrams were ordered sent to Federal Communications Commission, U. S. Department of Justice, Bureau of Investigation and to International Association Chiefs of Police, informing them of action taken regarding inter-city communication.

25. Vote of thanks extended to Mr. E. K. Jett, Federal Communications Commission, and Mr. E. P.

Coffey, U. S. Department of Justice, Bureau of Investigation for their cooperation as advisors to committee on inter-city communication.

26. Talk by representatives of manufacturers of Pioneer Generators and Shure microphones.

27. Ordered by majority vote, (1) that copies of plan as submitted by inter-city communication committee be forwarded to all departments engaging in communications work, (2) complete details of minutes of convention be forwarded to members, (3) condensed summaries of minutes be forwarded to all departments.

28. Report of committee and election of Officers and addresses of thanks.

29. Ordered by majority vote to hold next meeting in early fall of this year at Indianapolis, Indiana.

30. Address of welcome by Captain Robert L. Batt, Indianapolis, Indiana.

31. Tour through city.

32. Banquet and entertainment, addresses, etc.

The meeting was called to order by the President at 6:20 p.m. Mr. P. M. Smith represented the constitution committee and read the following recommended modifications to the constitution: An amendment to section 6 article 6, an addition to article 2 section to be known as articles 4 and 5. A vote was taken, and the modifications were accepted unanimously. The meeting was adjourned at 6:40 p.m.

The following were in attendance: Members — Robert L. Batts, WMDZ, Indianapolis, Ind.; B. J. Burnley, KGPC, St. Louis, Mo.; W. H. Carr, W9XCA, Kansas City, Kansas; Roy DeShaffon, KGPE, Kansas City, Mo.; Myron Y. Eck, WNFP, Niagara Falls, N. Y.; Everett E. H. Fisher, KGPC, St. Louis, Mo.; Conrad F. Harington, KGHZ, Little Rock, Arkansas; M. A. Hinds, WPEC, Memphis, Tennessee; H. O. Kelly, KGPB-KGPR, Minneapolis, Minn.; Carl H. Kiehl, KGHZ, Little Rock, Arkansas; J. A. Kirchner, WPEB, Grand Rapids, Michigan; Ray H. Mitchell, KGPZ, Wichita, Kansas; Wm. H. Nelson, WNFP, Niagara Falls, N. Y.; Louis R.

Padberg, Jr., KGPC, St. Louis, Mo.; C. F. Scavarda, WRDS, Lansing, Michigan; E. J. Scroggin, KGPE, Kansas City, Mo.; George M. Searle, WPGC, Albany, New York; A. J. Sigel, KGPI, Omaha, Nebraska; Otis J. Stanley, KGPN, Davenport, Iowa; P. M. Smith, WPDS, St. Paul, Minnesota; H. F. Wareing, WPKD, Milwaukee, Wisconsin; Emil Wander, KGPC, St. Louis, Mo.; Edward Winter, KGPC, St. Louis, Mo.; T. C. Wood, Jr., WPDV, Charlotte, N. C.; Jack Wilt, W9XCA, Kansas City, Kansas.

Associate member — C. Hubert Anderson, Supreme Instrument Corp.

Manufacturers' representatives— C. L. Berman, Shure Bros. Company; J. M. Briggs, Gamewell-Westinghouse Company; Frank Ecoff, Walter Ashe Radio Company; L. E. Lowry, Gamewell-Westinghouse Company; Allen S. Wise, Graybar-Western Electric Company; L. W. Wood, Wood and Anderson Company; R. D. Wright, Pioneer Genemotor Company.

Others in attendance—E. K. Jett, Federal Communications Commission; E. P. Coffey, U. S. Dept. of Justice, Bureau of Investigation; Donald S. Leonard, Michigan State Police; Barton N. Grant, Missouri Crime Prevention Bureau; Lawrence Burrows, Carondelet Township, St. Louis County; Charles J. Hahn, Jr., Editor National Police Officer; John McAdam, KGPC, St. Louis, Mo.; Wm. S. Rosen, KGPC, St. Louis, Mo.

ARTICLES OF
INCORPORATION OF
THE ASSOCIATED POLICE
COMMUNICATION OFFICERS,
INCORPORATED

Approved and filed Feb. 17, 1939,
James M. Tucker, Secretary of
State, Indiana.

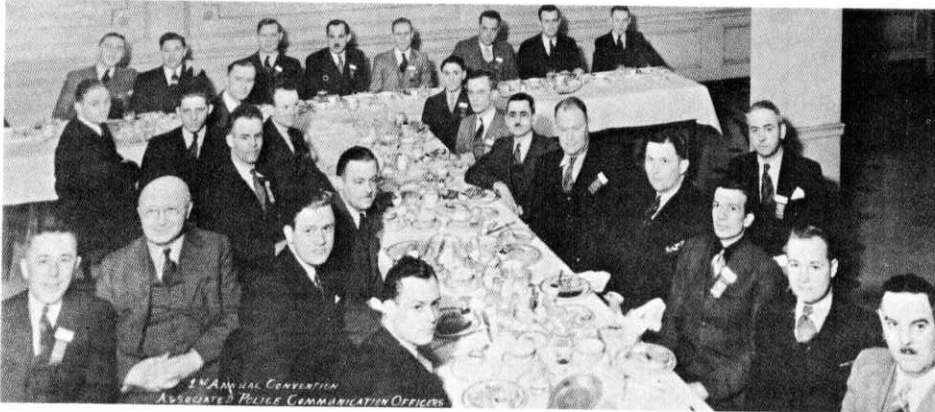
1. The name of this corporation shall be The "Associated Police Communication Officers, Incorporated."

2. The purpose or purposes for which it is formed are as follows:
(1) To foster the development and progress of the Art of Police Communication and Inter-Communication, and to promote, through example and active effort greater cooperation in the correlation of the work and activities

of the several town, city, county, state, and Federal law enforcement agencies, and of the Communication units therefore, as well as to promote harmonious cooperation between those of the United States of America and territories thereof, and other such agencies of law enforcement and police communication upon the North American Continent, to the end that the Safety of human lives, the Protection of Property, and the General wel-

the Inter-State Commission on Crime; the Federal Bureau of Investigation, and the United States Secret Service, as well as the Federal Communications Commission.

(5) To prepare, offer, and to provide assistance to police and other law enforcement organizations and bodies in the matter of their requirements relating to Communications equipment and its operation, and in the framing of legislation, regulatory rules



1st Annual Convention, APCO, Melbourne Hotel, St. Louis, Jan. 21, 1935

fare of all peoples concerned may be benefitted to the highest degree.

(2) To aid and assist in the development of channels, methods, systems, and all other media for the rapid and accurate collection, exchange, and dissemination of information relating to crime and criminals, emergencies, and other vitally important information of police or emergency nature.

(3) To prepare, and publish (or) to cause to be so prepared and published, to all regularly accepted members of this corporation, a regular publication, or bulletin, at such intervals as may be deemed reasonable and effective, containing technical and administrative data of such nature that it concerns police and communications personnel; news of general interest to men who are, or who may become interested and engaged in the work of communication or its allied fields from a Police and Emergency standpoint.

(4) To further, by active effort and example the cooperation among and between this Corporation and the International Association of Chiefs of Police;

and measures, and matters of police and communication policy.

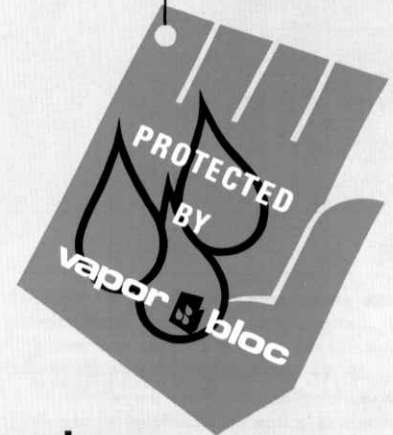
(6) To provide means whereby organizations of like character and aims, located within the several States, Provinces, or other political sub-division of the North American Continent may become affiliated with this 'Parent' organization, as 'Chapters' thereof, operating under individual charters to be granted by the National body of the Associated Police Communication Officers, Incorporated.

(7) To provide, and maintain, at the National Offices of this Corporation, certain files and information relative to certain phases of technical research and development relating to problems of equipment, procedure, and operating standards, in keeping with the policy of fostering the continued development of the Art of Police Communication.

(8) To provide for memberships in this Corporation, in accordance with the language of the Constitution and By-Laws now, and which may later be provided and in effect. Such memberships

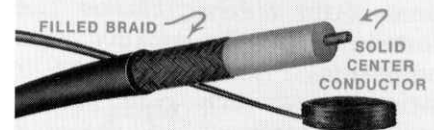
(Continued on Page 56)

will
your
new
antenna
carry this
tag?



only
if it's from Decibel!

This tag, attached to all DB antennas, not only details the engineering factors of VAPOR-BLOC® cable, but also tells the story of another "extra" afforded the 2-way radio industry by Decibel engineers in their continuing program of development. A dedicated effort that assures you of better system performance and durability.



VAPOR-BLOC® cable is a new generation cable developed to offer maximum moisture protection to your antenna system. Featuring a new sealant compound, it virtually eliminates the moisture deterioration of RF systems. Want to know more . . . write, wire or phone . . .



**DECIBEL
PRODUCTS, INC.**

A subsidiary of Communications Industries, Inc.

(Continued from Page 55)

to be of such classification and having such rights, privileges, and restrictions as may be provided from time to time in keeping with the state of such development of the Art of Police Communications.

3. The period during which it is to continue as a corporation is PERPETUAL INDEFINITE PERIOD.

4. The post office address of its principal office is 126 State Capitol



A rare photograph stolen from "secret" historical files shows Cunel Suh D. C. Bailey, initial organizer of the Florida Chapter and second Chairman of the Confederate Communications Commission, shooting down the perpetrator of a bum joke during a liquid CCC breakfast at a National Conference.

Bld., Indianapolis, Marion County, Indiana.

5. The name of its resident agent is Frank W. Morrow.

6. The post office address of its resident agent is 2605 College Avenue, Indianapolis, Marion County, Indiana.

7. If the memberships are to be divided into classes the designations of the different classes, and a statement of the relative rights, preferences, limitations and restrictions of each class, together with a statement of the voting rights of any such class.

There shall be two (2) classes of membership in this corporation, (ie) ACTIVE and ASSOCIATE.

ACTIVE MEMBERSHIP may be extended to all persons who are, or may become Actively engaged in the work of Police or other Law Enforcement Communications; or who are, or may be Actively in charge, as Communications Officers



An "earlier" shot of a Michigan Chapter meeting. See anyone you can recognize—now?

of such police or other law enforcement Communication services, stations, or technical shops thereof. The Active member of this Corporation shall be entitled to any and all rights, preferences, and privileges set forth in the Constitution and By-Laws of this Corporation, or may be set forth in such articles in the future. Active members shall receive without additional cost, other than the membership fee, the regular issues of the Bulletin, and such other papers or documents as may be prepared and offered without cost to the membership. Full voting privileges, and the right to hold office upon the directorate of this organization shall also be given the Active member.

ASSOCIATE MEMBERSHIP may be extended to any person who, through association, through manufacturing, sales, or a consulting capacity with the work of Police Communications, though not actually paid for police Communication work by any political sub-division or governmental department within the North American continent or territories of the United States is actively interested in the furthering of the Art. Sole restrictions imposed upon Associate members of this Corporation, other than those imposed in the Constitution and By-Laws, consist of

those which bar the Associate member from VOTING upon questions of policy and administration of the Corporation, and from holding office upon the directorate of either the National Body, or of Chapters hereafter designated by that body.

8. The number of directors of this corporation shall be SIX (6) MEMBERS. (This must be an exact number and cannot be stated in the alternative).

9. The names and addresses of the first board of directors are as follows:

Gerald S. Morris, 3111 Avenue L, New York, New York.

Eugene F. Brown, Iowa Bureau of Investigation, Des Moines, Iowa.

Robert E. Franklin, 1806 Valentine St., Houston, Texas

Frank W. Morrow, 2605 College Ave., Indianapolis, Indiana.

Charles B. McMurphy, 404 E. Merle Court, San Leandro, Calif.

J. Minter Wherritt, HQ. State Patrol, Jefferson City, Mo.

10. The names and post office addresses of the incorporators are as follows:

Frank W. Morrow, 2605 College Ave., Indpls, Indiana.

Arnet A. Curry, 3845 Byram Ave., Indpls., Indiana.

Ray Shigley, Jr., 4021 N. Tacoma

(Continued on Page 58)

A PRODUCTIVE HISTORY

(Continued from Page 51)

the stuff, we anticipated quick delivery. But it did not come. After a long wait, we finally called only to be told that Arizona sand had been Arizona mud for several days due to an unusually rainy season.

Ultimately, however, we did get our sand and indeed its powdery consistency (unlike ordinary granular sand) did foul up our switches. This led to improvements in the switch design that eliminated the

PUBLIC SAFETY BEAT

(Continued from Page 20)

found that the needs of the Land Mobile Radio Services could not be met under the existing allocations. To solve this problem, the Advisory Committee for the Land Mobile Radio Services was created.

Of the various user groups participating, only APCO had two members on the Executive Committee. After more than three years of work, the Committee found that only assignment of additional radio spectrum would provide relief in the quantity required. Finally, on July 17, 1968, the Commission responded by bringing forth Dockets 18261 and 18262. For a year and a half the storm of paper continued. Then before a packed house and all seven Commissioners, two days of Oral Argument took place on January 22 and 23, 1970. Quoting Counsel Kittner: "According to the trade press, or any other standard, APCO gave an outstanding performance. It is clear from the Report and Order that an enormously effective job was done in the oral hearings.

"We cooperated with IACP, the Department of Justice through the LEAA. At the time of the Oral Argument, the Phase II Report was placed on the desks of the Commissioners and it seems sort of strange that for the first time, APCO was in a powerful position to say what it really needed."

One last thought: APCO has come a long way!

Ω

problem. To this day, we get regular shipments of Arizona sand to use in our "standstorm" test chamber, for it is indeed the toughest sand in the country.

Since this article up to now has been totally dedicated to ways Shure-APCO cooperation has helped advance two-way communications, let me conclude it with a recollection of the part APCO played in the development of a product seldom associated with the safety communications field. It's the Shure microphone mixer, one of the most successful products we have ever marketed.

How was APCO involved in its development? As everyone knows, for years Chuck McCabe and myself have assumed the responsibility for setting up multiple microphones for APCO conferences in hotels across the country. In most cases, the hotels completely lacked the facilities for conveniently using multiple microphones. After a particularly trying bout with the sound system for the 1966 convention in Seattle, we were struck by the need for a compact microphone mixer for

use in just that type of situation, as well as dozens of other applications. The next year the Shure microphone mixer was introduced.

Hopefully, next year, and the year after, and for many years to come, the association between Shure and APCO will continue to be as mutually productive as it has been in the past. From our side of this friendly relationship, I can say that our involvement in the safety communications field, through our association with APCO, will continue to be stronger than any other microphone manufacturer. It is a position of leadership we have always enjoyed, and we have no plans to relinquish it.

To maintain this position, however, we know we must also maintain our welcome within the ranks of APCO. Since this welcome has been established on a strong foundation of Shure interest in the problems of APCO members, we sincerely hope you all will continue to consult us with these problems. And thus the productive history of Shure-APCO cooperation will go on.

Ω

NEW Signal Generator Capability



The new "A" model of the Lampkin DIGITAL FREQUENCY METER / SYNTHESIZER / SIGNAL GENERATOR has FM-modulation capability. Now — AM modulation, or FM modulation, from variable-frequency internal AF generator (50 to 3000 Hz), or from external source, at option.

- ☆ Range 10 KHz to 500 MHz.
- ☆ Frequency Readout on Digital Dials.
- ☆ Accuracy: better than 0.0001%, self contained.
- ☆ Power Supply: 115 V AC or 12 V DC, at option.
- ☆ Weight only 22 pounds.
- ☆ All solid state. Price \$2,390.00
- ☆ Write, wire, or phone — NOW

Name
Address
City State Zip

LAMPKIN LABORATORIES, INC.
Rt. 1, Bradenton, Florida 33505

(Continued from Page 56)

Ave., Indpls., Indiana.
Zellon R. Audritsh, 3218 Guion
Road, Indpls., Indiana.

11. A statement of the property and an estimate of the value thereof, to be taken over by this corporation at or upon its incorporation: The Associated Police Communication Officers, Incorporated will take over, upon its incorporation, no property of value other than such value as may be adjudged accumulated through the maintenance of the files, lists, papers, records, and the good will of

Communication Officers, with changes and amendments as provided for by the last (1938) Annual Convention thereof.

Principal among those changes and amendments is the provision of an order to the present Executive Board (Board of Directors) mandating the carrying out of the decision to Incorporate this organization.

Extract: Minutes of Convention —APCO at Houston, Texas, Oct., 1938. It is, therefore, the expressed will and desire of this body, that the Secretary, together with those whom he shall designate, be, and same are hereby instructed, to proceed immediately, or so quickly as

a fashion, what with all the terrific ignition noise, wheel static, etc.

This system was in operation through the World War II years and following the war, when the new FM gear was being put into production, the City of Valparaiso placed an order for a base station and several mobiles. Porter County Sheriff department also split the cost of the base station fifty-fifty with the City. (This joint ownership was about the last to exist in Indiana, each buying separate systems within the last two or three years). The original application, with the City of Valparaiso as licensee of the base station, was filed in 1947 for a base and mobile frequency pair with an additional frequency of 155.37 mcs for point-to-point communications or inter-city.

At this time Mr. Zellon Audritsh, who was in charge of the Indiana State Police radio communications system, was also very active in APCO and doing much of the work on R&R Part 10 for the FCC as a consultant. It was on Zellon's advice that Valparaiso apply for 155.37 mcs so that it could be forced through as a test case to try to break the ICC ruling that no point-to-point radio licenses could be issued by the FCC *IF* telephone lines were available to the cities wishing to be contacted.

City of Valparaiso was the seventeenth application to be filed with the FCC for operation on 155.37 mcs, the previous sixteen having been flatly denied. Eventually a license was received authorizing the base/mobile frequency pair but "operation on intersystem frequency of 155.37 mcs denied . . . etc." Mr. Patton immediately telephoned this information to Zellon in Indianapolis. Zellon advised he would be in town in two hours and on his arrival sent a telegram to the FCC, under Mr. Elden Kuehl's, mayor of Valparaiso, signature to the effect that "license for City of Valparaiso Police radio system received this date. City of Valparaiso is using the intersystem frequency of 155.37 mcs. in defiance of the no-operation order. What is FCC going to do about it?"

Obviously, Zellon had laid the

(Continued on Page 60)



Army Experts Study FM Radio System, Inspection of Link Equipment, Connecticut State Police, Oct. 1940

the Associated Police Communication Officers organization.

There is no real estate, furniture, office equipment, or other property owned or belonging to the said Associated Police Communication Officers, and the Corporation will start from the point of its incorporation with no property other than that mentioned in the paragraph above.

12. Any other provisions, consistent with the laws of this state, for the regulation and conduct of the affairs of this corporation, and creating, defining, limiting or regulating the powers of this corporation, of the directors or of the members or any class or classes of members:

At the time of its incorporation there exist no regulations or provisions relative to the conduct of affairs of the Corporation other than those in the Constitution and By-Laws of the Associated Police

possible with the task of bringing about the incorporation of the incorporation of the Associated Police Communication Officers under the laws of the State of Indiana.

By D. Eugene Wiggins
Faculty
Valparaiso Technical Institute
Valparaiso, Indiana

In the late 30's the City of Valparaiso, Indiana, installed its first two-way police radio system under the direction of Mr. R. Clويد Patton, staff member of Valparaiso Technical Institute. This was the somewhat conventional system of those days; base station talk-out on 2490 kcs and mobile talk-out on 30.58 mcs, all AM of course. As we look back on it now it was a rather crude setup but it did function after

FROM THE PRESIDENT'S DESK

(Continued from Page 53)

are able to make the chapter meetings, and consequently would find these video tape recordings very interesting.

I urge all chapter officials to make arrangements for one or more of the video tapes to be reviewed at your chapter meetings. After reviewing the tapes, I would ask that you then contact us to let us know if it is a worthy project to continue on or not. Let's not let the project die without giving it a chance.

Along the line of trying to be more responsive to the different areas of interest of our members, I am asking BULLETIN Editor Rhett McMillian to start placing articles in each BULLETIN issue that would be of interest to the dispatcher/operator, the engineer/technician, and the manager/supervisor. Rhett has agreed to do this, but he says that he really doesn't get this many articles for publication to permit him to do so. I am calling upon each member to help Rhett out by sending him articles in your particular area of interest. We know that almost each operation is unique in some way. Yes . . . we know that the general characteristics of each operation may fit a certain category, but there are some things about the operation that make it unique from others. The same holds true for the equipment and system techniques for those of you involved in the technical side of the picture. Why not prepare a short article about these and send the article to Rhett for publication. We want to have more and different kinds of articles for your interest and approval, but you must help us get them.

A resolution was passed at our last National Conference (Resolution #3) which requires that all chapter annual reports be submitted in writing to the National Conference in the future. There will not be time on the conference program for the reading or giving of chapter reports. I wish to take this idea one step further and require that some committee reports be made in writing as well as the

(Continued on Page 65)

ANNUAL CONFERENCE EXHIBIT INFORMATION

Richard (Dick) Moore, Chairman of the 37th Annual APCO Conference, to be held at the Hilton Hotel, San Francisco, California, August 9-12, 1971, has furnished the BULLETIN this latest list of exhibiting manufacturers and services who will show at the 1971 Conference.

Booths are reserved on a first come first served basis. Those who have not as yet made booth reservations are urged to write to Exhibit Chairman D. (Don) W. Ridenhour, 4830 Cameror Ranch Drive, Sacramento, California 95841, telephone number 916/443-0649.

Firm	Booth(s)
Secode Electronics	1
Rohn Manufacturing Company	2
The Singer Company	3
Pace Incorporated	4
Granger Associates	5
Net-Tronics Corporation	6
Speedcall Corporation	7
Teletype Corporation	8-9
Sonar Radio Corporation	10
Tri-Ex Tower Corporation	11
Bell & Howell Comm. Co.	12-13
Xerox Corporation	14-15
Traffic Electronic Co.	16
Dynacoustics, Inc.	17
Stanford Research Institute	18
Motorola C & E Inc.	19
Automatic Electric Company	20
Microwave Associates	21
Noller Control Systems, Inc.	22
Phelps Dodge Comm. Co.	23
The Hallicrafters Company	24
ITT/Telecommunications	25-26
Farinon Electric	27
Hammarlund Mfg. Co.	28-29
Ground/Data Corporation	30
Magnasynce/Moviola Corp.	31
General Electric Company	32-33-34
Technical Prod. Eng. Co.	35-36
American T. & T. Co.	37-38-39
R. J. Comm. Products, Inc.	40
Cushman Electronics, Inc.	41
Aerotron, Inc.	42
Shure Bros., Inc.	43
RCA Corporation	44-45-46-47
The Antenna Specialists Co.	48
Technical Comm. Corp.	49
Dictaphone Corporation	50
Motorola C & E Inc.	51-52-53-54
Decibel Products, Inc.	55
Plectron Corporation	56
Public Systems, Inc.	57
Diamond Power Spec. Corp.	58
Prodelin, Inc.	59
Cardion Electronics	60
Standard Communications	61
Federal Sign & Signal Corp.	62-63
Sylvania Sociosystems Lab.	64-65
Gates Acoustinet, Inc.	66
Comset Corporation	67
E. F. Johnson Company	68-69-70
Vega Electronics	Unassigned
Alpha Electronic Services	Unassigned

COMMUNICATIONS-ELECTRONICS CONSULTANTS AND SYSTEMS ANALYSTS

A SCIENTIFIC BUT PRACTICAL APPROACH TO POLICE COMMUNICATIONS AND INFORMATION SYSTEMS PROBLEMS

Specializing in:

- COMMUNICATION REQUIREMENTS ANALYSES
- SITE SURVEYS
- LAW ENFORCEMENT INFORMATION SYSTEMS
- POLICE CAR LOCATOR SYSTEM DESIGNS
- TECHNICAL EVALUATIONS
- SYSTEM DESIGNS FOR COMMUNICATIONS
COMMAND AND CONTROL
- OPERATIONS RESEARCH ANALYSIS

CAPITAL SCIENTIFIC CORPORATION

2629 Connecticut Avenue, N.W.
Washington, D.C. 20008
202 667-2833

(Continued from Page 58)

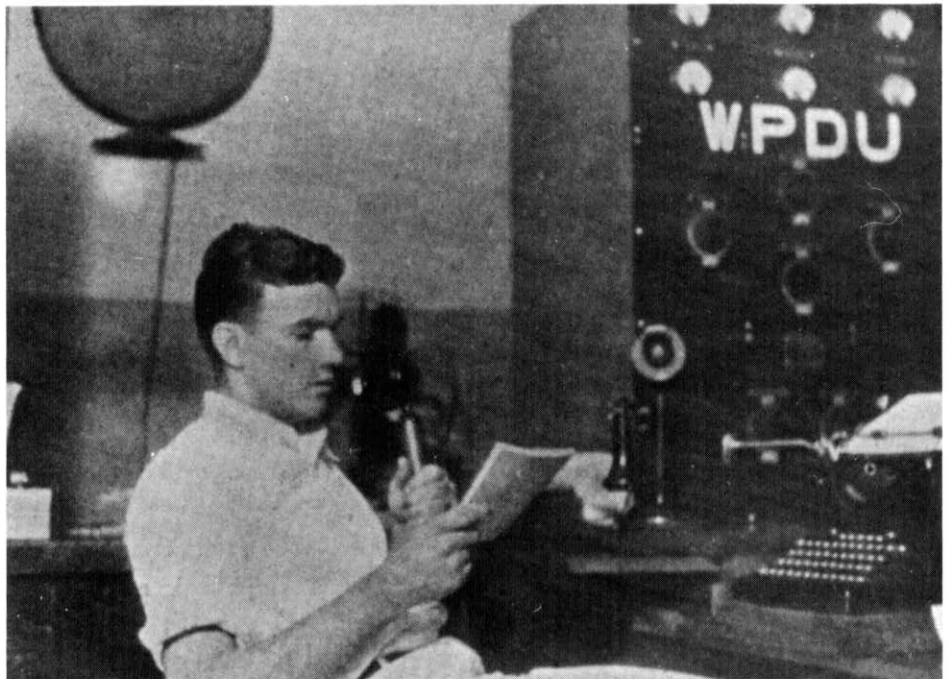
groundwork for this telegram in advance and it was "being awaited" by the FCC. Within a short time after sending the telegram, Zellon's office in Indianapolis advised that he was to return a telephone call to FCC, Washington. He called them and was asked how soon he could be in Washington. He left within a few days and was in conferences, hearings, etc., involving the FCC and ICC and the result of this was that the ICC ruling was overthrown and FCC was permitted to issue licenses in ICON, regardless of whether telephone wire service was also available or not.

City of Valparaiso, as all other licensees, then received authorization for use of 155.37 mcs, the national police intersystem frequency.

Dear Rhett:

Speaking of the frequency shortage —

"Requests have been received by the Commission for authority to establish two-way communication between police headquarters and police cars. While there may be some merit in these proposals, the Commission nevertheless does not have an ample supply of frequencies to permit the granting of applications to all who might make a satisfactory showing and it would be inconsistent to grant facilities to one applicant unless the same privileges could be granted to others. The officer's duty is to go where he is sent and when through to phone back to headquarters. If he is in trouble, a transmitter in his car would probably not be any more useful than the telephone at the corner store. Moreover, it is pointed out that the usual practice in the handling of messages between police headquarters and patrol cars is to transmit test messages at regular intervals. The officers in the patrol cars then know that the test messages should be received at these regular times and should they not hear the message, they are instructed to report immediately to the operator in charge of the station in order that a service car may be sent to investigate the difficulty. As a result of this



William M. Gamble, Operator, Radio Station WPDU, Pittsburgh, Pa., 1927 Look at that black hair on our Past President/Secretary-Treasurer.

procedure, a reliable system of communication has been worked out. In the event that someone at police headquarters should desire to talk personally to an officer on duty regarding a special emergency, an announcement could be made directing him to telephone to headquarters. This is now done in most cities and has proven to be a fast service."

The above is quoted from Public Notice 8026, dated February 15, 1933, and issued by the Federal Radio Commission. This Public Notice is entitled, "Police Radio Service" and gives the Commission's views on the service as of that time. It shows that things don't change very much over a period of time. The problem then was the frequency shortage as it is now. At that time, the Commission found it possible to allocate only eight frequencies to the Police Radio Service.

John McCormick
General Electric Co.

**POLICE RADIO
HISTORICAL SYNOPSIS**

1—1877 First Telephone for Police — Albany, New York — five phones from Mayor's Office to Precinct Stations. There were no switchboards at this time. This was two years after Alex-

ander Graham Bell developed the telephone.

- 2—1880 First Police Call Box — Chicago, Illinois—same as Indianapolis used until 1955, when switched to telephone type box.
- 3—1883 Detroit, Michigan P.D. installed one police telephone when there were only seven telephones in the entire city.
- 4—1905 Los Angeles, first light signal to contact walking officer.
- 5—1910 Teletype—similar to your typewriter but it places the message on different machines either all receiving or a combination of both sending and receiving.
- 6—1916 Telegraph—New York City — Harbor Police using WPY Spark Transmitters.
- 7—1921 Detroit Police obtained first license KOP for broadcast —discontinued 1922. Entertainers were asked to come to Police Headquarters and get on the air to fill in the time between police messages. This was abandoned in 1922 because of the lack of police messages and the shortage of entertainers.
- 8—1923 Pennsylvania S. P. used telegraph for point-to-point be

(Continued on Page 65)

R.C.A. POLICE RADIOS

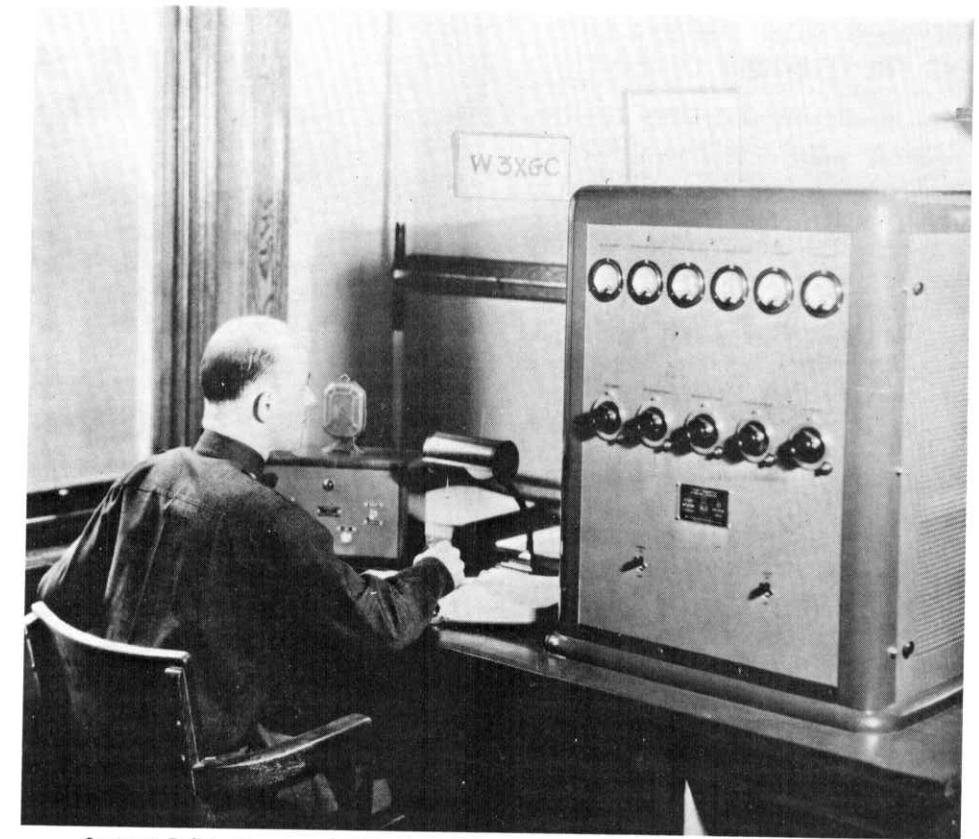
(Continued from Page 32)

them down to earth with a fine display of marksmanship.

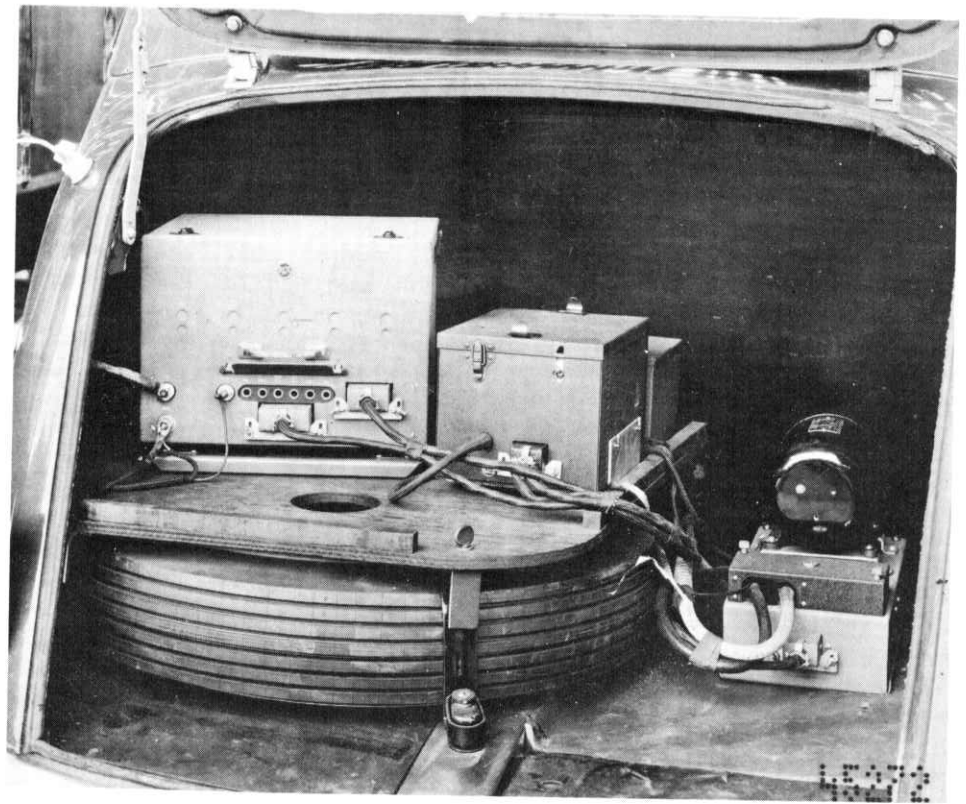
In 1935, an RCA advertisement announced the advent of two-way radio communications with the headline, "RCA Makes Another Great Contribution to Crime Control — Adds 2-Way Communication to Terra-Wave Police Radio System." Current users of RCA Terra-Wave Receivers (that's what we called them) could add a 25 watt mobile transmitter to their system and presto — two way radio communications for the police service! The transmitter, the ET - 5022, weighed in at a hefty 60 pounds and took up most of the trunk. But it was reliable. So reliable, in fact, that some users said the only way it could be put off the air was for it to be damaged in a major collision.

And what did the future hold for radio communications in the police service? Well, in 1936, David Sarnoff, then President of Radio Corporation of America, (today, General Sarnoff is Honorary Chairman, RCA Corporation), said, "No one knows what further protection to life and property the ingenuity of radio engineers will offer society in the future. Perhaps the next step will be to equip each patrolman with a small, short-range radio transmitter by which he can instantly send an alarm or call the nearest station for help. Again it may be the adaptation of one or more of the functions of television to record evidence during the actual commission of a crime."

Today, both of these visionary concepts have been achieved. Police officers are being equipped with radios so that vital communications can be maintained when the officer leaves his car and when the foot patrolman pounds his lonely beat. Closed circuit television keeps a watchful eye on warehouses, loading docks and secured areas in industry. Police departments are effectively using it for surveillance, line-ups and in training programs. The use of electronic computers for storage, quick retrieval and display of stolen car data, criminal records, etc., is still another com-



Scranton Police Department RCA dispatch center. Believed to be in use around 1937.



After all the RCA radio gear was installed in this Haddonfield, N. J. police car, there was just enough room to squeeze in a spare tire. (1937).

munications equipment extension that is becoming commonplace in today's modern police department.

Just 41 years ago it started. RCA was there! We're still here!

We're pretty darn proud of the part we have played in police radio communications — and we're well into our communications planning for the second 41 years. Ω

THE GOOD GUYS, THE BAD GUYS, AND THE TELEPHONE COMPANY

(Continued from Page 16)

scene. In most major cities by the Gay Nineties this figure dropped to about ten minutes.

Around the turn of the century the telephone company introduced a unique switching capability, officially referred to as the "#4 Police Special." This further speeded communications and shortened the response time. Over seventy years later response time is now down to several minutes.

It's interesting to note, those early day police phones were rudimentary affairs, frequently operated by hand crank, housed in heavy cast iron booths while in contrast sometimes a few feet away from the



Early model Western Electric phone booth of gay nineties featured wood paneling, a writing desk, carpeting, silk curtains and soundproofing. An attendant collected the charges.

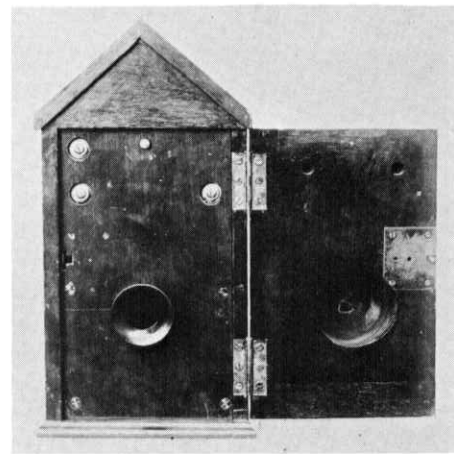
purely functional and unattractive police telephone, often located in the splendiferous lobby of a major hotel, would stand a ten-foot high mahogany panelled edifice, positively Oriental in its opulence, comfort, and architectural gaudiness. This structure, the high-class public booth of its day, measured about 10 feet on a side, had six stained glass windows, two doors, one thick, ornate rug, a desk, two chairs, silk curtains, and of course the telephone. The policeman, outside on the beat might have suffered a frost bitten ear from his frozen iron receiver while the hotel guest chatted comfortably in his temporary telephone chateau.

In June, 1899, Fire Chief Hale of

Kansas City and an electrician for the local phone company got together and patented a battery-operated contraption that "automatically Transmits the Human Voice in Loud Clear and Distinct Tones. It is a Combination of a Telephone, a Telegraph, a Phonograph and Thermostats." Hale and Haldeman, his electrical pal, actually sold \$5,000 worth of stock to a New York syndicate. The first installation was in an Armour meat processing plant in New York City. The idea was this: Hale engineers strung the six-story plant with ceiling wires attached to thermostats that sensed radical changes in temperature. When the temperature changed, a circuit closed and a phonograph record in the basement began turning, sending a recorded voice fire alarm to both police headquarters and the fire department. Accompanied by a flashing red light at headquarters, a doomsday voice would intone "There is a fire in the sixth-floor rendering room of the Armour plant on Dey Street." Firemen and police dashed to the scene within minutes prepared to fight a hot, spluttering oil-fed fire.

In the nature of things, the Hale company failed. Fires in filing cabinets were reported as butcher shop emergencies, sometimes the thermostat worked and the recording didn't and nobody knew whether there was a fire or not. What was worse, with changes in the seasons, the thermostats reported many fires that weren't there at all. And finally, as more companies like Armour plugged into the system, transmitting wires got crossed and tangled and fires that existed in one place were reported as taking place someplace else. One day the system went totally berserk and everybody in the network was reported as having fires on all floors at once. As firemen and police shot off in all directions, there were some real fires in which a number of structures were burned to the ground. Shortly after this debacle, Hale went out of business.

Interestingly enough, the Hale idea has been refined in the past few years by the Bell System, in the form of an alarm reporting telephone. The ART operates successfully, notifying control centers



Fire alarm in call box developed by Mr. Watson and installed in the City of Boston, Mass., 1877.

of warehouses, schools and remote equipment locations needing attention.

After the telephone itself, the next major advance in communications technology of direct crime control benefit was the teletypewriter that began coming into limited use in 1916 and more generally in the mid-twenties. In 1929, the first state-wide police teletypewriter system went into operation in Pennsylvania. In 1930, New Jersey started a similar system. In 1931, there was a 7,000 mile hook-up involving 12 states, a Canadian province and 15 major cities stretching from New York to the Pacific coast, a forerunner of today's "LETS."

Most police teletypewriters were set up on a private line basis in the early thirties. But in 1935, the FBI took a giant step forward when it inaugurated one of the first law enforcement Teletypewriter Exchange Services in cooperation with Bell System. The FBI system consisted of 36 teletypewriter centers located in FBI district offices coast-to-coast. Vast publicity was given to the fact that Washington Headquarters had four machines and there were two each in Chicago, Philadelphia, and New York.

By the early thirties, the bad guys were faced with another new communications threat . . . Police Radio. This new service began as a primitive one-way system in which headquarters could notify outlying points. Rudimentary as it was, the combination of police radio, teletypewriter and the telephone proved

the undoing of many an evildoer. The Robert J. Mahoney case in 1934 received wide press coverage and provided an important shot in the arm for high speed police communications generally.

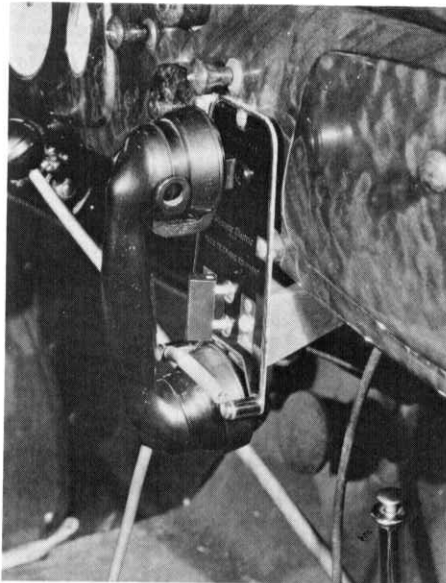
Mahoney, a small-timer, and three companions broke into a jewelry shop in Beacon, New York. The police were waiting, having been tipped by telephone, and captured one of the thieves. The other three escaped by car. Headquarters notified Fishkill, N. Y. and other nearby towns by teletypewriter to be on the lookout and before the fleeing bandits had reached Yonkers, every good guy was watching for them.

One more robber was caught in Westchester county, the other two commandeered a passing taxicab and were finally captured in New York City after a shootout in the city streets. A newspaper account of the next day said, referring to Mahoney, "A bullet killed him, but radio teletype and the telephone had already killed him."

The next, significant breakthrough in law enforcement communications occurred with the introduction of . . . two-way police radio.

During 1921, The Bell System and the Detroit Police Department began experimenting with two-way radio, however, it didn't catch on as a backbone operation until the city of Evansville, Indiana, installed a Western Electric two-way system in 1935. Before the year was out more than 90 other towns and cities added the capability and two-way radio in public safety was off and running.

Possibly the biggest boost to two-way police radio came from Michael P. Duffy, Director of Public Safety for the city of Newark, New Jersey. Duffy installed radios in most



Police radio telephone equipment No. 23A Control Unit, manufactured by Western Electric for the Bell System, September 12, 1935.

Newark patrol cars and formed a radio division, one of the first in the country. This technical advance proved to be a mixed blessing. For while crime decreased and the number of arrests increased, a number of policemen were thrown out of work. According to the Newark Ledger in 1935 "The radio division has made 849 arrests, extinguished 55 fires, saved more than 40 lives and recovered stolen property valued at \$115,002.

"In 1931 there were 110 more men in the police department than there are today. Radio made it unnecessary to replace them upon retiremen. Figuring on a base pay of \$2,300, saving of their salaries means more than \$250,000 in the annual running expense of the police division.

"In addition Duffy was able, due to the wide range that one car can handle, to abandon four police precincts." These properties, Duffy goes on to say, can be later sold

and provide taxes to the community.

Duffy's testimony, coupled with Evansville's statistics . . . crime down 17 per cent, arrests up 60 per cent . . . in the first five months of two-way radio operation effectively sold the system to the police forces of the nation. The early days of communications assistance to public safety now seem funny and old fashioned.

The telephone companies around the country have a long and dramatic history of participation in matters of public safety from these early efforts through emergency reporting system in towns and along highways to centrex. Traffic and manpower management systems, to 911.

Today the Bell System and many other firms in the electronics field are working on such things as new tiny chip circuitry, computers, high speed switching equipment, laser and waveguide transmission systems. The continued perfection of which hold real promise that in the near future we can expect present day methods to appear just as quaint and amusing as the very first systems. Ω

San Mateo County, Calif.—Supervising Communications Technician. Salary Range: \$958-1198. To supervise a technical work force involved in the installation and maintenance of base and mobile public safety communications equipment, microwave including VHF control, telephone and frequency shift multiplex equipment, teletypewriter, computer interface and peripheral devices. Will have supervisory responsibilities over a ten man work force. Requires: Possession of at least a FCC issued 2nd class Radio Telephone Operators License. High School graduation and 5 years of full-time paid experience in radio communications equipment maintenance and repair work. Experience must have included the installation and maintenance of microwave equipment, as well as base station and mobile low, high, and ultra-high frequency radio telephone receivers and transmitters. Apply by April 1, 1971 to: San Mateo County Civil Service Commission, County Government Center, Redwood City, California 94063.



Communications Engineering

- Requirements Analysis
- System Design
- Specifications
- Acceptance Tests

GAUTNEY & JONES COMMUNICATIONS, INC. .

2922 TELESTAR COURT, FALLS CHURCH, VIRGINIA 22042

703 - 560 - 6800

CHAPTER MEETINGS

MICHIGAN ANNUAL REPORT, 1970 FRANKENMUTH, MICHIGAN

President *Mitchell* opened the meeting with 62 in attendance. He then called for introduction of members and their guests. The Chapter was honored with four past National Presidents: *Edwin Denstaedt*, *Frank Campbell*, *Walter Williams* and *James Evans*.

Secretary's minutes of previous meeting read and approved. The Treasury report was then read, and also approved. The Secretary then read a letter from President *Flood* to the Secretary and also one to the elected incoming President *Albert Thomas*. President *Mitchell* then took up the way the member of the Chapter to the National Executive Committee is handled. The Secretary was instructed to investigate the method used. The President then appointed the Election Committee to count the ballots. *Jim Evans* mentioned that anyone who wanted copies of the Kelly report, that he had copies. *Jim* gave a report on Major *Quantz*' National Research Committee. This concerns several things, including a letter from Mr. *John Simmons* regarding monetary incentive for the Chapters to host the National Conference. Mr. *Evans* gave a full report on this and a date of November 10th was set for the Chapter Executive Committee to meet in Lansing and discuss this matter.

The President then commented on the excellent reports that the Chapters have been receiving from our National President. The reports indicate that the work that he has been doing at the various Chapter meetings that he attended. This is costing money but the Chapter feels that it is money well spent.

The Membership Committee reports two applications for membership; namely *Vance Weber* and *John Wilder*. It is an honor to say that they were accepted. *Dave Wise* then gave a report on the Seminar held in South Bend, Indiana. He reported he brought some very useful information back that will be incorporated in our Chapter Seminar. An interesting Seminar—and Mr. *Wise* stated that he learned some interesting things. The Frequency and Technical Committee report by *Edwin Denstaedt* stated that the Kelly Report is holding up the Advisory Committee, particularly in the 450 MHz range. The committee has held up the allocations until they get a report on the Kelly Study report. A discussion followed on this report.

The other committee reports were called for and reports were given.

Mr. *Frank Campbell* of Indianapolis was now introduced to give information as to the accomplishments being made in Project 3. *Frank* stated in January he resubmitted an application to LEAA to end Project 3 Phase Three that *Otto Rhodes* had designed. *Frank* gave a very interesting and informative report on this.

Following *Frank Campbell*, Motorola was called upon to show their new Low Level closed circuit television system. Great detail

was given in a very informative demonstration with two TV Monitors and Cameras. Following the TV demonstration, Motorola also showed their Mav-Pak schooling instructive program, using slides.

Next on the agenda was the call for meeting places for 1971. They are as follows: January 21, Royal Oak; March 18, Lansing; May 20, Muskegon; July 15, at Deckerville; September 16, Livonia; October 28, Frankenmuth.

At 6:15 p.m. a move to adjourn was made by *Pat Petten*, seconded by *Stan Steigman*.

Following the regular meeting, the usual Frankenmuth dinner was served, with Motorola as host. After dinner, President *Mitchell* introduced the officers for 1971 as follows: President, *Albert Thomas*; First Vice-President, *John Strubank*; Second Vice-President, *Russell Robinson*; Secretary-Treasurer, *Harold C. Bird*; Sergeant at Arms, *Patrick Patten*. President *Mitchell* then thanked everyone for the cooperation for this past year. Annual meeting adjourned. *Harold C. Bird*
Secretary-Treasurer

NORTHWEST CHAPTER AT OREGON CITY, OREGON NOVEMBER 18, 1970

Thirty-four members and guests attended the November meeting of Northwest Chapter of APCO which was called to order by President *Bob O'Brien* at Rider's Cafe, Oregon City, Oregon, at 3:35 p.m. Wednesday, November 18th.

Following the usual self-introductions of members and guests, President *O'Brien* appointed a Tally Committee to count the ratification ballots for the proposed change to the Chapter C & B in the amending procedure. *Ralph Murphy* was appointed as Chairman, with *Dave Graham* and *Bill Smith* to serve on his committee. The Tally Committee then retired to count the ballots.

Art Cameron gave a report on the activities of the Frequency-Advisory Committee. He stated there is a continuing demand for channels. *Art* advised that thus far his committee has not received any official applications and it was suggested that perhaps the committee look into the possibility of recommending use of area block-grants with a number of small cities to shape among themselves by agreement the number of channels they desired. The alternative is to recommend issuance of channels on an individual entity basis.

Lieut. *Howard Cushner* from Lane County gave the reasons his group is requesting a clearance for ten channels. Basically, he felt that the ten channels were required in their future planning. He said they presently have serious problems of jammed channels due to circuit-overloading. President *O'Brien* commented that although the committee would like to recommend to any applicant the total number of channels they ask for, that is impossible due to the limited number of available frequencies.

The Tally Committee then returned its

report on the balloting for the proposed C & B amending procedures. There were a total of 69 ballots returned; 55 were required to ratify the proposed amendment. Of those voting, 61 voted in favor of streamlining our amendment procedure and 8 voted against. The proposed amendment therefore was passed.

Dyer Downing read a proposed Resolution to the Chapter to raise dues of all classes of members by \$2.50 per year. This Resolution was drafted by Secretary-Treasurer *Levinson* and presented to the Executive and Resolutions Committees, which both approved it with a "do-pass" recommendation.

Ray Mayhugh moved the Chapter approve the resolution to raise our dues by amending Sections 1 through 4 of By-Laws (Article) #10 of the C & B; Active and Associate Members would pay \$15 per year, Commercial Members would pay \$20 per year, and Governmental Entity Memberships would be rated at \$30 per year for their two Active Memberships. Motion seconded by *Jim Wendt* and passed.

This Resolution will be printed in the December COMMUNICATOR to qualify under terms of our newly-approved revised amendment procedure. The Resolution will then be voted upon at the Chapter meeting in Aberdeen in December before it can become effective.

President *O'Brien* then announced that *John Farris* had agreed to take the Chairmanship of the Eugene Seminar May 18th and 19th.

John asked the Chapter for some ideas as to the nature of the program. He proposed that the Seminar be split into two equal sessions and have one group cover one part of the program on Tuesday while the second group covers the second section at the same time. On Wednesday, he proposed the two groups switch. A proposed program was circulated to the Chapter.

After considerable discussion the Chapter agreed to the idea of a split program. *Ralph Murphy* suggested that the Eugene Seminar Committee be left a free hand to run the Seminar program; to design the program they felt would be best.

Ralph Murphy and *Al Hull* stated they would serve with *Farris* on the Eugene Seminar Committee. *Murphy* advised it was planned to get accreditation again this year from the Oregon State Board of Police Standards and Training.

The Active Member application of *George R. Doak*, Mason County Civil Defense Director, Shelton, Washington, as recommended by *Don Ashley*, with 1970 dues paid, as approved by the Executive Committee, was presented to the Chapter. Application passed.

The Active Member application of *John T. Dolan*, Law Enforcement Planner of Oregon District #4, Corvallis, Oregon, as recommended by *Ray Mayhugh*, with his 1970 dues paid, as approved by the Executive Committee, was presented to the Chapter. *John*, who takes office as Benton County

(Continued on Page 79)

IN THE BEGINNING -- --

(Continued from Page 60)

- tween posts on 250 KC.
 9—1928 April 7th, Detroit WCK full-time basis — one-way receive only.
 10—1929 September, Cleveland P.D.—Second system to go on the air.
 11—1929 December 24th, Indianapolis on the air. Third city to go on the air.

FROM THE PRESIDENT'S DESK

(Continued from Page 59)

chapter reports. In addition, I ask all Chapter Secretary - Treasurers, all Standing Committee Chairmen, and all Special Committee Chairmen to prepare final committee reports for inclusion in the August Conference issue of the APCO BULLETIN. The Conference Issue is normally the BULLETIN Issue that comes out just prior to our National Conference. This means that copies of the final reports should go to BULLETIN Editor Rhett McMillian and me by June 10th at the latest. We must have the reports set up for printing by not later than July 1st. Please help us make this idea a good workable one.

By getting the chapter and committee annual reports published in the BULLETIN, it will be possible for all of us to study the reports. Then, if there are any questions or comments concerning the chapter or committee activities, we will have ample time to explore and discuss them. This will also be a pretty swell way of letting all of the members know what each chapter has been doing, and what accomplishments each committee has been able to make. This is your APCO! We want you to know as much as possible about it!

Ω

COMMUNICATIONS CONSULTANTS

LEO G. SANDS ASSOCIATES, INC.
 250 Park Ave., New York City
 212/697-0235

- 12—1930 Michigan S.P. on 1642 KC.
 13—1931 Indianapolis P.D. — 32 solo cycles equipped on 2442 KC with Mallory vibrator packs.
 14—1933 Bayonne, New Jersey P.D.—First 2-way system, 4 cars.
 15—1934 Two-way radio started—several cities all started at the same time — mobile transmitters so the officer could talk back to the dispatcher—difference between one and two-way.
 16—1934 FCC created as a result of Communications Act of 1934 —replacing Federal Radio Commission.
 17—1935 APCO Organized.
 18—1936 Police telegraph network between cities — Indianapolis, Buffalo, Detroit, St. Louis — TV1 from Purdue—still a large system today.
 19—1939 FM radios appeared, invented by Dr. Dan Noble at MIT—first used on Connecticut State Police, equipment furnished by Link.
 20—1953 Television — Houston,

Texas — new \$250,000 police radio station, television to view the jail cells—eliminates jail help — one man can see more.

- 21—1955 Wisconsin—Microwave — sending by means of high frequency radio, telephone, facsimile, radio and teletype signals all over a single piece of radio equipment and all at the same time.
 22—1957 Facsimile—Indiana State Police.
 23—Bernard Fitzgerald world's first police radio operator.
 24—Robert L. Batts, builder of first successful police receiver.
 25—Indianapolis Police radio system first to use cavities.
 26—Connecticut State Police use first radio equipped helicopter for traffic work (1947).
 27—Anderson, Indiana first to use 154 mc band (1946).
 28—William E. Rutledge proclaimed "Father of Police Radio" (1946).
 29—APCO TEN SIGNALS go into effect (1940).

Ω

AUTOMATIC DC to AC CONVERTER

Starts by itself!



Runs From Batteries!

PROVIDES STAND-BY POWER FOR EMERGENCY SERVICE

Don't live in fear of power failures! Have instant emergency standby power from this Carter DC to AC converter. Runs on storage batteries or other D-C. Delivers 115 v. or 230 v. 60 cycle AC. 750 watt capacity. Starts automatically if normal AC fails, takes over instantly until line power is restored.

STARTS EVERY TIME

These compact converters offer unquestioned reliability as emergency power supply for paging systems, intercoms, telephone, standby lighting and other services in hospitals, schools, institutions, mines, industrial plants. Not affected by transients, sudden overload, input voltage variation. Weight only 59 pounds. Size approx. 14" x 6¾" x 7¼".

WRITE FOR CATALOG of complete line DC to AC converters, 20 to 2000 watt capacity. Use letterhead for special attention.



Carter Motor

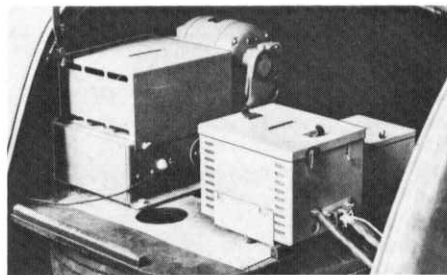
CARTER MOTOR CO.
 2700 W. George St. Ph: (312) 588-7700
 CHICAGO, ILLINOIS 60618

FROM HERTZ TO MEGA HERTZ

(Continued from Page 26)

Electra in New York Harbor one afternoon I was stopped by one of the sailors. Then I was taken to the ship's captain, who wanted to take my two tubes. I told him that I must get a receipt from Marconi himself. After a few minutes' argument, I was taken below to Marconi's large room. He was at once interested in the tube characteristics and the special ways that a water cooled tube must be handled. Such things interested Marconi and I found his rather formal British mannerism soften to one of warmth.

"Most people think of Marconi as an Italian. His father was an



G-E police radio equipment installed in rear trunk of Ford 1938 automobile. View shows, from left to right, model 4G1B1. 15-watt ultra-high-frequency transmitter. 1938. (Fig. 3)

Italian, but his mother was Irish, and her home was in London. His Irish blood gave him light hair and blue eyes. He looked more like a Britisher than an Italian. He spoke perfect English, but with a slight British accent. He wore a monocle, British fashion, over his left eye. He told me he had unfortunately lost the use of his right eye in an automobile accident.

"As I sat talking to this soft-spoken, modest, unassuming man it was hard for me to realize that I was in the presence of the most distinguished Radio Pioneer on earth. Years ago, when I was a boy back in Terre Haute, Indiana, I had read about Marconi's experiments in radio and when I heard my first radio telegraph signals from NAA, little did I think I would ever be sitting before him — this great man of radio. It seemed like a dream.

"I asked him how he first became interested in experimenting with

Wireless, and he said it was largely because as a young man he wanted to do some sort of work that would enable him to travel all over the earth. He told me that he and his mother often traveled from his home in Italy to visit his mother's folks in London. As he crossed France, he saw glacier-clad mountains, rivers, and chateaus with romance, so then he got the urge to travel. He felt, by experimenting with electric waves, he would have a great opportunity to travel to far off lands. He told me he could never be cooped up in an office or a laboratory. This was the reason he used the Electra as a laboratory for his work now.

"He told me some of his problems to transmit messages across the Atlantic. He had several failures using kites and balloons to hold up the receiving antenna. Finally he got a kite to remain up for hours. He listened for hours, without success.

"Suddenly, one day, he heard a faint click, then another, then another — yes, that was it. It was the 'S' signal that had been agreed upon from Cornwall, England. He longed to rush out and tell everyone, for he had realized his dream. He did not do this, he told me, because he feared people would not believe him. He listened for 48 hours and told no one, for he wanted to be sure of the signals he heard. Then he cabled England the news of the transatlantic success. This caused a great sensation. Newspapers on all five continents featured the story. Man had triumphed over space and time. His experiment was destined to change the world."

Marconi's first act on arrival in England was to file for patents on his wireless system. In 1897, a group of wealthy Britains joined him in forming the Marconi Company. With almost unlimited funds behind him, he made rapid progress and in 1900, was granted his famous British patent 7777, filed also in many other countries; this was for many years (17 years only in U.S.) the basic radio patent throughout the world.

A great many scientists in Europe protested the Marconi patent, claiming prior experimentation with various components of the system. The most vociferous of

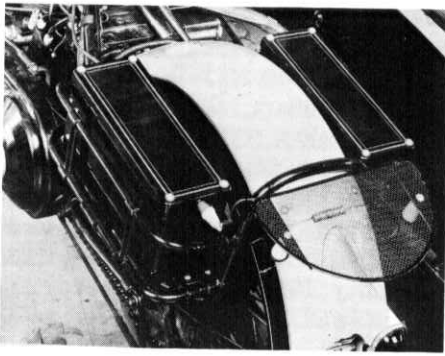
these protesters was the Russian Popoff who did not argue about wireless, but went right to the heart of the matter by claiming that he, and not the German Hertz, had discovered Hertzian waves.

Despite the storm of protest, the Marconi patent was sustained. Thereafter, his maritime wireless company grew rapidly both in England and the United States. The growth was stimulated by the sinking of the Republic in 1904, and the dramatic rescue through wireless of all but six of the passengers and crew. By the beginning of World War I, the American Marconi Company owned about 90% of all commercial stations in the United States, both ship and shore, and was manufacturing practically all of the commercial apparatus made in this country.

While the Marconi Company was making herculean progress, the scientists and inventors in the United States were not inactive. The accomplishments of deForest, Coolidge and Langmuir have been mentioned. Dr. Langmuir's work was paralleled by Dr. Harold D. Arnold of The American Telephone and Telegraph Company, who was trying to apply the audion to coast-to-coast telephony. Fessenden, Armstrong, Alexander and many others made numerous basic inventions. Some of these may have infringed the basic Marconi patents and the Fleming valve patents and no one company, other than Marconi, owned or controlled a sufficient number of patents to put together a wireless system.

When the United States entered World War I, the government cleared the patent roadblock with a guarantee to protect all American companies if they were prosecuted for patent infringements. There followed a few years of great progress. In 1918, the Navy, fearful of the loss of the Atlantic cables, was responsible for the installation of the first 200 kw G. E. Alexander alternator at New Brunswick, New Jersey on about 20,000 meters, or 15 kHz. This demonstrated that transoceanic telegraphy was not only feasible, but reliable as well.

The success of this very low frequency alternator and Ernest F. W. Alexander's multiple-tuned antenna system made a profound im-



G - E ultra - high - frequency motorcycle radio-receiver mounted on Harley-Davidson motorcycle. 1937. (Fig. 5)

pression on Marconi. He had long since delegated the operation of the Marconi companies to subordinates and had been giving almost full-time for 15 years to the development of a practical world-wide radio telegraph system. Despite fantastically expensive and complex antennas, he was successful only in demonstrating that wireless communication over such a great distance was possible. He never succeeded in achieving a system which would provide reliable, world-wide service.

After the war, Marconi, knowing that the alternator was a sure answer to his hopes for a world-wide communication system, proposed to buy from General Electric 24 alternators at a price of \$127,000 each. This was big business and represented an order which the Company was very anxious to book. Before the deal could be consummated, however, Admiral William H. G. Bullard, Director of Naval Communications, heard of the proposal and asked for a meeting with General Electric. He had grave fears about British domination of United States Radio Communications, and suggested that General Electric form a communication company. This was like asking General Electric to establish a company for the generation and distribution of power—in competition with its power company customers. Finally, however, with the promise of the full backing of the Navy Department, it was decided to go ahead. General Electric purchased the American Marconi Company and following this, established the Radio Corporation of America. This gave RCA rights to the basic Marconi patents, the Fleming valve, the tungsten filament, ductile tungsten,

the Langmuir “pure electron discharge tube,” which was then in dispute, the Alexanderson alternator and the Alexanderson antenna.

In the meantime, Westinghouse had acquired the Armstrong “feedback” patent and joined with International Radio Telegraph in a manner similar to GE and RCA. This gave that new company Professor Fessenden’s “heterodyne” patent which, coupled with the “feedback” patent, was soon to dominate all receivers using electron tubes.

At this time, the Navy realized that electronic tube equipment having great advantages could be manufactured *only if the patent owners would get together. They urged that this be done*, even though the government had withdrawn its protection for patent infringement at the end of the war. The first result of the Navy pressure was a cross-licensing arrangement between GE/RCA and AT & T, who had purchased the deForest audion patent, with the former licensed for telegraphy and the latter for telephony.

Finally, just 21 years after the Marconi patent was issued, Westinghouse came into RCA. This came about because of Frank Conrad’s broadcasting results, with the pioneer broadcasting station KDKA and the inability of Westinghouse to sell broadcast receivers without infringing RCA patents. Thus, in 1921, the patent situation, with some 1,200 patents involved, was cleared at last and radio came out of the laboratory into the beginning of a production business. At this point, however—as you may recall—we were only up to the headphone stage.

One thing which this paper has made evident up to this time is the impracticability of meaningfully summarizing the history of the growth of radio and electronics in a tolerable time. Here we have brought the history only to the headphone stage and that, as we know now, was not much more than a beginning.

With the removal of the roadblocks in 1921 General Electric began to make great progress. At first RCA had the right to operate wireless or radio communication systems and the right to sell products

and licenses. General Electric and Westinghouse could develop and manufacture, but could not sell their radio products, other than military, except to and through RCA. This stimulated the inventors, the developers and the innovators in General Electric and there began a long list of “firsts.”

Many of you will remember the rapid build-up in power tubes. Transmitters applying these tubes grew from 200 watts, to 500 kw. For many years, every high-powered transmitter in military service, whether 25 kw, 50 kw, 100 kw, 300 kw and 500 kw, was built by General Electric. While this development was going on, much progress was being made in receivers and loud speakers for the rapidly growing broadcast market. Recall the Radiola Receivers I, II, III, IV, the Model 104 dynamic loudspeaker, the first phonograph pick-up, the condenser microphone. All were built by GE in the Schenectady Works and by Westinghouse at East Pittsburgh. The great expansion in broadcasting was spearheaded by the development of broadcast transmitters of increased power, by a steady stream of improved receivers, and by the development of network facilities. The task of developing and producing the transmitters and receivers was shared by GE and Westinghouse. The development of the network facilities was done, of course, by AT & T.

After a few years of experience, the original agreements of the manufacturing companies with RCA were modified because GE and Westinghouse wanted to sell and RCA wanted to manufacture, as well as sell. When this was worked out, RCA purchased the Victor Talking Machine Company and established a self-sufficient organization for the development of broadcast receivers and electronic phonographs. Eventually, the charter and organization was broadened to include transmitters and practically all electronic devices. During this period of readjustment, General Electric went out of the receiver manufacturing business and sold receivers manufactured for them by RCA. This, as might be expected,

(Continued on Page 68)

FROM HERTZ TO MEGA HERTZ

(Continued from Page 67)

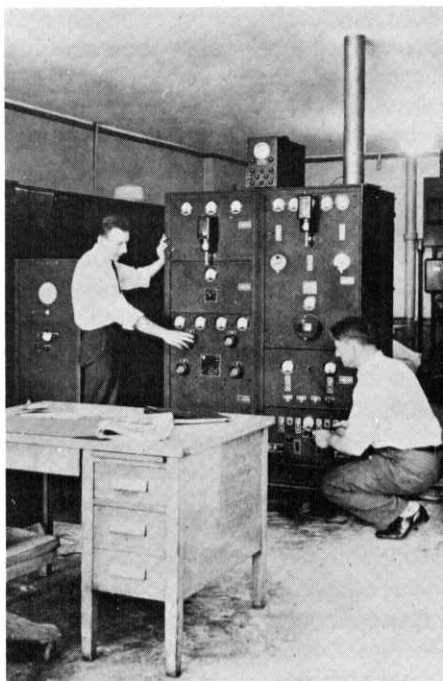
proved to be an unsatisfactory arrangement, which was destined for a short life of five years.

It was 1935 when General Electric regained its manufacturing rights under the so-called A-1 agreement. This made General Electric and RCA competitors in the broadcast receiver market and in some other areas. It required a few years more, however for the issuance of supplements to the A-1 agreement, which gave the manufacturing companies rights to television and frequency modulation and to practically all electronics products except sound movies. Then, General Electric and RCA were, in fact, competitors for electronics business on the broadest possible scale.

The radical changes in the basic agreement between RCA and the manufacturing companies, as upsetting as they were to the organizations involved, fortunately did not stop progress at General Electric. Rather, each shift of responsibility appeared to stimulate contributions.

Many of the old timers still living can recall the first water-cooled tube, the first four-element tube, the first metal tube, and numerous firsts in standard and short-wave broadcasting, power line carrier, electronic heating, electronic control, television, radio, and microwave communications. These accomplishments, along with many others, helped to bring about radical changes in the design of electronic products and systems. The pioneering equipments were made of bakelite, treated maple, porcelain, lead covered wire and copper tubing. In those days we had variometers, vacuum tubes mounted horizontally on spring supported cradles, rotating DC power supplies, and much rubber hose. There was little or no aluminum in evidence, receiver cases were made of wood, not plastics, and loud speakers were logically equipped with horns.

In those days, industry was not the only agency concerned in building products. Many thousands of people built their own receivers, except for the Baldwin or Murdock headsets, and such words as galena, tuner, heterodyne, neutrodyne, and



G-E ultra-high-frequency police radio transmitter, 1.5 KW, and associated speech input equipment, at police headquarters, Boston, Mass. 1937. (Fig. 1)

regeneration came into common usage outside of engineering circles. This was true, too, in the earliest days of police radio. Most of the equipment, particularly the receivers, was of the do-it-yourself type.

General Electric's early participation in the police radio field and in what the FCC called "Emergency Services" started about 1931, when the Company leased to and operated for the New York State Police a five kilowatt medium frequency AM transmitter. The transmitter was located on the same site as WGY and the complex of GE international short-wave broadcast transmitters at South Schenectady, New York. Following is a description of that early police transmitter as recalled by Harold G. Towlson, a GE Engineer still working for the Company at Syracuse, New York. I quote him:

"When I first went to South Schenectady in 1935, WPGC had been in operation for a few years. I estimate the start at about 1931. It continued to somewhere around 1944 when the use by New York State Police of two-way VHF FM equipment, with repeaters at various high elevations, made the AM equipment obsolete.

"The equipment at South Schenectady was built and operated by GE, on lease to the New York State

Police. It was located in the main building, on the South Schenectady site, along with 50 KW WGY, 5 KW WGY auxiliary, 100 KW short-wave WGeo, 50 KW short-wave WGEA and 25 KW WGEX. This combined operation made decided savings in personnel, power, heat, etc. The call was WPGC and the frequency 1658 KC. The AM transmitter was a Class B RF Linear type with a final amplifier using a pair of water-cooled type 892 tubes in push-pull with 869-B mercury-vapor tubes in the 15 KV rectifier. The antenna was a cage T suspended between two 300-foot steel towers, and operated with a counterpoise. Operation was controlled, and announcements made from the State Police office in Albany, using telephone lines for control and announcing. A 1,000 cycle tone preceded each announcement for about 10 seconds. This was a 24 hour/day, 7 days/week operation with maintenance done on a minimum basis as negotiated with the Police announcer on duty. The car radios, which were not supplied by us, were fixed tuned.

"Performance of this equipment was very good. However, in the daytime there were some areas of the state not well covered, and at night there was some mutual sky-wave interference with other State Police systems (North Carolina was one). And, of course, it was one-way communication; mobile responses had to come from the nearest telephone.

"About 1938, or thereabouts, the State Police added 5-1KW stations spotted around the state to improve the coverage. These were, as I remember, Link transmitters. Three of these were located at Tupper Lake, Oneida, and Sydney. One was located, I believe, at Peekskill and I believe the other was at Batavia. These were operated by New York State Police personnel and GE had no direct responsibility, although we did help them out whenever they called upon us.

When the 2-way FM equipment was obtained by the New York State Police, use of the above equipment was discontinued. About 1965, a remote-controlled WGY transmitter, and Auxiliary, were installed in a new and smaller building. All of the old equipment was disposed

of, and the old main building torn down."

Shortly after the installation of the New York State Police transmitter, a number of 1 kw AM transmitters were installed for the North Carolina Highway Patrol, the New York Fire Department, the U. S. Border Patrol at St. Albans, Vermont, and others.

In February, 1933, the Federal Radio Commission issued a very interesting public notice No. 8026 concerning the Police Radio Service. At that time, there were only eight frequencies available for police use in the 1500 to 3000 kc range. Frequencies above 30 megacycles, considered UHF then, were experimental. As an interesting sidelight, the Public Notice stated that two-way communication could not be authorized because of the shortage of frequencies.

In 1934, the first two-way installation of General Electric AM equipment operating in the 30 to 40 megacycle band was made for the Boston Police Department. Fig. 1 shows the 1½ kw UHF transmitter and associated speech input equipment at the Boston Police Headquarters. Figure 2 shows a test car which was used in the development and test of UHF police car receivers and transmitters at the GE Schenectady Works back in 1934.

Figure 3 shows equipment typical of that era installed in the trunk of a 1938 Ford. Note the large, hefty dynamotor which made the transmitter capable of continuous duty. Another interesting feature of this early equipment was duplex operation as in normal telephone conversation. Figure 4 shows the control unit and telephone handset installed on the dash of a Ford car.

Figure 5 shows that motorcycles were not overlooked in the early days of Police radio. The black case in the foreground contains a UHF receiver mounted on a Harley-Davidson motorcycle. The photograph is dated May 3, 1937.

On November 6, 1935, an event occurred which was destined to change the course of all Land-Mobile Radio Service in the years to come. Major Edwin H. Armstrong demonstrated his system of frequency modulation to the Institute of Radio Engineers in New

York. The idea of frequency modulating a radio carrier was not new. Years before, investigators had considered it a possible means of minimizing radio spectrum occupancy. (Doesn't that have a familiar ring, even today?) Why not transmit all of the frequencies in and above the audio range, while swinging the carrier only ± 1 kilocycle, and thus occupy only a 2 kilocycle channel band width? As we now know, this theory was quickly disproven mathematically



GE 50-watt ultra-high-frequency police station-house radio transmitter, in typical installation. 1936.

and experimentally. Nevertheless, researchers in those early days never lost sight of the possibilities of this form of modulation and, in fact, on July 22, 1929, R. B. Dome of the GE Schenectady Development Laboratory applied for a patent which was granted July 4, 1933, on a method of frequency modulating an oscillator, of multiplying the swing by a series of cascaded multipliers, and of suppressing amplitude modulation in the process.

Armstrong's contribution was the idea of using very wide swing in order to transmit frequencies throughout the range of human hearing up to 15,000 cycles per second and to use limiters in the receivers to wipe off amplitude modulation and thereby defeat static and man-made noises to a higher degree than had ever been achieved in amplitude modulation broadcasting.

General Electric was one of the few, if not the only major manu-

facturer, to respect the Armstrong FM system patent and took out a license to build FM broadcast receivers, transmitters and two-way radio equipment. As many other inventors before him, Major Armstrong met a great deal of opposition. Many who had millions of dollars invested in AM broadcasting threw every conceivable obstacle in his way. Others appropriated his invention and there followed patent infringement suits, which were fought out in the courts over a 20-year period. Armstrong finally won out, but only after his death at the age of 63. Nineteen of the twenty-one legal actions were settled with payments to the Armstrong estate. According to his attorneys, these amounted to "several million dollars."

In 1935, General Electric started to manufacture FM broadcast receivers at the Bridgeport Works. Interestingly enough, the first FM broadcast band extended from 44 to 50 megacycles — the FCC had turned over to FM, TV Channel 1. Subsequently, FM broadcasting was transferred to the 88 to 108 megacycle portion of the spectrum.

General Electric Engineers and others very quickly perceived that FM had great possibilities for application to the Land-Mobile Services, because of its noise-reducing properties, the capture effect, which would reduce interference between systems operating on the same channel, and other fine characteristics. On April 26, 1938, application was made to the FCC for an experimental license to use FM at 40 megacycles to test the feasibility of FM for Mobile Radio Service. The license was issued on August 3, 1938 and field testing started immediately, with equipment previously developed in the Laboratory.

General Electric made a noteworthy industry contribution in those early days of FM by setting up FM/AM transmitters at Schenectady and Albany in New York's capitol district to demonstrate the superiority of FM over AM as an emergency communications system. Duplicate AM and FM transmitting facilities were set up at the stations and in a car. Instant side-by-side comparisons of the two systems

(Continued on Page 70)

FROM HERTZ TO MEGA HERTZ

(Continued from Page 69)

could thus be made with the transmitters in the two cities operating co-channel. The superior noise-quieting characteristics of FM and the "capture effect" were demonstrated. At a point about mid-way between the two cities, a simple movement of the quarter-wave antenna on the car would cause the FM mobile receiver to capture either the Schenectady or the Albany transmitter, depending upon its physical position. This was quite a dramatic demonstration of the capture effect, and showed clearly that frequencies could be duplicated without too many miles of separation between systems and still permit relatively interference-free communication.

One of the objectives of the tests was to demonstrate to FCC representatives that FM *could* operate in the same 40 kHz channels assigned for AM transmission at that time. In order for the FM transmissions to occupy the same 40 kHz band width, it was found that the swing should be held to a maximum of ± 15 kHz and this standard was suggested to the FCC Engineers, who subsequently, adopted it as a standard. A reactance-tube modulator was used in the test transmitters, in order to test the various degrees of frequency swing without the need of changing the transmitter multiplying factor at all. With the reactance-tube modulator, it was possible to swing the carrier very little, or a great deal and draw comparisons, using only a single, relatively simple transmitter at each location.

Among the first to witness the mobile FM vs. AM demonstrations on the Schenectady/Albany circuit were representatives of the U.S. Navy on August 24-26, 1938, including Rear Admiral C. E. Courtney, and Lt. Commander J. B. Dow.

On April 5-7, 1939, a three-day test was conducted as a dress rehearsal for a coming FCC presentation. Technical representatives from several Government agencies, including the Signal Corps of the CAA, were present. As a part of this series of tests, the CAA supplied a WACO Biplane for airborne

tests. Major Armstrong was also present.

On April 13-14, 1939, the full-scale Schenectady/Albany FM/AM tests were run for the FCC and IRAC. Present were FCC General Counsel W. J. Dempsey, Chief Engineer E. K. Jett, Assistant Chief Andrew D. Ring, Director of Research Dr. L. P. Wheeler, and J. H. Dellinger, Commander John R. Redman and Major Tom C. Rives from IRAC.

On September 28-29, 1939, the tests were repeated for the FCC's "Emergency Service" people. These tests proved to the satisfaction of the FCC people the feasibility of inter-mixed FM/AM systems on the then existing 40 kc channels. Present were Major Armstrong, of Columbia University; Paul Lion of the FCC; Glenn Nielsen of the FCC; and Daniel E. Noble, Assistant Professor, Connecticut State Agricultural College and Radio Communications Consultant for the Connecticut State Police.

In the Fall of 1941, the FCC started licensing FM communication systems on a regular basis — the experimental phase passed into history.

None of us will forget December 7, 1941, the start of the difficult war years. By that time, a great number of police departments, (many also serving fire departments) and a number of public utility companies had installed FM radio systems, but for the duration of World War II, only police and fire departments could obtain the necessary AIA priority to purchase two-way radio equipment. Quartz crystals were in particularly short supply.

In January, 1944, with the end of the war in sight, the FCC established the Radio Technical Planning Board (RTPB) under the chairmanship of Dr. W. R. G. Baker, Manager of the Electronics Department of the General Electric Company. Dr. Baker appointed a chairman for each panel of representatives for each class of service claiming use of the radio frequency spectrum from 25 to 890 megacycles, with the objective of complete re-allocation of that portion of the spectrum directly after the war.

The result of this work was the post-war re-allocation proceedings, in which a number of new services

were opened up to the Land-Mobile category, such as Taxicabs, Special Industrial, Manufacturers' Radio, etc. Today, any person or organization, legitimately requiring the use of two-way radio, can obtain a license in at least one, and often several, of the Land-Mobile Services.

In closing, the writer wishes to add a personal note.

Researching the subject of the early history of radio has been just as interesting and fascinating as following the exploits of our Astronauts today. To quote Paul Schubert from his book, "THE ELECTRIC WORLD":

"In the seven years between the dawn of 1921 and the dawn of 1928, the popular use of radio spread into every nook and cranny of the United States. The radio audience of a few thousand had grown to more than half the adult population of the land. It was possible then, by inter-connection of transmitting stations for that tremendous concentration of human minds to be focused upon a single voice, a single instrument, a single event . . .

"It is perhaps difficult for those who have lived through this change to comprehend what it signifies in terms of World History. No nation ever had greater communication barriers than those of the wilderness infancy of the United States; no nation has ever so broken those barriers down or achieved such astonishing unanimity and rapidity of thought conveyance as has this one in its young maturity. It took aeons of time for the use of fire to spread among men, aeons of time to develop a substantial man-made structure to shelter him from the elements, aeons of time for him to learn to speak, other aeons to write — his progress along the pathway up from bruteness has been painfully, pitifully slow . . . and now, in this era of science and inter-communication, of which these United States are such a vital expression, an entire nation has come to the point of absorbing some new thing into its life, a thing that will henceforward play a profounder part in its environment than it can guess, in the short span of a little more than

two thousand days . . . " End Quotation.

Those words were written in 1928. How prophetic they have proved to be!

The "ELECTRIC WORD" was published by the MacMillan Company in 1928, and is long since out of print. If obtainable, I commend the reading of the entire book to all those police radio men and others who are currently interested in, or are working in, the field of electronics — old-timers and newcomers alike.

ACKNOWLEDGEMENT:

The major source material employed in the preparation of this paper was taken from the script of the main address by John J. Farrell at the Old-Timers Reunion, Syracuse Chapter of the General Electric Quarter-Century Club, June 24, 1961 and Paul Schubert's "THE ELECTRIC WORD." The comments, suggestions, and review of the paper by GE Engineer R. H. Williamson are also gratefully acknowledged.

Ω

PAID YOUR DUES YET?

Remember, dues are payable Oct. 15th, due on Jan. 1st, and past due on April 1st. Ω

PROPOSED RESOLUTIONS

(Continued from Page 45)

with the new membership and alignments, now therefore be it Resolved: That Article II, Section 9 of the Constitution be amended to wit: "Section 9. *Governmental Representation.* Any local, state, provincial or political subdivision or any governmental unit having a radio or communications system shall be eligible for Governmental Representation. Each such governmental entity or unit may designate its employees to serve as members of this Association in accordance with the uniform dues schedule and Constitution Article II and Bylaws Articles I and VI.

GOVERNMENTAL REPRESENTATION RATES SCHEDULE

Minimum Cost	Entity	Membership	Classification
\$15.00	I	2	Operator
\$18.00	I	2	Operator and Engineer/Technician
\$30.00	I	2	Active and Operator
\$21.00	I	2	Engineer/Technician
\$33.00	I	2	Active and Engineer/Technician
\$45.00	I	2	Operator

Each entity may subscribe for ad-

Mikermanship - - -



HESITANT - INDECISIVE

ditional individual memberships at the local chapter individual membership rate." And be it finally

Resolved: That this resolution become effective January 1, 1972.

Ω

Yo' in a HEAP O'TROUBLE,
Ifn' you don't use STANWICK



"COMMUNICATIONS & INFORMATION

SYSTEMS SPECIALISTS FOR THE 70's"

COMMUNICATIONS & ELECTRONICS SYSTEMS DIVISION



THE STANWICK CORPORATION
1401 WILSON BLVD ARLINGTON, VIRGINIA 22209
(703)524-6126

GLANCING BACK . . .

(Continued from Page 43)

any of the scores of steamships coming into New York harbor.

At the convention of the International Chiefs of Police in 1920, Chief James Higgins of Buffalo, N. Y. presented a paper: "The Use Of Wireless Telegraph In Police Service."

Pennsylvania soon became the first state to achieve the goal of a state wide radio telegraph system. It made use of continuous wave or CW transmitters operating on the very low frequency of 250 kilocycles. This operation began in 1923 and was for point to point communications only. No mobile units were involved.

April 1917; A Dark Month For Radio

It was the month that all amateur radio men and experimenters received notices from the Department of Commerce ordering that "all aerial wires be lowered to the ground; that all radio apparatus be rendered inoperative both for transmitting and receiving any radio messages or signals." And I was there.

What a howl would emanate from the American public if this same policy had been followed in World War II.

The first World War ended on November 11, 1918 but the ban on radio equipment use continued. It was only after some prodding by Congress that the radio ban was revoked on September 26, 1919.

The crash of sparks and the whine of rotary gaps (strange words?) soon filled the air around 200 meters but the era of the spark was fast approaching its end as war surplus and new vacuum tubes became available for transmitting purposes.

Many of the four thousand wireless operators who had volunteered their services to fill a critical shortage of trained operators in the military services, soon returned home to resume their radio hobby with new knowledge and experience. Many of them were soon building C W and radiophone transmitters. A goodly number of these small transmitters were used in early experiments to show the possibili-

ties of using radio for police operations.

Men With Vision and Problems

As early as 1920 and 1921 a number of progressive police officials were advocating the use of radio for more effective police operations. Experiments were conducted from coast to coast with both technical and legal problems retarding progress.

Detroit was one of the most active departments but there were no Federal government provisions for a police radio service. When the first tests were conducted on May 23, 1921 it was necessary to use the 200 meter amateur band with the amateur call letters W8BNE.

During the next six years the station was operated on several different channels with different call letters and licenses.

On October 11, 1929 the Federal Radio Commission issued Order #74 which assigned three channels for police use under limited commercial licenses. Six months later on April 8, 1930 order #85 from the Radio Commission finally gave full recognition to police radio service. Eight channels were allocated for the exclusive use of the police; 1712 kilocycles, 2410 kc., 2416 kc., 2422 kc., 2440 kc., 2452 kc., 2458 kc., and 2470 kc.

Bob Batts, then a rookie with the Detroit Police Department, who designed their first satisfactory receiver, would readily agree that just about all the men using our present FM public safety radio equipment would hardly accept any of the early noisy receivers as satisfactory.

On the west coast Berkeley, California had an operating system in the late twenties that received much publicity in leading radio magazines.

The action of the FRC in allocating channels for police radio operations and the availability of better radio apparatus greatly accelerated the interest in police radio so that soon systems were in use in Chicago, Indianapolis, Cleveland and other cities before the early thirties.

Not All The Eggs In One Basket

The installation of teletype systems covering large areas in one

or several states contributed much to the cause of law enforcement. These installations were mostly made by the common carrier companies and lacked the individuality and some of the glamor of the radio systems constructed and installed by the police department personnel. Providing printed copies of all messages the teletype systems have continued to spread in coverage and continue to be of immense value to our police departments.

Too Many Cooks Spoil The Broth

During the early thirties the use of police radio spread like wildfire into every section of our country. In fact the many new systems coming on the air on frequencies subject to distant skip of signals after dark created such interference and chaos that many mobile units were greatly handicapped or even found it impossible to receive their own messages at times due to static and distant stations with stronger signals than their local stations through the hours of darkness.

CQD—SOS—Mayday

Only the cooperation of the many departments using police radio in the mid-thirties could succeed in bringing about more workable conditions on the police radio channels.

Sergeant Everett Fisher, Radio Supervisor of the St. Louis, Missouri Police Department sought to secure this needed cooperation with a chainletter in November, 1934. The interest and response was most encouraging; every system was having interference problems. The date for the first meeting was set for January 21, 1935; the place was the Melbourne Hotel in St. Louis; and you are there.

The sky is a dull gray as you step down from the comfortable steam-heated Pullman car, one of several in the long train, after long hours of riding smoothly through miles and miles of beautiful snow-covered countryside. The temperature is eleven degrees below zero and the gusting wind plasters your face and fills your eyes with snow.

It's good to get inside again but you notice that the others in the meeting room are still wearing their overcoats. You decide that

(Continued on Page 74)

ULTRA-HIGH FREQUENCY DUPLEX RADIO TELEPHONE SYSTEM FOR SHORT DISTANCE COMMUNICATION

IDEAL FOR POLICE, FIRE, AIRCRAFT, ETC. PIONEERED AND DEVELOPED BY THE RADIO ENGINEERING LABORATORIES, INC., LONG ISLAND CITY, N.Y. U.S.A.

The ultra high frequency method of communication is radically different from any other present day radio system. Atmospheric interferences which usually interrupt regular radio service do not interfere with ultra high frequency communication. There is no day or night effect. Steel buildings, hills and other signal radio absorption factors do not hamper ultra high frequency work. The signals are restricted to a local define area and will not be heard in other cities. This means the elimination of interferences caused by signals from Police Departments in cities hundreds of miles away. Less power is re-

quired to cover given areas. This in turn means economy in the initial purchase of equipment. Apparatus can be supplied for duplex two way communication or for single way communication. Two way communication system opens up a new field for fast accurate work.

Radio Engineering Laboratories, Inc., have been pioneering and designing radio apparatus for the past ten years. Their competent staff of engineers is always available to solve your radio problems.



The RFL Cat. #289 illustrated herewith is the type of equipment regularly installed in police vehicles. It complies with transmitter and receiving circuits. It is ready for immediate use and does not require the attention of an experienced operator.

BOSTON POLICE MAY GET SUPER RADIO

HUB COPS TO TRY RADIO



Commissioner Hultman permits reporter to take up any city in the world if secret

tests conducted during the past few weeks prove successful, Commissioner Eugene C. Hultman revealed yesterday.

The radio equipment now being tested will enable every police car not only to receive messages from headquarters as to moves about the city, but also to send messages to headquarters as to moves about the city. Tests so far completed have caused Commissioner Hultman's assistant Timothy Hayes, chief of the police radio department, to advise the commissioner that the new radio system will be ready to arrive here today and all day and night tests will be conducted by Hultman and technical advisers.

GOVERNMENT O.K.

The commissioner also revealed several provisions of the Federal Radio Commission to conduct the test. The commission's consent was necessary because the new radio system operates on specially reserved channels.

For months Commissioner Hultman has been studying the problem of the police department's effort to find radio communication equipment suitable for Boston's needs. Since the agitation for radio communication has been mounting here, he and Hayes, the signal chief, have requested the U.S. Dept. of Commerce to find all of these mobile radio stations.

"I have wanted to talk about this for some time," Hultman said.

Hultman to Try Out New System Today

Continued from Page 1

experimenting during the past few weeks. Hultman said yesterday in explaining the move with which the experiments have been conducted, "Because we may be disappointed again."

"However, I am confident that we have found something better than the short wave sets presently installed. If the equipment lives up to its promise the Boston Department will be equipped with radio sets superior to any now used in any city in the world."

EXPECTED TODAY.

The new sets, one of which is located in the experimental car operated to arrive here today from the Long Island factory where it was made, will be installed in the police cars today.

This operates on high frequency and is very short wave radio. Hultman said yesterday that the equipment has been tested for some time, but that he is confident that the equipment will be ready for use today.

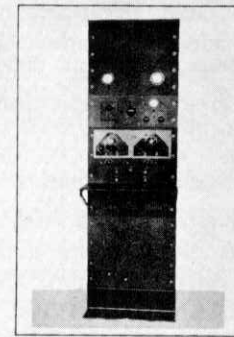
"I have had one fault to find with most of the radio equipment offered to me for study recently," Hultman said. "I have always felt that radio which worked only one way could not be efficient, because the operating station could never know whether or not the other cars received their orders. This new equipment overcomes that major objection."

Hayes, the signal expert, who has conducted tests with the new equipment both in Providence and Long Island, is the inventor of the duplex signal system, now operating in many of the divisions. According to Hultman, his technical knowledge and experience with other methods of interlocking communication systems, led to the present trial of a radio equipped with two-way communication.

PLAIN HEADQUARTERS

Hayes, according to the commissioner, will install sending apparatus at headquarters as soon as the first car arrives here and will probably use the laws on the line for trial during experiments. He reported that police headquarters is in one of the most difficult spots in the city for radio work because it is so central.

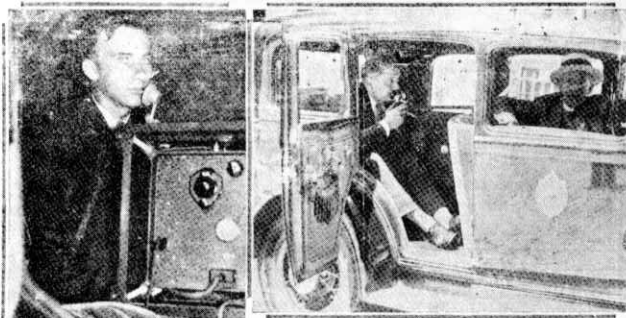
The new equipment does not require large sending stations, as is the case with the old equipment. Hultman revealed that the sets are being tested on a temporary station set up at headquarters in its office. It is the intention to give satisfactory results. The "805" is a complete duplex telephone transmitter and receiver.



RFL Cat. #205 ultra high frequency radio telephone station. This is a typical type equipment as is installed in headquarters or main stations. It is compact, completely simple to operate and can be guaranteed to give satisfactory results. The "805" is a complete duplex telephone transmitter and receiver.

BOSTON DAILY RECORD, June 28, 1932

Radio Test Successful—Has Boston Police O. K.



I Can Hear You Very Well! Timothy Hayes, chief of police signal service, and a Daily Record reporter answered the broadcaster when the test proved satisfactory. The reception was excellent.

This question opened the two-way conversation Boston police radio test yesterday between the broadcaster, above, at Station WIXAH in the Hotel Stetler, and a Daily Record reporter in a police car, below.

IS POLICE RADIO NEAR? SENDING MESSAGE TO CAR



At least the Boston Police Department is thinking radio. Experts were in Boston yesterday demonstrating the workings of the radio system to aid the police work. Above is Frank A. Gumbler, treasurer of the Radio Engineering Laboratories, Inc. He is talking to the driver of the cruising car from the 14th floor of the Hotel Stetler, telling him that the Boston Evening American photographer seeks a photograph of their car. In a moment a clear voice came back into the ears of the photographer, telling him that the police car would be in front of Police Headquarters in five minutes. It was there. You see the picture taken below. (Staff Photos.)

BOSTON DAILY RECORD, June 28, 1932

Speed It Along



Police car equipped with high-frequency, two-way radio equipment, which was tested by Police Commissioner E. C. Hultman yesterday, is shown here. Operator Charles M. Drehoff, talking with temporary station WIXAH in Hotel Stetler.

Police Commissioner Eugene C. Hultman stands committed to the cause of radio equipment for the Boston Police Department.

After a long test in a cruising car yesterday of a new high-frequency, two-way radio equipment, the commissioner praised it highly. He went so far as to say:

"This is the greatest improvement in police radio I have ever seen. The reception and test were away ahead of anything I have seen before."

The commissioner said he would try a few more tests and then ask the City Council for a police radio contract. He added:

"A couple of more fool-proof tests and I will be convinced that the system is perfect."

The commissioner and his radio experts cruised all over town, testing particularly what he calls the "noisy dead spots." Even in those spots reception was "intelligent," meaning that those in the car could hear the operators broadcasting messages to the moving car from temporary station WIXAH in the Hotel Stetler.

In a few of the "dead" spots the operator in the car was unable to communicate with the main station. But the commissioner admits that, with more powerful coverage than the low power used in the test, "dead" spot communication would be different.

The experiments are continuing. Let them be completed as speedily as possible so that radio may be installed for much more time slips by. The agitation for it has been on since last August.

It must be borne in mind that other cities, where radio has been praised for its speed and efficiency, are using the standard one-way equipment, whose value has been demonstrated.

It is desirable to get the best system for Boston. But it is desirable, even essential, that Boston have police radio without waiting indefinitely in the experimental stage.

The commissioner favors a central, synchronized broadcasting system for Boston and the metropolitan area. That would be well if the other communities would come in. But maybe they would not.

Arlington and Somerville already have their own independent police radios. Chief Danery of Somerville has no hesitation in objecting to one radio system for the metropolitan area. He fears overloading and delay.

If the suggestion of a central police radio system for the metropolitan area lacks support, that should not bar Boston from going ahead and establishing her own system, the same as other large cities have done and are doing.

Let us lead the police radio procession if we can. But let us get into it meanwhile.

BOSTON POST, WEDNESDAY, JUNE 29, 1932

Police Radio Tests Made as Blinker System Balks



Here is Charles M. Drehoff, president of the Radio Engineering Laboratories, New York, talking on radio-phone installed in police car. All Boston police cars may shortly carry radio in the metropolitan drive to wipe out the gaslight.

"ALL POLICE CARS STAND BY"

While tests were being made on the two-way radio communication between the police car and the radio station, it became known that the blinker system in the police car had broken down and that when a signal was sent from one car to the other it was impossible to get back light in the other was giving the light.

A short time ago, however, the tests were successful. A signal of "undouble" in the police car was received in the other car, which was a great relief to the police.

Commissioner Hultman said at the end of the tests, "The radio system is a great improvement over the blinker system. It will be installed in all police cars as soon as possible."

The radio system will be installed in all police cars as soon as possible. It will be a great relief to the police.

The radio system will be installed in all police cars as soon as possible. It will be a great relief to the police.

BOSTON DAILY RECORD, June 29, 1932

SUPER RADIO HAS BOSTON POLICE O.K.

"This is a Daily Record reporter from police headquarters. Can you hear me?"

"I can hear you very well."

This was the opening of a two-way radio conversation between the Daily Record reporter and a police car equipped with the new radio system.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

Boston Record Wins Fight for Cop Radio Cars

The campaign of the Boston Daily Record for radio equipment for the Boston police earned a victory yesterday when Police Commissioner E. C. Hultman announced that the city would purchase the new equipment.

"It was a few more tests and then we were convinced that the system is perfect," Hultman said.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

HULTMAN SEES POLICE RADIO AUTO BENEFIT

Commissioner Hultman said that the new radio system would be a great benefit to the police.

The test was successful. The police car received the reporter's message and the reporter received the police car's reply.

GLANCING BACK . . .

(Continued from Page 73)

maybe you will keep yours on until you thaw out; somehow it just seems comfortable to you and the other thirty-two gentlemen as you listen attentively to Everett Fisher explain the purposes of the meeting; the creation of a police communications organization to secure more adequate radio facilities and reduce the chaotic conditions that were greatly handicapping the police radio systems.

Everything But Trading Stamps

Though off to a cold start weatherwise, the meeting generated a lot of warm enthusiasm. Everett Fisher was elected as the first president of APCO. He lost no time in naming a number of committees, including the very important "Inter-city Radio Communications Committee."

Although there was no registration fee charged, the meeting provided a banquet for all present and still was able to show a balance of \$25.40 after all the bills were paid. The rental of booth space had produced \$300.

Another three-day meeting was planned to open October 7, 1935 in Indianapolis. APCO was soon pledged the full support of the Florida Officers Communications Association as well as similar groups in other states.

At the July, 1935 meeting of the International Association of Chiefs of Police, the APCO inter-city radio net plan was approved and two APCO members were authorized to work with two of their own members to make recommendations to the Federal Communications Commission. The inter-city radio telegraph plan was soon submitted to Washington for approval.

The Word Gets Around

When the October convention was opened on Monday, October 7, 1935 in Indianapolis at 10:35 a.m. by President Fisher and a welcoming address by Mayor John W. Kern, the attendance registration had tripled that of the first meeting at St. Louis nine months earlier.

The yearly dues of \$2.50 included the convention registration fee and the banquet. If the wife was with

you, she was included in the deal at no extra charge, but non-members were supposed to pay \$2 for the works.

After this kind of a miracle its little wonder that the host, Bob Batts, was elected President for the coming year. It does seem possible that the twenty-two manufacturers' representatives again had a big hand in providing the loaves and fishes.

An invitation from Otis J. Stanley to hold the 1936 convention in Davenport, Iowa, from October 5 to 7 received the approval of the delegates. And so on through the years the national gatherings have continued to attract more and more public safety officials and communications men interested in improving the communications of their departments.

A Rose By Any Other Name

The first six meetings were billed as "conventions" but a decision prompted by the belief that the word convention did not convey the proper impression of a group of communications experts gathered together for the serious purpose of safeguarding the American public during the critical years of World War II resulted in the annual gathering in the following year, 1940, at Orlando being billed as a communications conference. This designation has remained for the national meetings for thirty years. Recently the same name has been applied to large sectional gatherings of APCO chapters such as the very successful Western States Conference and the Great Lakes Conference, both being well supported by the regional members.

In only one year, 1945, was the national APCO Conference omitted. This was due to federal travel restrictions brought about by the terrific struggle of the United States engaged in an all-out war on two fronts, in Europe and the Pacific.

Beyond The Call Of Duty

APCO and the public safety services owe much to the chairmen, their committees and public officials who have given so willingly of their time and efforts to make the annual conferences and conventions the successful affairs that they have

been since the first one in St. Louis in 1935 to the last one in Clearwater in 1970 with Stanley Hawkins as Chairman.

- 1—1935—St. Louis, Mo.
Jan. 21-24—Everett Fisher
- 2—1935—Indianapolis, Ind.
Oct. 7-10—Robert L. Batts
- 3—1936—Davenport, Iowa
Oct. 5-7—Otis J. Stanley
- 4—1937—New York City
Oct. 11-14—Gerald S. Morris
- 5—1938—Houston, Texas
Oct. 19-22—Robert Franklin
- 6—1939—Kansas City, Mo.
Oct. 2-5—Roy De Shaffon
- 7—1940—Orlando, Fla.
Dec. 2-5—James W. Verden
- 8—1941—Oakland, Cal.
Sept. 10-13—Chas. McMurphy
- 9—1942—St. Louis, Mo.
July 27-30—James H. Teeter
- 10—1943—Madison, Wisc.
Aug. 31-Sept. 3—Ray Groenier
- 11—1944—Toledo, Ohio
Sept. 18-20—Clinton H. Knudel
- 12—1945—Cancelled — World War II travel restrictions.
- 12—1946—Buffalo, N. Y.
Oct. 18-20—Lawrence Geno
- 13—1947—Los Angeles, Cal.
Aug. 25-28—Wm. H. Durham
- 14—1948—Houston, Texas
Sept. 20-23—Paul Franklin
- 15—1949—New York City
Aug. 29-Sept. 1—F. A. Burns
- 16—1950—Cleveland, Ohio
Aug. 28-31—Tom Story
- 17—1951—Miami, Fla.
Aug. 15-18—Ben Demby
- 18—1952—San Francisco, Cal.
Aug. 19-22—George W. Hippely
- 19—1953—Detroit, Mich.
Aug. 25-28—Edwin C. Denstaedt
- 20—1954—Pittsburgh, Pa.
Aug. 10-13—Wm. M. Gamble
- 21—1955—New Orleans, La.
Aug. 16-19—John Bulmer
- 22—1956—Los Angeles, Cal.
Aug. 2-5—Frederick Crowder
- 23—1957—Daytona Beach, Fla.
June 26-29—Rhett McMillian
- 24—1958—Baltimore, Md.
Aug. 4-7—William E. Taylor
- 25—1959—Denver, Colorado
Aug. 3-6—F. A. Swanlund
- 26—1960—Philadelphia, Pa.
Aug. 3-6—Wilfred E. Faust
- 27—1961—Long Beach, Cal.
Aug. 1-4—Foster Strong
- 28—1962—Clearwater, Fla.
Aug. 8-11—B. A. Everitt
- 29—1963—Minneapolis, Minn.
Aug. 13-16—Joseph J. Sentyrz

- 30—1964—Norfolk, Virginia
Aug. 5-8—Ormond Murden
- 31—1965—Chicago, Illinois
Aug. 10-13—William Miller
- 32—1966—Seattle, Washington
Aug. 2-6—E. J. Loerch
- 33—1967—Toronto, Ontario
Aug. 8-11—George Long
- 34—1968—Palm Springs, Cal.
Aug. 5-9—Harvey O. Platt
- 35—1969—Des Moines, Iowa
Aug. 4-8—Jack W. Sauer
- 36—1970—Clearwater, Florida
Aug. 3-6—Stanley L. Hawkins

Like Rome, It Took More Than A Day

It is hoped that this special historical issue of the APCO BULLETIN will bring a little clearer picture of the long, long efforts made to understand and make use of the invisible and imponderable agent electricity that is the basis for all our modern communications systems.

While we owe great appreciation to the scientists, inventors and engineers for progress in our equipment and apparatus, we should never overlook the many officers, members and committees of APCO for their long years of cooperative efforts to improve our equipment and make more effective use of it for the protection of the public.

Just A Bird's Eye View

A brief glance back across so extended period of time is very much like a jet plane trip across the continent; you see only a few of the prominent landmarks. There are so many important places and

SPECIAL MEETINGS:

Sixth Annual Western States Regional Conference, Denver, Colorado, March 22-27, 1971. Jan A. Burton, Chairman. Phone 303-279-2571 for information and booth space.

East Coast Regional Meeting hosted by Mid-Eastern Chapter, Convention Hall, Ocean City, Maryland, May 11 - 12 - 13, 1971

Great Lakes Conference, Kahler's Inn Towne Motel, Lake Delton, Wisconsin, May 6th and 7th, 1971. R. R. Chandler, Conference Chaircan, c/o Sauk County Sheriff's Dept. Baraboo, Wisc. 53913.

details passed by without even receiving mention.

With more time we could travel more slowly on the ground with the opportunity to see many more interesting people and places.

This jet type narration leaves much to be desired as a history of APCO and public safety communications. Volumes could be written about the problems that APCO has contributed to solving; but there have been some lighter and very enjoyable hours at all the conferences as can be vouched for by that early rising and colorful group of fun lovers known as the Confederate Communications Commission.

It's Later Than You Think

There is a real need for a more complete story of the events, places and people involved in the long search for better public safety communications but this can never happen unless you and the pioneers, who are still around, will avoid taking the fifth amendment and let your Chapter Historian or this ancient Historian in on your secrets before it is too late.

If you wonder why you or your department have never received proper recognition for your work, it may be that you have been a codfish.

*A codfish lays a million eggs,
While the feathered hen lays one,
But the codfish does not cackle,
To inform us what she's done.
So we disregard the codfish,
While the fruitful hen we prize;
Which only goes to show,
It pays to advertise.*

What Would We Do Without Them?

Our sincere thanks to the many APCO members who have provided material for the Glancing Back columns during the past nine years. A special thanks to APCO's first Historian Herb Wareing, Past-President and charter member of APCO. Appointed in 1960 at Philadelphia he provided first-hand information with a vast amount of detailed material published in his columns during 1961.

Herb was at St. Louis in 1935 and is still doing a fine job as Historian of the Wisconsin Chapter.

Can your chapter say as much?
Duck E.

Ω

**THE APCO MARCHES ON !!
1935 SUMMARY**

**Organization — Activities — Results
— 1935 —**

1. APCO organized in St. Louis, Missouri, January, 1935, by Everett Fisher, Supervisor KGPC, who was elected first President.
2. Committees appointed and function through regular bulletins issued by President Fisher.
 - (a) Intercity Radio Communication Committee.
 - (b) Executive Committee.
 - (c) Technical Committee.
 - (d) Resolutions Committee.
3. APCO receives pledge of support from Florida Officers Communication Association; its members join APCO. Similar activities in Ohio and Michigan.
4. Intercity Radio Committee formulates Proposed Nationwide Intercity Police Radiotelegraph Communication System.
5. APCO officially recognized by the International Association of Chiefs of Police at July Convention.
6. APCO Intercity Plan presented to Association of Chiefs of Police and is approved.
7. Chiefs Association votes to permit two designated members of APCO to work in conjunction with two members of its own Radio Committee in making recommendations to the Federal Communications Commission.
8. Intercity Radiotelegraph Plan submitted to Commission.

Ω

89.163(f) LICENSEE RESPONSIBILITY

The provisions of this section authorizing certain unlicensed persons to operate certain stations, or authorizing unattended operation of stations in certain circumstances, shall not be construed to change or diminish in any respect the responsibility of station licensees to have and to maintain control over the stations licensed to them (including all transmitter units thereof), or for the proper functioning and operation of those stations (including all transmitter units thereof) in accordance with the terms of the licenses of those stations.

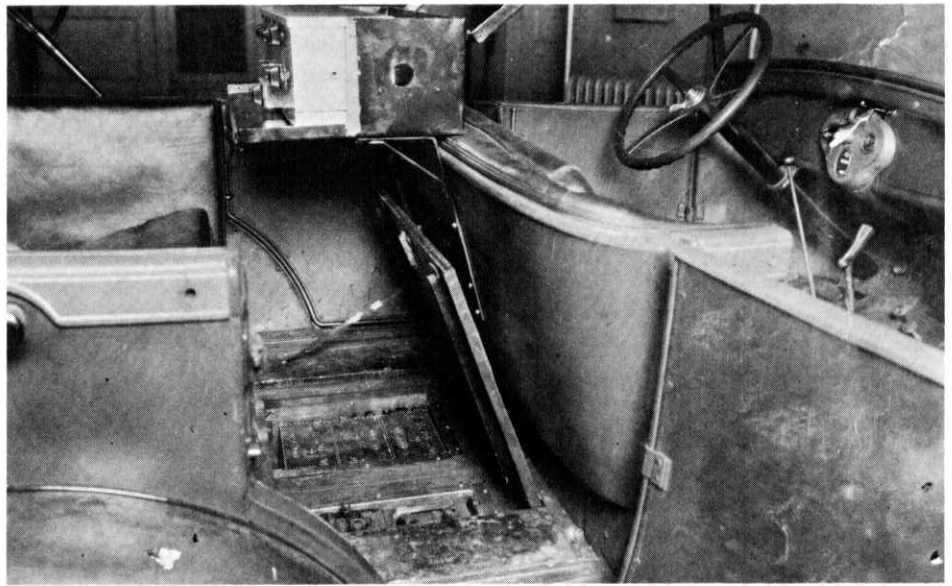
PAST, PRESENT AND FUTURE

(Continued from Page 41)

or the police and other services. Some of you will probably remember that I was chairman of Panel 13 of the Board, and I worked with the police committees all through the rule-making procedures.

Now we will take a look at the future. Of course, I could tell you about the increasing use of integrated circuits in portable and mobile equipment which will make the equipment smaller in size and lighter in power consumption while, hopefully, increasing reliability and improving the performance. Since it is practical to put one hundred or more components on a single 50 mil chip and later this may be increased to five hundred or even a thousand components, it is easy to see that complex informational processing for selective calling, for computer dispatching, and for automatic response for information requests will follow naturally as our art matures. Even today if we wish to spend money enough, we could install automatic equipment which would do almost everything up to the handcuffing of the suspect.

I would caution you all that it isn't what we *can* do that should determine the system's development, but rather what we *should* do to significantly increase the efficiency and effectiveness of police communications systems. We can do almost anything including the effective carrying on of communications by means of mobile and portable equipment for Apollo and the moon landing. With substantial increases in complexity we can establish police systems with car location monitoring and with computer decision-making dispatching. We can set up such systems today, but I suggest that for some cities the cost may be far too great for the improvement achieved. Undoubtedly, as our integrated circuit technology advances, the costs and the apparent complexity will be reduced and the use of such systems will be standard practice. While mobile and portable radio communications will change, we can characterize the changes as I have indicated in terms of the rising use of integrated circuits, the use of in-



First Police radio (1927) as installed in Detroit Police cruiser. This was done by Bob Batts, now head of Motorola's technical training department.

formation processing equipment, and the use of visual recording as well as audio equipment in the vehicles.

The function of police radio equipment is to provide information which will dispatch men to the scene of crime or conflict in the shortest possible time. The efficiency of such systems is rather good today, except for the large systems which are saturated when city-wide or large-scale problems arise. While the radio systems will be designed to aid in the maintenance of law and order, there will be other forces at work attempting to alter the environmental patterns so that law and order will be an accepted behavioral mode for the culture of the future.

Today we are in trouble, but I am an optimist—I believe that the trouble is temporary and that it relates to the transition upheaval which is accompanying our change from a technological culture to the new culture of the scientific revolution. Perhaps you can understand the police problems today a little better if you view them with some understanding of the forces which developed our technological culture and the new forces which will radically modify the present culture over the next fifty year period.

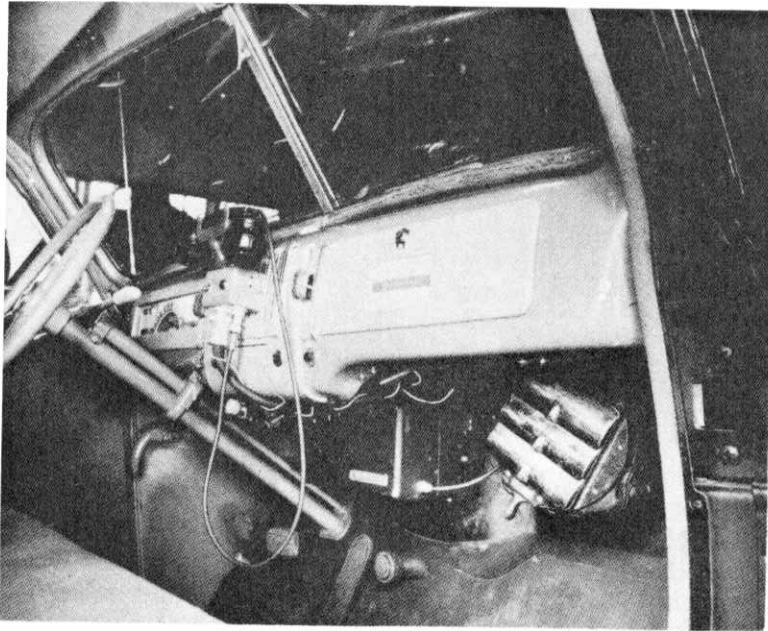
The Industrial Revolution is primarily responsible for the development of our present technological culture, but it is necessary to oversimplify the analysis of the Indus-

trial Revolution in order to understand what has happened to us. Before the Industrial Revolution, men and women were condemned to long hours of drudgery and even child labor became a part of the economy in an effort to bolster the weak structure. Drudgery for the many, with leisure for privileged few, characterized the social system a little more than fifty years ago. As the Industrial Revolution gathered force, everything was radically changed. The development of bulldozers and machinery and equipment to do heavy work and intricate work and redundant work in the construction of railroads, and automobiles, and roads, and airplanes, and the development of high-speed printing facilities and distribution systems produced a miracle of changes.

Why did all of the changes take place? Man had been around for seven thousand years of recorded history, so why the sudden change? This sudden change came about because for the first time in the history of mankind, man discovered how to improve the productivity of labor. He improved the labor efficiency, or more generically, he developed systems for muscle-power extension. The bulldozer, for example, became an extension of man's muscle power, and he could move tons of earth in a few minutes; or in other words, he could

(Continued on Page 78)

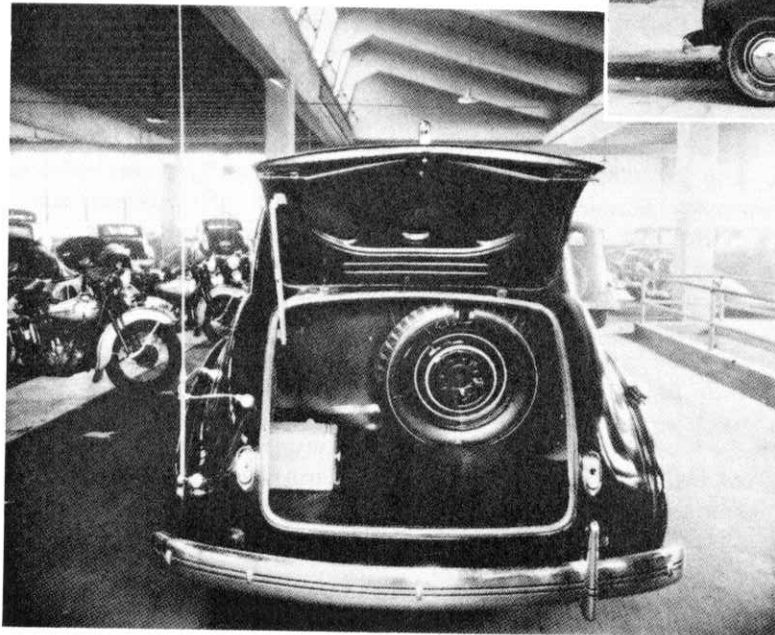
ST. LOUIS POLICE DEPARTMENT USES *Motorola* 2-WAY RADIO



At left is photograph of Controls and Receiver.



Below shows Transmitter and Aerial Installation.



Above is photograph of St. Louis Police car which is equipped with Motorola 2-Way Communication System.

MOTOROLA
AGAIN!

Reproduction of a typical early
BULLETIN Advertisement, 1939 -
1940 - 1941.

GALVIN MFG. CORPORATION • CHICAGO

PAST, PRESENT AND FUTURE

(Continued from Page 76)

move more dirt in a few minutes than fifty men could accomplish in hours.

This improvement in the productivity of labor soon provided leisure for everybody with products to make the leisure more significant. The ordinary working man could now choose where to live, where to work, what education to select for his children, and the entertainment to enjoy. New degrees of freedom of choice became available to the mass of people, beyond anything that had been enjoyed in the prior history of mankind. Unfortunately, we were unable to plan the effects of this application of the extension of man's muscle power, and the forces at work not only produced magnificent improvement in the quality of living for many people, but it also was accompanied by negative trade-offs which today result in the polluting of air and water, the crowding of our cities, the traffic deaths of fifty thousand people a year, and the generation and distribution of an inundating flood of information which has saturated man's brain and his ability to process the information.

In perspective, man is better off than he ever was before in the history of the world, but the man who is *crushed* and *defeated* by the *complexity* of his environment will be unable to consider the changes philosophically; he knows only that the flood of information has challenged his standards and values and subjected him to a regimentation and a complexity which has left him confused and desperately eager to *retreat* to some new *simplestic environment* which he thinks might *ease* all of his problems. The cities are crowded and they are essentially obsolete in terms of the potential developments of our modern technology. The invention of the tractor and commercial fertilizers drove millions of people from farms into the city, and the rising population threatens to change an intolerable situation into a total catastrophe.

I suggest this alienation which permeates our entire country and many countries of the world has resulted from the physical and



EFFICIENCY OF RADIATION IS RAISED ABOUT 40 PER CENT AND PATTERN IS MADE CIRCULAR BY MOUNTING ANTENNA ON CAR ROOF. 34-OHM CONCENTRIC LEAD TO ANTENNA IS INSTALLED AT FACTORY DURING ASSEMBLY OF THE CONNECTICUT PATROL CARS

PROF. DANIEL E. NOBLE WITH THE EXPERIMENTAL MODEL OF THE FIRST 2-WAY FM EQUIPMENT EVER USED FOR POLICE EMERGENCY SERVICE. PHOTO TAKEN AT HARTFORD, CONN.



mental crowding, and from the total saturation of the information processing capabilities of our personal computers (brains). I have said that the organizations we have created, that is the administrative systems and procedural controls, have increased in complexity to the point where the administrative systems are ruling the people who are supposed to be running them. In any large organization, it is impossible for the top executives to make dynamic on line decisions, that is, decisions in real time which are related to the current information. This situation is getting worse rather than better. The problem is clear. What is the solution?

Since the problem is the saturation of our information processing capability, the solution is obviously the development of means of handling the increased information processing load. Fifty years ago we could look at a variable or two involved in a problem, and adjust to an acceptable decision. Today, we look at a hundred or even a thousand variables and the resolution of the force vectors involved is totally beyond the capability of our unaided brains. In the past we solved the problem of drudgery by developing efficient muscle power extension systems. Today, we must solve the problem of *brain saturation through the development of brain extension systems* to increase our information handling capacity by several orders of magnitude.

The computer in its present

quasi-primitive state represents the most important approach to the development of brain extensions systems which will change our social, economic, industrial and political systems of our environment. In the past we approached complexity by organization, and by regimenting people to follow established procedural patterns. Well, some regimentation will always be essential to orderly living; the emphasis upon brain extension systems will restore the individual to an important place in the value-decision making which must direct the formation of our new culture. The random accumulation of an environmental structure is no longer an acceptable or a valid approach; in the future we must plan our goals and properly implement and direct the forces which will help us to reach the goals.

The generation of new scientific information and the rate at which the scientific information is put to work by the engineers has increased substantially over the years. In my lifetime I encompass the period all the way from the invention of the airplane to the successful trip to the moon. We have advanced more, technologically, in the last fifty years, than we have in all the preceding seven thousand years of recorded history. I have characterized the past fifty years as a period of emphasis upon the application of muscle extension systems. The next fifty years will be characterized by far greater speed of change,

with information processing as the dominant force in our changing culture.

Our educational systems will be radically changed and improved by the use of computer oriented teaching machines. The extension of man's brainpower by means of brain extension systems will move us away from regimentation, and restore the importance of the individual in our political and economic systems. Everything from traffic management to production will be automated, and our legal and governmental systems will undergo radical changes . . . we may even succeed in rescuing the country from the hands of the lawyers.

We think we have high speed information processing and distribution systems today, but in the future information centers will store the usual pictures, words, diagrams, and even motion pictures, formally found in libraries, in solid state memory systems which will make information on almost any subject instantly available to the homeowner of the future who will be supplied with requested information over a coaxial cable system feeding directly into his home.

The trend will be away from radio, TV propagation, and toward the universal utilization of cables. Some day it will be cheaper to dial the requests for a book, which will be printed on demand and delivered within minutes, than it will be to store books in the library and follow through the process of picking up the book and delivering it, recording the transaction, and later return the books to the stack. With satellite communications and universal TV and information exchange, the world will move rapidly toward a single culture, and eventually war among countries will be as absurd as the thought of a war between Iowa and Illinois is today.

I wish to emphasize that while we can do almost anything for which the funds are made available, the great change which must take place in our handling of technology is in the decision making process for deciding which things we should do. We must select the most rewarding projects which are destined to enrich life experiences. In the past the invention of new systems and the development of equipment

was determined largely by the *laissez-faire* philosophy, our culture accumulated . . . it was not designed. And the accumulation was not controlled.

We have outgrown the simplistic approach which simply allows things to happen with no thought to the negative trade-offs which can be created. While in the past it was nearly impossible for man to anticipate the changes and direct the forces at work, because of the great numbers of variables involved which were beyond man's information processing ability to cope, in the future, with the aid of computer systems, it will become possible to develop mathematical models and to relate hundreds and even thousands of variables so that reasonably viable decisions can be made. With brain extension systems at work, we no longer have an excuse for letting things happen without control or direction.

So I am saying to you that police communications systems will change radically, but that the changes will be primarily influenced by a changing environment which

will be altered more radically and more rapidly than would seem possible today. We shall remain in trouble during a ten or fifteen year continuing period of widespread alienation, but as the application of brain extension systems becomes more general, we will move into a new and enlightened era. I am optimistic enough to believe the next fifty years will be one of the most exciting, interesting and rewarding periods of man's existence. I wish I could stay around to take part in the brain power revolution. Ω

CHAPTER MEETINGS

(Continued from Page 64)

(Oregon) Sheriff on January 4th, was accepted.

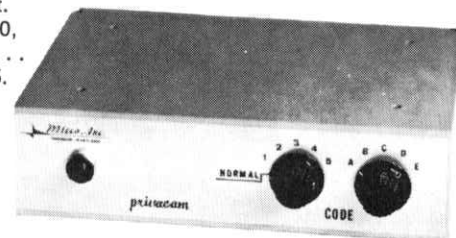
The Active Member application of *Martin W. Pearson*, Chief of Police of Brier, Washington, with his 1970 dues paid, as approved by the Executive Committee, was presented. Application passed.

No further business appearing, the Chapter meeting was declared closed by President *O'Brien* at 5:48 p.m.
Samuel H. Levinson
Secretary-Treasurer Ω

Communications security . . .
mobile radio

SCRAMBLERS

Mieco's Model 10 Privacom Scrambler has 25 instantly selectable codes for a high degree of radio-telephone security. Model P-38 uses complex band-splitting techniques for added security, providing 384 different code combinations, any eight of which are factory pre-wired and selectable by front panel switch. Simple installations . . . interface with any 2-way radio equipment.
Model P-10,
just \$330 . . .
P-38, \$655.



MIECO, INC.

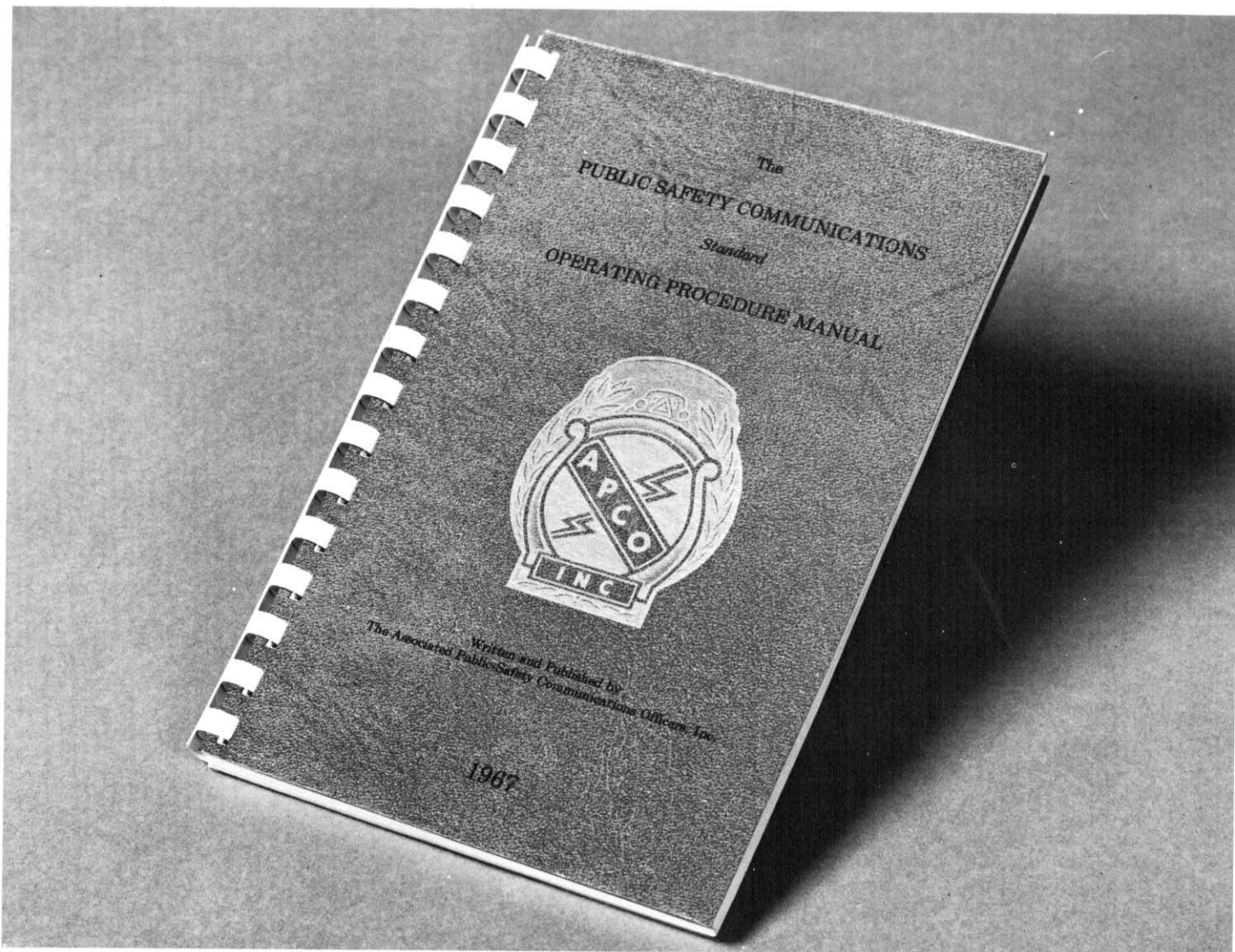
1928 C-4 Green Spring Drive
Timonium, Md. 21093

FROM THE OPERATING POINT

List of Licensed State and Municipal Police
and Emergency Fire Radio Stations—Alphabetically by States

As Compiled by the Federal Radio Commission, Washington, D. C.

Call Letters	Name	Transmitter Location	Frequency Kilocycles Feb. 1, 1932	Call Letters	Name	Transmitter Location	Frequency Kilocycles Feb. 1, 1932
Harbor Police *State Police †Emergency Fire							
CALIFORNIA				NORTH CAROLINA			
KGPD	City of San Francisco	San Francisco	1558	WPDV	City of Charlotte	Charlotte	2458
			2470	OHIO			
KSW	City of Berkeley	Berkeley	2422	WPDO	City of Akron	Akron	2458
KGPG	City of Vallejo	Vallejo	2422	WKDU	City of Cincinnati	Cincinnati	2430
KGJX	City of Pasadena	Pasadena	1712	WRBH	City of Cleveland	Cleveland	2458
KGPL	City of Los Angeles	Los Angeles	1712	WPDG	City of Youngstown	Youngstown	2458
WPDA	City of Tulare	Tulare	2414	WPDI	Franklin County Board of County Commissioners	Columbus	2430
DISTRICT OF COLUMBIA				WRDQ	City of Toledo	Toledo	2470
WPDW	Metropolitan Police Dept.	Washington	2422	OKLAHOMA			
GEORGIA				KGPH	County of Oklahoma	Oklahoma City	2450
WPDY	City of Atlanta	Atlanta	2414	OREGON			
ILLINOIS				KGPP	City of Portland	Portland	2442
WPDC	City of Chicago Police Dept.	Chicago	1712	PENNSYLVANIA			
WPDD	City of Chicago Police Dept.	Chicago	1712	WBA	Penn State Police	Harrisburg	257
WPDB	City of Chicago Police Dept.	Chicago	1712	WBR	Penn State Police	Builer	257
INDIANA				WDX	Penn State Police	Wyoming	257
WPDH	City of Kokomo	Kokomo	2470	WJL	Penn State Police	Greensburg	257
WPDH	City of Richmond	Richmond	2442	WMB	Penn State Police	West Reading	257
WMDZ	City of Indianapolis	Indianapolis	2442	WPDP	City of Philadelphia	Philadelphia	2470
IOWA				WPDU	City of Pittsburgh	Pittsburgh	1712
KGZ	City of Cedar Rapids	Cedar Rapids	2470	TEXAS			
KGPN	City of Davenport	Davenport	2470	KGPI	City of Beaumont	Beaumont	1712
KGPK	City of Sioux City	Sioux City	2470	KVP	City of Dallas Police and Fire Signal Dept.	Dallas	1712
KENTUCKY				TENNESSEE			
WPDE	City of Louisville	Louisville	2442	WPEC	City of Memphis	Memphis	2450
MASSACHUSETTS				WASHINGTON			
WEY	Boston Fire Dept.	Boston	1558	KGPA	Seattle Police Dept. and Fire Dept.	Seattle	2414
WMP	Commonwealth of Mass., Dept. of Public Safety Div. of State Police	Framingham	1574	WISCONSIN			
MICHIGAN				WPKK	City of Milwaukee	Milwaukee	2450
WPDL	City of Lansing	Lansing	2442	CONSTRUCTION PERMITS ISSUED			
WPBE	City of Grand Rapids	Grand Rapids	2442	CALIFORNIA			
WMO	City of Highland Park	Highland Park	2414	KGPM	City of San Jose	San Jose	2470
WCK	Detroit Police Dept.	Belle Isle	2414	KGPS	City of Bakersfield	Bakersfield	2414
WPDZ	Detroit Police Dept.	Detroit	2414	INDIANA			
WKDT	Detroit Fire Dept.	Detroit	1558	WPDZ	City of Fort Wayne	Fort Wayne	2470
WPDF	City of Flint	Flint	2442	IOWA			
WPDR	Township of Grosse Point	Grosse Point	2414	KGPI	State of Iowa	Des Moines	2506
WRDS	State of Michigan	Ingham Township	1574	NEW YORK			
MINNESOTA				WPEA	City of Syracuse	Syracuse	2458
WPS	City of St. Paul, Dept. of Public Safety	St. Paul	2430	WPDN	Auburn, City of	Auburn	2458
KGPI	City of Minneapolis Police Dept.	Minneapolis	2430	OKLAHOMA			
MISSOURI				KGPO	City of Tulsa	Tulsa	2450
KGPC	City of St. Louis	St. Louis	1712	OHIO			
KGPE	City of Kansas City	Kansas City	2422	WPDN	City of Dayton	Dayton	2430
NEBRASKA				TEXAS			
KGPI	City of Omaha	Omaha	2470	KGPR	City of Ft. Worth	Ft. Worth	1712
NEW YORK				TERRITORY OF HAWAII			
WMJ	City of Buffalo	Buffalo	2422	KGPK	City and County of Honolulu	Honolulu	2450
WPY	City of New York Police Dept.	New York City	438	UTAH			
			500	KGPI	City and County of Salt Lake	Salt Lake City	2470
WRDU	City of New York Fire Dept.	Brooklyn	1558				
WCF	City of New York Fire Dept.	New York City	1558				
WPDR	City of Rochester	Rochester	2458				



The APCO Safety Communications Standard Operating Procedure Manual, a training publication of the Associated Public-Safety Communications Officers, Inc., is receiving world-wide acceptance.

Orders for the Manual have come from every segment of the national two-way communications community and from such foreign places as Brazil, Canada, Holland, and Pakistan. It is apparent that the book is fulfilling a global need for information that will teach proper and modern two-way radio operating techniques for both space and wire line mediums, since the Manual also teaches procedural methods for the national law enforcement teletype systems (LETS).

The 120 page book is a product of the Project Two group of the APCO Project Series Foundation. Written from a background of experience by selected communications specialists, the Project was

originally funded by a grant from the Office of Law Enforcement Assistance but the subsequent editions are being printed solely by APCO, which is a non-profit Association.

The original printing was in February, 1967 and the publication is now in its fifth edition with more than 23,000 total copies having been printed. APCO has instituted a monthly instructional seminar - From the Operating Point - in its official house publication, the APCO BULLETIN, that is geared to the Manual and which teaches its application in detail. The continuing seminar tends also to update the Manual and keep it current. This combination of Manual and seminar represents the largest effort of its kind ever attempted in the two-way radio field.

Agencies of state, county, and municipal governments have been the largest purchasers but among

federal agencies using the Manual are HEW, USAID, Department of the Army, Embassies, Treasury Department, Bureau of Customs. Orders have also been received from the industrial area, including Monsanto, Lockheed, Douglas, SIRSA, Forest Industries, and the major suppliers of radio equipment. Orders have also been placed by universities, libraries, research groups, and foundations.

Copies of the copyrighted Manual, which features a letter from Rosel H. Hyde, Chairman of the Federal Communications Commission stating that the Commission . . . "can speak unqualifiedly in commending this highly worthwhile effort" . . . plus a new official listing of the famous APCO originated TEN SIGNALS can be obtained from APCO's Executive Secretary, Major J. Rhett McMillian, Jr., P. O. Box 669, New Smyrna Beach, Florida 32069, postpaid at \$1.25 per copy.

EDITORIAL

THREE DECADES AND SIX

This issue of the BULLETIN marks the latest effort of the Association to gather its historical memoirs together and present them in one collective vehicle. Unfortunately, as usual in voluntary efforts of this type, all of the data was not available.

However, there is little doubt but what most of it will be forthcoming, for when those who participated in APCO's early history read this special issue and belatedly realize that they should have answered the many previous BULLETIN calls for material, they will want to establish their part in the effort.

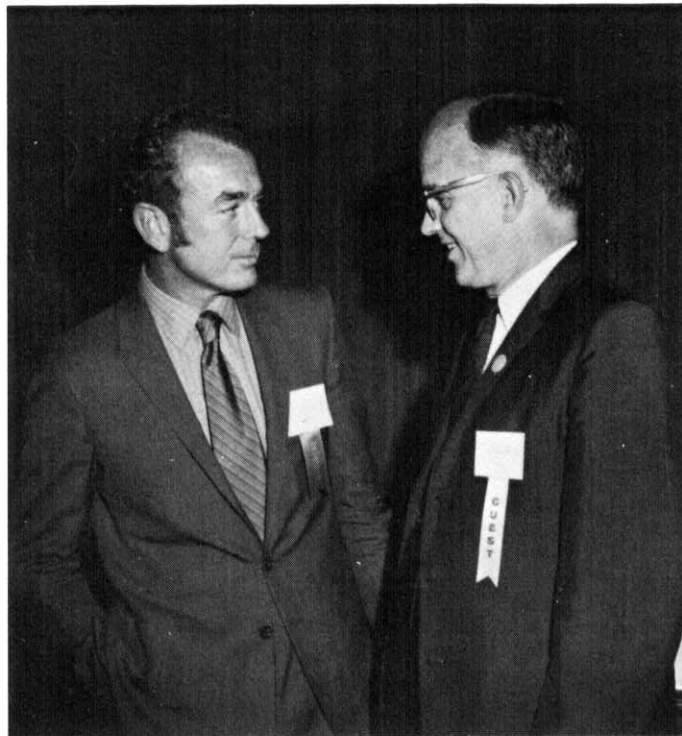
Therefore, it should be understood at this point that the BULLETIN plans to issue a sequel to this issue, a special effort to not only incorporate that belated historical material hopefully flushed out by this issue, but to as well present a corollary on local chapter histories. A clear call is thus issued to all local chapters who have not as yet reported on their historical past to do so at once, and to once again request those historical figures who did not reply to the earlier call for "antique" material to now contribute their own experiences.

The material in this issue is priceless in historical value. No other than APCO could have collected and presented it as well. And, of course, the most important consideration of all is that the history of the entire two-way land mobile radio field had its beginning in APCO, so it is only to be expected that APCO should be the official body and treasurer of this resource.

There are some subtle philosophical as well as historical trends to be noted in this issue, all of which, of course, are expressed in separate context and from different viewpoints. Nevertheless, there seems to be some differences of opinion in matters concerned with who did what where first. This is to be expected, for when information from different sources is compared in concert for the first time the lack of previous availability of information becomes apparent. In this direction, the BULLETIN is requesting APCO Historian Ducky Dengler to research this issue in detail, make inquiries where considered necessary, and at a later date in his Glancing Back column to report on his findings. This compiled information, with subsequent comments from the field regarding these and other matters as reported in this issue, will add much to later historical efforts in the field of public safety radio communications.

A more dominant theme to be found in this issue is that of the tremendous dedication of the APCO member. It is difficult to visualize an organization whose participants are more united and consistently eager to obtain objectives which are as selfless and idealistic as those of this Association. APCO is not an immense

organization as national groups go. It may never be a large organization in that sense. But it will always be large in terms of deeds. It is the largest and oldest in the public safety radio field. It is large in terms of respect tended it from the industrial and regulatory worlds. It will always be largest of all in terms of the devotion and comradeship of its members, be they Active, Associate, Commercial or whatever.



FLOOD

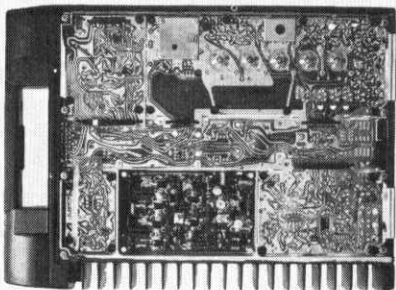
(Courtesy IMSA)

COX

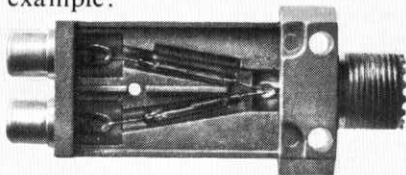
An historical example of this spirit is exemplified by the photograph on this page where Bernie Flood, then incoming APCO President, pays his personal respects and says goodbye to outgoing FCC Commissioner Kenneth Cox during the recent Clearwater Annual National Conference. Commissioner Cox established an historical precedence in bettering the relationship between APCO and the Federal Communications Commission, with an insight and personal interest whose loss is already sorely missed. There was hardly a dry eye in the group that crowded around Commissioner Cox after he had bid APCO farewell, including, we suspect, the normally twinkling orbs of the brilliant regulatory official.

There is hardly more to be said on this page. Many of the historical figures are no longer seen around the meeting halls, the exhibit areas and the hospitality suites. It would be unfair to mention one without mentioning all; even so, under guise of the latest to retire from the scene, are Bills Whiting and Gamble. APCO will never be the same without them and others of their ilk. The other pages between the covers of this issue speak of these matters more plainly and effectively. It is up to the newer members to carry on the ideals and objectives of present APCO. And don't think for a moment the Association doesn't endlessly look for and toward fresh talent.

It does, indeed. Historically. Ω

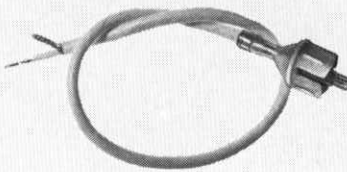


Our new MICOR 2-way radio is the first radio with custom designed monolithic integrated circuits. It's the most powerful, longest lasting radio ever made. That's quite a claim, but it's quite a radio. For example:

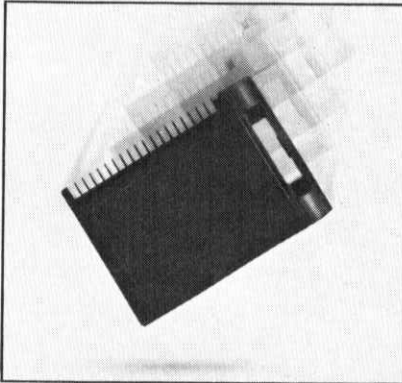


Antenna switch failures were always a problem in all radios. We eliminated the problem completely. We tested our new switch 200 million times. That's equivalent to 100 operations a day for 5,000 years.

Another big change is wiring. Most radios use about 108 feet of wire. We replaced it all with only 5 feet. Less wire. Less problems.

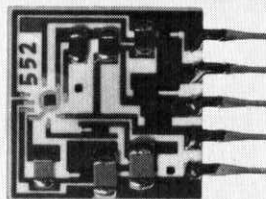
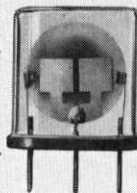


We made the case and components strong enough to survive a 20g impact. So, if it can survive that, don't worry about road bumps, vibrations, and shocks.



Monolithic crystal filters produce high selectivity and stability with fewer parts and no tuning.

IC circuitry throughout the radio tops off all of MICOR's new ideas. It works better, lasts longer, and literally makes maintenance a snap with plug-in modules. Even tuning can be done without removing the radio.



MICOR is a radio for today. A radio for tomorrow. A radio for you. Write for a brochure. Motorola Communications & Electronics, Inc., Dept. 79, 1301 E. Algonquin Rd., Schaumburg, Ill. 60172.



MOTOROLA TOTAL COMMUNICATIONS

**Now that we've made it,
we have to make you believe it.**



THE HANDIER ONE...

GE's new MASTR Personal/Mobile Two-Way Radio.
Adds a New Twist in Personal Communications.



Here it is. 5½" small, 17 oz. light.
Thick-film integrated-circuit modular
construction with connections to a
common mother board for maximum
reliability.

You get output up to 2W.

The whole works is enclosed in tough
GE LEXAN® housing.

And quick-change twist-lock battery packs
allow you to choose power output, duty
cycle and operational time—a new twist
and new dimensions in personal
communications.

Get your hands on the handier one.
Call your GE Communications Consultant,
in the Yellow Pages under "Radio Communication."
Or write General Electric Company,
Mobile Radio Department, P.O. Box 4197,
Lynchburg, Virginia 24502.

GENERAL  ELECTRIC

