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NEW YORK'S MODERN FIRE COMMUNICATIONS CENTER

N. J. Reinhardt
A. Dettori

THE RADIO CLUB OF AMERICA, INC.
11 West 42nd Street ★ ★ ★ New York City

FOUNDED 1909 NEW YORK, U.S.A.

The Radio Club of America

ORGANIZED FOR INTERCHANGE OF KNOWLEDGE OF THE RADIO ART, THE PROMOTION OF GOOD FELLOWSHIP AMONG THE MEMBERS THEREOF, AND THE ADVANCEMENT OF PUBLIC INTEREST IN RADIO.

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NEW YORK'S MODERN FIRE COMMUNICATIONS CENTER

BY

N .J. REINHARDT* AND A. DETTORI**

The subject under discussion is the new Fire Communications Center in Staten Island, N. Y.

It will be helpful to lay some groundwork for this subject since Fire Communications is a specialized field with which comparatively few individuals have direct contact and even less technical association.

The current annual budget for the New York Fire Dept. is over $140,000,000.00. The organization is obviously not small and, since its efficient function is largely dependent upon rapid and accurate communications, the magnitude of the Communications problem is self-evident.

The physical plant of the Bureau of Fire Communications consists of five central stations serving 284 fire houses, 1700 miles of cable, 1800 miles of aerial wire, 500 miles of conduit and some 15,000 fire alarm boxes. A radio system composed of 4 sub-systems serves the fire fighting force and is composed of about a dozen base transmitters, a microwave link and nearly 1000 mobile and portable units. There is also a fleet of 10 fireboats equipped with high resolution navigational radar.

The annual communications traffic consists of the processing of some 96,000 alarms of fire involving about 61,000 actual fires. The **total** number of signals transmitted was 115,000 the the total number of radio transmissions was in the order of 730,000 for the past year.

By use of a slide rule, it becomes apparent that it costs about $2290.00 to extinguish a fire and, if unnecessary and false alarms are counted, a figure of $1468.00 is indicated for each "run" of apparatus.

In keeping with the current trend toward management analysis of cost per unit of accomplishment it is obvious that an increase in either fires or false alarms will result in a direct reduction of units costs. The pathway toward greater municipal economy is clearly marked.

The telegraphic fire alarm system came into existence almost immediately following the developement of the telegraph itself and dates back to about 1848. The earliest systems were open circuit-very much in the nature of the door bell with a simple coding device for identification of the box location. Not too long afterward there began the developement of more sophisticated systems involving the closed or supervised circuit and, in about the 1880's, some significant advances involving the non-interfering and non-interfering, succession types of fire alarm box were made.

In order to clarify these terms, it will be of help to explain a typical fire alarm circuit. The circuit is basically a wire loop, some miles in total length, connected to a station battery or other source of power through one or more current sensing relays. A number of fire alarm boxes are interposed in series in the circuit loop. These are basically circuit interruptors which transmit a unique code by means of a spring wound mechanism driving a code wheel. The circuit interruptions are sensed by the aforementioned current sensing or "line" relays. Drop out of the line relay closes a "local" circuit causing a signal in synchronism with the code wheel interruptions to manifest itself by lights, buzzers, punch tapes or any other convenient means. Any opening of the circuit in an abnormal manner is manifest and circuit integrity is thereby guaranteed.

It is apparent that such a system is vulnerable if two boxes are pulled simultaneously since a mutilated signal would be received. A mechanism was developed during the 19th century, which was the age of glory for the mechanical engineer, first to permit reception of one signal while ignoring the second and later on to permit reception of the first signal and then to receive the second in the order of the box activations. These were known as the non-interfering and the non-interfering, succession types of fire alarm box respectively. The second very quickly supplanted the first for the obvious reason that one box was ignored and therefore "last" in the earlier, simpler non-interfering unit. The non-interfering succession type of box has been relatively unchanged for over 80 years. It has been quite satisfactory and, on the whole, extremely reliable and constitutes a tribute to the mechanical or, more properly, the electro-mechanical skills of those who have

*System Design Engineer. New York Fire Department
**Project Engineer, Reeves Instrument Corporation

long preceded us.

There are other sophistications constantly in process which will be discussed later on but the fire alarm was, in conjunction with the telegraph as we know it, one of the top ranking developements of that phase of the art at the time. Before the turn of the century, there existed what now appears to us as a novel situation in which the Telephone Company borrowed a few cross arms from the Fire Alarm Telegraph Bureau, to string wires on poles for purposes of telephonic communications. The police telegraphic system for a time was co-existent but had developed somewhat later than the fire system.

The fire alarm box can transmit a unique, simple and straightforward plea for help but little additional intelligence and it has not changed significantly in nearly 80 years.

It may be in order to dwell briefly upon what is, no doubt, a logical question in the mind of an intelligent observer, "Why do we not combine the communications functions of several emergency services, and utilize some of the more flexible media available to us for the transmission of emmergency messages?"

Anyone who has had intimate association with Fire Departments in relatively undeveloped areas can see, compressed into a very short period of time, the whole evolution of the municipal emergency communications system.

When a community is built, the first need is for fire protection and the medium of communication is the split locomotive tire with a sledge hammer, chained to a post, to strike a blow for the further developement of emergency communications.

This device had its problems as do our present day transistors. The particular mode of failure for this unit was termites in the hammer handle.

The logical evolution from the locomotive tire or bell was in line with the advance of the telephonic medium and consisted of dragooning the local telephone operator into service for purposes of rounding up the personnel to man the fire apparatus. The next step contributing to spiralling a municipal budget was the employment of a village policeman who directed traffic in front of the church on Sunday mornings and devoted the rest of his time to unremitting vigilance designed to nip in the bud any incipient local crime wave. The combination of telephone operator and policeman constituted what was essentially a 24 hour watch and telephone calls were relayed to the Police Department who, in turn, notified the volunteers of any fire emergency. At this stage, the police department grew as a professional paid organization while the fire department grew as an unpaid volunteer group. The cooperation between the two at this stage was generally somewhat less than totally satisfactory. Further community growth produced a paid or partially paid fire department and the functional rivalry between the police and fire departments usually resulted in separate communications for the two with greater emphasis on the fire system.

As communities grow very large, the efficiency experts who are a, perhaps necessary, concomitant of municipal enterprise arrive at the earth shaking conclusion that the several emergency services should be combined in the interests of efficiency and economy. These analysts were, of course, not practicing their trade at the time the services were split as a matter of pragmatic necessity.

The incidence of fire calls is significantly less than calls for other emergency services. Requests for assistance from police, ambulances and dog catchers are far more numerous than from the fire department.

Those of us in the fire services are gravely concerned with the fact that any combination of services or use of a universal communications system would tend to degrade our own operation. This is because, in a communications center handling a variety of calls, the fire call is probably the most infrequently received and for this reason not ordinarily anticipated. The nature and frequency of other calls is such that, in most instances, there is no need for the split second response required in the fire service where the first few minutes generally determine the entire complexion of the operation and frequently are a matter of life and death not only for the occupants but also for department personnel.

The net result is that receiving personnel is not mentally or emotionally conditioned to respond differently to a fire call than to a routine civic complaint and the additional re-routing to the fire service interposes another delay detrimental to efficient operation.

Such a universal communications center is almost necessarily one depending entirely upon the telephone and in a city of the size and complexity of New York the deficiencies of an oral communication system due to the multi-lingual nature of the population and to the aberrations of people under stress is most apparent to anyone who has ever heard a recording of such a conversation.

There are instances in which the caller may

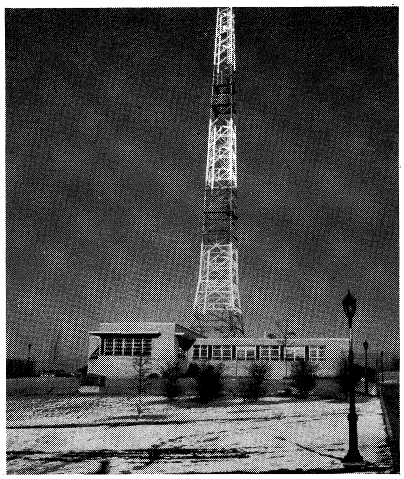


Fig. 1. The New York Fire Department Fire Communications Center on Staten Island, N.Y.

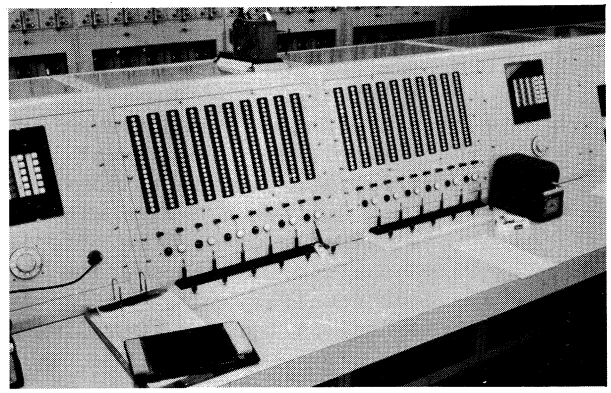


Fig. 2. The dispatching function, which includes equipment status display, geographic distribution and available communication means.

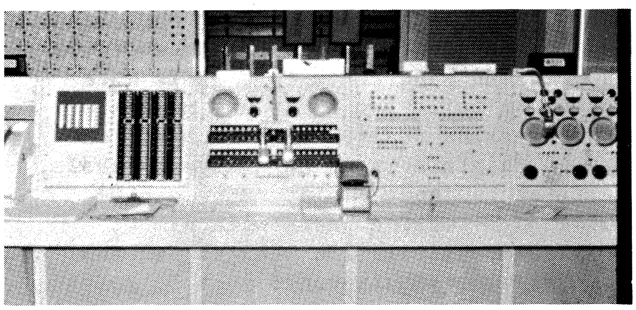


Fig.3. The voice alarm panel providing selective public address communications with fire houses, singly, in groups or in their entirety.

Fig. 4. The radio control console providing city wide communications and communications directed to the individual boroughs.

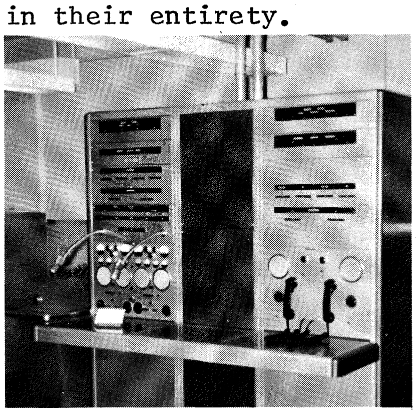


Fig. 5. Rack of voice alarm equipment installed in the Fire Communications Center basement.

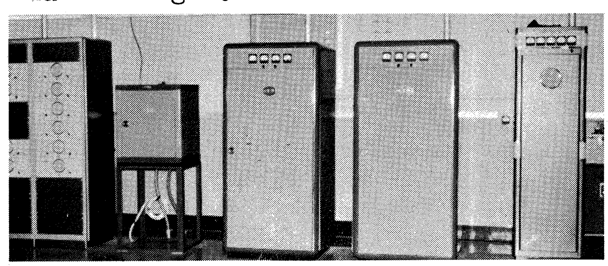


Fig 6. Radio transmitting equipment installed at the Fire Communications Center. Complete redundancy is provided to insure unfailing communications.

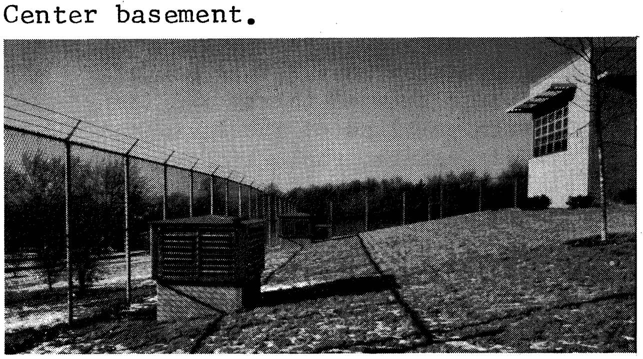


Fig. 7. One of the air intake tunnels which provides filtered air for personnel and equipment.

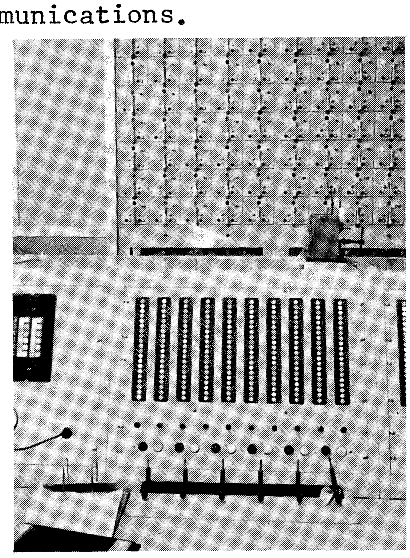


Fig. 8. The automatic bell transmission panel which control the familiar bell signals heard in every fire house.

give an address at which he resided twelve years ago, an incomplete address a completely wrong address and so on.

There is merit in a device which transmits a message that is accurate, impersonal and requires no further interpretations. The fire alarm box is such a device within its limitations and continues to be effective. The telephone complements the box and they are both necessary in any effective system. Neither one is totally effective per se.

It is imperative that those of us charged with the responsibility for providing communications keep abreast of changes and improvements in the art. We cannot, however, be expected to be at the very frontiers of communications knowledge because we must restrict ourselves to tried and proven methods because the order of reliability must be extremely high. It is doubtful that in an incidence of 96,000 alarms of fire annually produces more than two or three malfunctions as error. This is a failure rate substantially lower than in any other normal communications medium.

The operational methods may appear to be somewhat cumbersome but they are remarkably effective and there is good reason for maintaining an open minded skepticism toward the use of the wonder children of the electronic age without thorough evaluation of their deficiencies as well as their capabilities.

All of the foregoing is background material but is germane to this discussion.

We have been confronted with the threat of the nuclear bomb for almost twenty years and those of us who are charged with the responsibility of trying to anticipate the future - however poorly - cannot fail to be cognizant of this threat.

About fifteen years ago, serious thought was given to the role of fire communications in a nuclear attack. At the same time, the necessity for a new alarm station in Staten Island was becoming more pressing. The old station was built in 1904 and was totally inadequate to cope with any substantial population expansion.

The technical problems was to attempt to incorporate, at cost, all of the desirable attributes which could be foreseen.

The structural problems were resolved by building down instead of up. All normal functions are on the ground floor level and the major portion of the equipment is housed on the basement and sub-basement levels with an emergency operations center on the latter.

The economics effected by not housing to provide a finished exterior greatly offset the costs inherent in a structure of this size built in a more conventional manner.

While there were no major changes in the fire communications concepts per se, there was a radical departure from most previous methods of the implementation of these concepts. There are a number of members of the Radio Club who, unconsciously or otherwise, contributed much to the underlying philosophy of the design.

The principle of redundancy is of extreme value in this particular application. We, in common with industry and everyone else, are confronted with the problem of acquiring competent personnel. In actuality, it was ever thus and the problem is simply that our present day expectations are higher than they were a generation or more ago because of the increasing complexity of our society. It has been our experience that it is more economical to build two units and maintain them in a routine fashion than to build one and try to maintain it on an emergency basis. In the first instance, maintenance can be scheduled on a routine basis with almost total manpower utilization whereas, in the second, manpower requirements must be geared to maximum instantaneous demand with much attendant idle time.

In addition, a routine repair or maintenance function can be more efficiently and effectively carried out than can be one which is performed under conditions of urgency and consequent stress.

The selection of components was an all-important part of the overall design because, as equipment capability is increased, so too is its complexity and its susceptibility to failure. It was the intent to eliminate the human factor to the greatest possible degree. It has been our experience that a function which can be programmed can be more reliably carried out by mechanical or electrical than by human means provided that the component failure rate is not as high as to negate this concept.

In the fire service, an installation of the type under discussion must have a useful life of somewhere between thirty and forty years. Certain portions of the equipment such as diesel engines, radio transmitters and their associated controls are less long lived and must be replaced in a matter of 15 or 20 years because of their greater frequency use and the more rapid technological absolescence. Component reliability, however, must be at least as high as in other equipment.

In certain portions of the equipment, infrequency of operation is a more serious problem than failure caused by wear in other types of service so that a certain amount of judgement must be exercised in the selecton of materials as dictated by the application.

All relays employed are of the plug-in variety and in many instances constitute sub-assemblies of plug-in modules. Contact materials are of gold alloy for audio circuits and those operating below 10 volts, of palladium in other applications and of tungston or silver-cadmium oxide where extreme frequency of operation or high interrupting capacity makes their application preferable. Mercury wetted and glass encapsulated dry reed relays are employed in certain areas and the latter are utilized in logic matrices where the great numbers required to perform the function makes an extremely high reliability mandatory.

Relays are invariably dust protected by means of individual and in some cases, common screw down dust covers. Common bus bars are gold plated and all plug in connectors are of the gold plated variety. The corrosive atmospheres in an industrial area near salt water makes their use absolutely essential for high reliability.

All wire is teflon insulated in the interests of fire resistance and for its ability to be re-worked without damage by soldering irons or due to aging.

The operating consoles contain little equipment other than wiring and the essential switching keys or jacks. All relays, switches, amplifiers and other equipment is, in so far as is practical, are separately and remotely housed. This is not only a boom to the service

R C A
FOUNDED 1909

The Radio Club of America, Inc.
11 West 42nd Street
New York 36, N. Y.

September 11th, 1963

Miss Emma R. Kunkel
Radio Club of America
New York, N.Y.

Dear Miss Kunkel:

I wish to express the appreciation of the present Officers and Directors of the Club, and indeed that of past Administrations as well, for the vast amount of work you have done for the Club for so many years. I have contacted many of these past officers and received complete concurrence in this expression from all with whom I talked.

While we all have realized that any work given you, touching on any of the many fields of our activities would always get done quickly, accurately and with a minimum of effort on our part - it seems that we have come to take this efficiency for granted, seemingly without appreciation of the efforts we have asked for. We will all miss you. And it seems that the rest of us will now have to get busy ourselves for a change to handle the scores of details that come up each month that have been left, till now, in your hands.

Since many of our former officers and members may not have heard of your impending retirement, it has been decreed that this note of appreciation be published also in the next issue of the Proceedings.

We wish you a happy future.

Sincerely,

Ralph R Batcher

President, 1963.

man in terms of better access remote from the area of activity but goes a long way in protecting delicate equipment from the attrition of Coca Cola, cigarette ashes and bologna skins which are the bane of the electronics and communications industries.

Before going further it may be in order to describe the fire dispatching operation. Contrary to popular belief, in a large municipality, the signal from the fire alarm box does not go directly to a fire house. It is transmitted to the Fire Alarm Central Station and is then retransmitted to the a propriate fire houses. The Central Station is, in essence, a clearing house for all fire department activities. The two basic methods of receiving alarms of fire are by street box and by telephone. In the more densely populated area, a fire alarm box is located at alternate street corners so that theoretically one need never go more than one block to sound an alarm. Each box constitutes the focal point for apparatus movement on a particular assignment and the entire assignment system might be likened to a television display of relatively low resolution. The telephone alarm can pin point the fire location more accurately but for dispatching purposes, all activities are based upon the box number with additional information supplied via the "Voice-Alarm" or public address system and by radio. Each fire alarm box has an assignment card associated with it which lists the apparatus units that are to respond upon an alarm. Should the fire be of such proportions as to require additional equipment, assignments based upon 2nd 3rd 4th and greater alarms are listed as well as assignments for the relocation of remote units into vacated fire houses nearer the scene of the fire. These assignments are based upon rather carefully evaluated sets of factors such as the general occupancy of the neighborhood, access routes and numerous others which were examined when everyone was in full possession of his faculties and little is left for spur of the moment decisions.

The means of communication between the Central Station and the individual fire houses consist of the public address system, the telegraphic bell system, telephone and finally radio. None of these media is any more reliable than one can reasonably expect even with every possible safeguard; but four fold redundancy has provided an almost perfect record of operational integrity despite occasional loss of one or more of the facilities.

The dispatching function operates smoothly as long as the assignment card can guide the activity but the nature of any emergency service is such as to be confronted occasinnally with the unforeseen. If several large fires are concentrated in a relatively small area, the assignment card is of limited value and the dispatcher must exercise considerable judgment in order not only to supply an adequate amount of equipment at each fire but to provide proper protection in areas stripped of apparatus.

Thought is being given to the eventual semi-automation of this phase of the operation and, in all likelihood, steps will be taken to incorporate this feature in the next central station modernization program.

The accompanying illustrations show the physical arrangement of the equipment and some of the features which are unique to the Staten Island installation. Figure 1 is a view of the building and its surroundings including the 250 foot radio tower which is the supporting structure for the various antennae. The tower design is based on a working load of fifty pounds per square foot upon one and a half times the projected area plus half an inch of ice. The foundation design is based upon an uplift of double that encountered at maximum working stress. The ultimate load which can be sustained is probably in excess of twice the working load.

Figure 2 is a partial view of the operating room and that portion of the console which represents the dispatching or sending function. There are shown the four essential pieces of equipment that are the tools of the supervising dispatcher. First of all is his status board which consists of a series of three position switches related to each piece of fire apparatus in the borough.

The positions are "In service," or available for assignment, "Out of Service" and "In Service by Radio." Associated with the status board is a stylized map which shows the approximate geographical location of each unit and its particular status by means of colored lights. White is "In Service," red "Out of Service" and green "In Service by Radio."

The dispatcher knows whether the units he is about to call are available and whether they must be contacted by wire line if in service or by radio if in the field.

The next piece of equipment is the "Voice Alarm" which is the rather esoteric term applied in the fire service to the public address system which permits transmission of voice messages to the fire houses on an individual, or group or over-all basis.

This is a pirority system in which the dispatcher has complete control. The fire house cannot interrupt the message and it is not used for purposes of intercommunication between fire houses. It is limited, and deliberately so, to direct communication between dispatcher and fire house.

Here again is total redundancy. There are two microphones, two loudspeakers, two VU meters and two volume controls

Figure 3 shows the voice alarm panel. They are identical but in no way related to one another except that by operating a single switch, total replacement of all essential units common to the system is effected and duplicate units are now in operation. A fault can be corrected as a routine instead of an emergency without interruption of service. The duplication does not extend to units associated with individual fire houses but is limited to those units which are common to the system.

Figure 4 shows the radio console which is the last of the four dispatching elements. There are four distinct radio systems in the New York Fire Service. One consists of the city wide operation which encompasses administrative units and those which operate in all five boroughs. Manhattan and Bronx share a common set of frequencies as do Brooklyn and Queens. Richmond, by virtue of geographic isolation, operates on its own set of frequencies.

The console is capable of controlling transmitters on all of the four frequencies and receiving on the four talk-back frequencies. The console consists of two dual panels, the first controls the Richmond and the city wide operation. Since all transmitters have dual frequency capabilities, it is possible to use one unit as a standby for the other and provide a total duplication of sorts in the event of the failure of one system - again by throwing a single switch. The second panel controls two transmitters, one on the Manhattan and Bronx frequency with capability of operating on Brooklyn-Queens and the other the reverse. They are marked Manhattan-Queens and Brooklyn-Bronx in anticipation of an ultimate separation of the boroughs. The reason for the particular selection is that while it would be fairly common for Richmond to operate with either Brooklyn or Manhattan units, it would be almost unheard of to utilize either Bronx or Queens units at a Richmond operation. At the present time, the arrangement again represents total duplication of facility.

One of the unique system features is the use of automatic receiver selectors on the Richmond console.

There are a number of receivers located at various points throughout Staten Island to relay messages from mobile units via wire lines and microwave to the control station. The radio operation requires the rebroadcast of mobile messages and the mixing of messages from various receivers is detrimental to clarity, due to various qualities of reception by the several receivers plus phase distortion occasioned by the differing propogation characteristics of the telephone lines. Manual selection is cumbersome and is honored more in the breach than in the observance because of the press of more important matters.

The signal to noise ratio at each receiver is translated into a figure or merit through the switching of combinations of three tone codes which yield seven combinations for each receiver. The tones are below 300 cycles in frequency and are separated from the audio by means of appropriate filters at the station end. The tone activated relays which give priority to those combinations associated with the highest figure of merit and only the best receiver is heard. The action is quite rapid and if levels are properly set, there is no perceptible break in continuity as the selector changes from one receiver to another.

It has long been an established practice in the control center, the value of which has been proved out again and again, to record every voice communication related to a fire or other emergency. This applies to telephone, radio and voice alarm operators. Figure 6 shows soundscriber discs being changed as a routine maintenance operation.

Figure 5 shows the rack housing the voice alarm equipment in the basement. The individual switching modules and the several amplifiers are all plug in and unit substitution greatly minimizes trouble shooting problems.

As has been indicated previously, the operation is on a three story basis. The sub-basement radio console is the true console; the one on the first floor operations room is a remote operating extension of the one shown in figure 7. The panels are exact duplicates of those installed on the first floor. A switch permits transfer of operating function to the sub-basement master unit and total isolation can be effected by withdrawal of plug-in connectors in the rear of the cabinet.

The only vacuum tube equipment in the entire operation other than in the radio equipment is mounted in the sub-basement radio console. The amplifiers which were a part of the original radio system date back some twelve years. They have been relatively faultless and in the case of about 150 units there have been only three or four instances of failure in this period attributable to defective tubes and no to the associated equipment itself. The equivalent type of solid state amplifier did not exist at the time the design was frozen and this fact accounts for the retention of the vacuum tube equipment. In subsequent designs, such units will be supplanted by solid state devices.

Again all relays are plug-in and all wire teflon insulated. This latter feature was most fortuitous on a particular occasion during the course of installation when a certain highly placed engineer, the mention of whose name is forbidden by modesty, through a stroke of monumental stupidity, managed to "blow a short" and burn out everything but the teflon wiring portion of the equipment. Anything other than teflon would have resulted in a smoldering mess and necessitated the replacement of not only the affected wiring but adjacent harnesses as well.

Figure 6 shows the radio equipment. The two large transmitters have been in continuous operation for twelve years and their performance is not matched by other current communications equipment. They were fitted with ultra-stable oscillators about two years ago and maintain a stability of about three parts in 10^8 cycles per second. Since the stability is nearly that of a primary frequency standard, it is difficult to establish the error. They serve as a secondary standard for the field service personnel for purposes of setting up the mobile equipment and are, for this reason, extremely valuable in eliminating the need for individual portable standards and obviate the need for "netting" techniques.

The various receivers are in the racks on the right. The unit on the extreme left is one of the two transmitters utilized in the Manhattan-Brooklyn function. Another will supplant the small unit near the right, which is a microwave receiver. The latter will ultimately be replaced by a multichannel mircowave unit.

Figure 7 shows one of the air intake tunnels. They consist of three to four foot diameter concrete tubes each of which can supply the total amount of air required for diesel engines, air conditioning and human consumption. Total obstruction of two, or partial obstruction of all three, would still permit entry of sufficient air to carry on all functions. Provision is made for emergency sewage ejection, filtration of contaminated air, detection of excessive radio activity, and emergency food and water supplies. There are dormitory and food storage facilities and it is possible to sustain from ten to fifteen people in reasonable security, if not in complete harmony, for probably six to eight weeks.

An automatic readout for incoming fire alarm box signals, now in the process of construction, will be considered and described in a later paper.

PRESIDENT BATCHER ATTENDS RADIO ANTIQUE CONCLAVE

Your president attended the conclave of the Antique Wireless Association held at Holcomb, New York, near Rochester, on August 17th. Several scores of wireless equipment collectors, some from more than a thousand miles radius, inspected an array of radio antiquities, a few of them equipments over 50 years old. Those attending had an interesting time discussing the exhibits, the possibilities of more expanded events in the future and, ultimately, for a permanent historical museum.

President Batcher reported several projects under consideration by our Archives Committee: first, whether it is possible or desirable to consider a Club-sponsored wireless historical museum, in view of the extensive "hordes" of apparatus still in the possession of its members, and second, the possibility that the Club might establish a form of certification which would show that certain equipments did indeed play a part in memorable events, based upon a formal investigation under rules to be set up. The ideas were well received and the hope was expressed that we would proceed with these objectives.

McMANN APPOINTED VICE PRESIDENT, CBS LABORATORIES

STAMFORD, Conn., August 21, 1963 -- The promotion of Renville H. McMann, Jr., to Vice President of the Military and Industrial Systems Department was announced today by Dr. Peter C. Goldmark, President and Director of Research of CBS Laboratories.

Mr. McMann has been Director of Engineering for the Department since 1960. His areas of special competence include aerial reconnaissance systems, FM multiplexing, color video recording, special radar techniques, and video recording and transmission systems. He joined CBS Laboratories in 1955 as a project engineer.

CORRECT YOUR RADIO CLUB LISTING

Inform Club office of any changes in address, telephone number and connections for the revised list soon going to press.

NEW CLUB MEMBER HAS ESTABLISHED WIRELESS MUSEUM

Another new member, Bob Merrian, has, with his wife Nancy, established the New England Wireless Museum on Tillinghast Road, East Greenwich, Rhode Island, purely as a hobby and seemingly an expensive one. They are also looking for pictures, letters, documents, books and equipment that touch on the story of "wireless" before 1930. Club members are invited to stop in when in the neighborhood. The location is two miles south of the junction of US 95 and Rhode Island Route 2; the telephone is TU 4-1710. If any members wish to submit material and exhibits, send complete information by letter describing equipment, age, condition and significance. Do not ship without prior approval.

ART LOUGHREN WILL IMPROVE THE TRAFFIC PICTURE

Arthur Loughren (F '44) is active in a new group of engineering consultants specializing in analysis and solution of traffic control problems. Formerly Applied Research VP at AIL, Loughren is widely experienced in the analysis and design of communications systems. He is well known for his achievements in TV engineering, particularly in compatible color TV. He has been very active as a consulting engineer in the past few years. The results of his new duties with Traffic Operations Associates, Syosset, will be eagerly awaited by anyone who drives in the New York-Long Island area.

1909 RCA 1963

54th Anniversary Banquet
OF
The Radio Club of America, Inc.

Thursday, December 12th, 1963

AT THE

SEVENTH REGIMENT ARMORY

PARK AVENUE AT 66th STREET, NEW YORK CITY

STAG — INFORMAL

A full account of Dr. William E. Schevill's brilliant and informative presentation will be included in the next issue.

Another *hallicrafters* FIRST ----

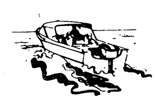
with SSB !

New kind of information center brings you all the things you don't want to get away from

If you need a portable only for an occasional picnic, then frankly this one is out of the ball park. But if you are a man of action whose interests demand important and reliable information wherever you go . . . read on.

This precision communications instrument utilizes the same type of high performance hand-wired circuitry and features employed in Hallicrafters' finest professional and military receivers.

Four separate short wave bands bring you news of important world events, direct by short wave (in English) from Moscow, Berlin, Havana, London — with as many different viewpoints. And you can monitor radio amateurs, military, aviation, government and disaster frequencies at will.



The low-frequency band brings you reliable aviation data and government weather reports from hundreds of miles around, 24 hours a day . . . plus Consolan marine navigation . . . and you'll hear home-town stations from hundreds of miles away on the extreme-sensitivity AM band.

- ★ **Six bands — four short wave (foreign, amateur, government, military, disaster frequencies) plus extended-range AM plus long wave band for aviation weather and marine navigation.**
- ★ **BFO for code, single sideband and Consolan (marine navigation system) reception.**
- ★ **Weighs only 12 lbs.; plays up to 500 hours on ordinary flashlight batteries.**
- ★ **Illuminated, rotating dial shows band in use.**
- ★ **Three-position tone control.**
- ★ **Vernier fine-tuning knob for far-away stations.**

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WR-3000 Portable

6-band, communications-type
SHORT WAVE/LONG WAVE
plus AM RECEIVER

This is no "ordinary" portable, but a six band, precision communication instrument utilizing the same type of high-performance, hand-wired circuitry and features found in Hallicrafters finest professional and military receivers. Completely transistorized. **Priced under $200.00.**

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Laboratory Standards

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MEASUREMENTS' — "FAMOUS FIRSTS"

1939

MODEL 54 STANDARD SIGNAL GENERATOR — Frequency range of 100 Kc. to 20 Mc. The first commercial signal generator with built-in tuning motor.

MODEL 65-B STANDARD SIGNAL GENERATOR — This instrument replaced the Model 54 and incorporated many new features including an extended frequency range of 75 Kc. to 30 Mc.

1940

MODEL 58 UHF RADIO NOISE AND FIELD STRENGTH METER — With a frequency coverage from 15 Mc. to 150 Mc. This instrument filled a long wanted need for a field strength meter usable above 20 Mc.

MODEL 79-B PULSE GENERATOR — The first commercially-built pulse generator.

1941

MODEL 75 STANDARD SIGNAL GENERATOR — The first generator to meet the need for an instrument covering the I.F. and carrier ranges of high frequency receivers. Frequency range, 50 Mc. to 400 Mc.

1942

SPECIALIZED TEST EQUIPMENT FOR THE ARMED FORCES. WORLD WAR II.

1943

MODEL 84 STANDARD SIGNAL GENERATOR — A precision instrument in the frequency range from 300 Mc. to 1000 Mc. The first UHF signal generator to include a self-contained pulse modulator.

1944

MODEL 80 STANDARD SIGNAL GENERATOR — With an output metering system that was an innovation in the field of measuring equipment. This signal generator, with a frequency range of 2 Mc. to 400 Mc. replaced the Model 75 and has become a standard test instrument for many manufacturers of electronic equipment.

1945

MODEL 78-FM STANDARD SIGNAL GENERATOR — The first instrument to meet the demand for a moderately priced frequency modulated signal generator to cover the range of 86 Mc. to 108 Mc.

1946

MODEL 67 PEAK VOLTMETER — The first electronic peak voltmeter to be produced commercially. This new voltmeter overcame the limitations of copper oxide meters and electronic voltmeters of the r.m.s. type.

1947

MODEL 90 TELEVISION SIGNAL GENERATOR — The first commercial wide-band, wide-range standard signal generator ever developed to meet the most exacting standards required for high definition television use.

1948

MODEL 59 MEGACYCLE METER — The familiar grid-dip meter, but its new design, wide frequency coverage of 2.2 Mc. to 420 Mc. and many other important features make it the first commercial instrument of its type to be suitable for laboratory use.

1949

MODEL 82 STANDARD SIGNAL GENERATOR — Providing the extremely wide frequency coverage of 20 cycles to 50 megacycles. An improved mutual inductance type attenuator used in conjunction with the 80 Kc. to 50 Mc. oscillator is one of the many new features.

1950

MODEL 111 CRYSTAL CALIBATOR — A calibrator that not only provides a test signal of crystal-controlled frequency but also has a self-contained receiver of 2 microwatts sensitivity.

1951

MODEL 31 INTERMODULATION METER — With completely self-contained test signal generator, analyzer, voltmeter and power supply. Model 31 aids in obtaining peak performance from audio systems, AM and FM receivers and transmitters.

1952

MODEL 84 TV STANDARD SIGNAL GENERATOR — With a frequency range of 300-1000 Mc., this versatile new instrument is the first of its kind designed for the UHF television field,

1953

MODEL 59-UHF MEGACYCLE METER — With a frequency range of 420 to 940 megacycles, the first grid-dip meter to cover this range in a single band and to provide laboratory instrument performance.

1954

FM STANDARD SIGNAL GENERATOR. Designed originally for Military service, the commercial Model 95 is engineered to meet the rigid test requirements imposed on modern, high quality electronic instruments. It provides frequency coverage between 50 Mc. and 400 Mc.

1955

RADIO INTERFERENCE MEASURING SET. An aperiodic noise meter useful to 1000 Mc.

1956

MODEL 505 STANDARD TEST SET FOR TRANSISTORS. A versatile transistor test set which facilitates the measurement of static and dynamic transistor parameters.

1957

RADIO FIELD STRENGTH AND INTERFERENCE MEASURING SET. A tuned radio interference and field strength set covering the frequency range of 150 Mc. to 1000 Mc.

1958

MODEL 560 STANDARD FM SIGNAL GENERATOR — First successful FM Signal Generator using solid state modulator.

1959

MODEL 700 FREQUENCY METER — A completely new concept of frequency measurement. An instrument capable of direct and continuous reading to one cycle in 25-1000 Mc. range.

1960

MODEL 139 TEST OSCILLATOR — A compact, versatile, and portable instrument for rapid and accurate alignment of I.F. circuits in all types of radio receivers.

1961

MODEL 760 STANDARD FREQUENCY METER — An accurate, simple to operate, direct read-out, portable instrument designed for servicing two-way mobile radio equipment.

1962

MODEL 140 STANDARD DEVIATION METER — A portable, self-contained instrument designed to accurately measure the peak deviation of F.M. transmitters. Frequency coverage from 25 to 1000 Mcs.

MEASUREMENTS
A McGRAW-EDISON DIVISION
BOONTON • NEW JERSEY • U.S.A.

MESSAGE TO MORSE

History students know the message which opened the first telegraph line spanning the forty miles between Washington and Baltimore: "What hath God wrought!" But Washington's wonder had been excited by an earlier message. It occurred when the Whig convention of 1844 ended.

The train carrying delegates back to Washington stopped at Annapolis Junction. An associate of Morse wired him Clay had been nominated for president, and the astounded delegates found the news in headlines upon their return.

The wonder of wire has been superseded by wireless. Its most evolved form is tropospheric scatter radio which, thanks to REL, plays so important a role in military and civil communications. Recognizing no obstacles, it spans vast stretches with strides of up to 500 miles—crosses mountains and moors, burning sands and barren snowfields, watery wastes.

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