

Laying Field Telephone Wire by Airplane

By P. W. BLYE

Transmission Engineering

LATE in the afternoon of October 15, 1944, a small group of Laboratories' engineers and Army personnel waited in suspense in a clearing near Gatlinburg, Tennessee, as a C-47 Army cargo plane zoomed overhead gathering speed for the climb over the peaks of the Great Smoky Mountains lying ahead. As they watched, a small parachute emerged from the plane, opened and floated earthward. To the ground party its speed seemed tantalizingly slow, for they knew that attached to it was

the lead end of a 16-mile length of Army field wire being paid out by the rapidly disappearing plane. Some two minutes after the chute first appeared, the wire scored practically a direct hit on the ground party. A field telephone set was quickly connected to it and for the first time communication was established over wire between ground and a plane in full straightaway flight. For about four minutes thereafter until the far end of the wire left the plane, the author, a member of the ground party, carried on a



Laying field wire in the jungle is an arduous and often a dangerous task. AAF authorities in the CBI theater, when informed of the plans for developing air-laid wire, cabled a request that the work be pushed

continuous conversation with Lieutenant (now Captain) R. R. Ford of the Air Technical Service Command, Army Air Forces, riding the plane. A few minutes later the far end of the wire was retrieved by a second ground party and end-to-end communication was established over the 16-mile circuit which had been laid over rugged mountains and forests in $6\frac{2}{3}$ minutes. For the Laboratories' engineers and the Army personnel who cooperated with them, this successful demonstration climaxed more than two years of hard work and often discouraging research and experiment.

Development work by the Laboratories on air-laid wire dates back to 1942 when J. J. Gilbert and W. M. Bishop undertook, for N.D.R.C., theoretical and laboratory studies on the uncoiling of lightweight wire at high speeds. They produced a number of types of coils which later found application in the laying of wire from ground vehicles and from the backs of ski troopers. Although very limited flight tests were made, the results of this early work looked promising, and the Army gave quite wide distribution to the N.D.R.C. report. It is interesting to note that even though several other methods were subsequently investigated, the "criss-

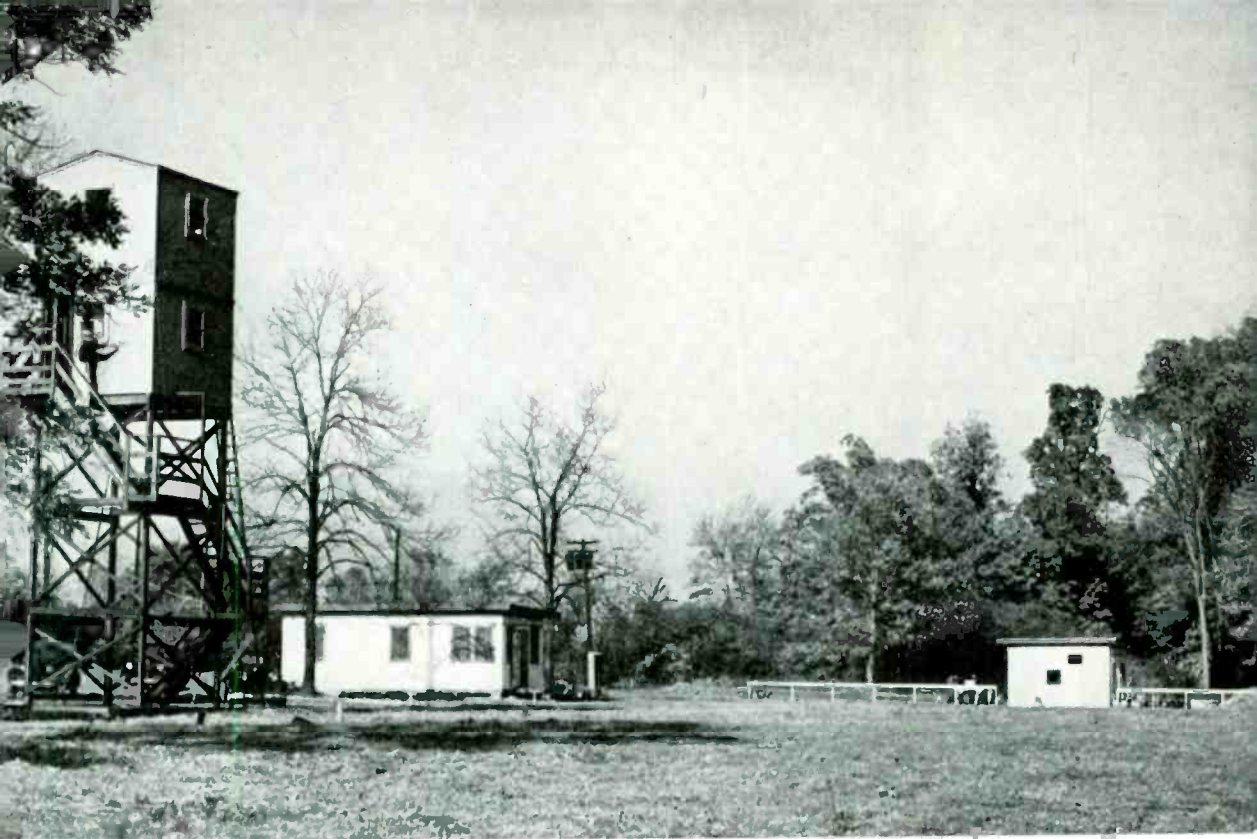
cross" type of coils developed in the early studies by Gilbert and Bishop form the basis for the system now being adopted by the Army Air Forces.

The N.D.R.C. report eventually reached the China-Burma-India theater where conventional methods for providing communications had often proved inadequate. Radio transmission was not always reliable in the steaming jungles and over the rugged mountains; also enemy direction finders were active, and shelling and bombing was often the fate of newly discovered radio posts. The laying of wire through swamps and over mountains often meant the transporting of coils on the backs of men crawling through jungle vegetation infested with the enemies of man and often playing "sitting duck" to enemy snipers. It was recently reported that in one sector of the Asiatic theater alone, forty-one men were killed or wounded in a single wire-laying mission. With this background, AAF authorities in the CBI theater were eager for air-laid wire and, in January, 1944, cabled a request that development work be continued.

Shortly thereafter the Air Technical Service Command requested that the Laboratories resume work on air-laid wire on a rush basis. It was specified that standard Army field wire be used; a flying speed of 150 miles per hour was designated and a maximum length of wire to be laid in a single

In October, 1944, a C-47 cargo plane laid sixteen miles of wire in the Smoky Mountains in Tennessee. This successful demonstration climaxed more than two years of hard work





Methods of packing the wire were studied in an outdoor laboratory at Murray Hill. In a building several hundred feet away from a 40-foot tower, a motor-driven drum was located by means of which wire could be drawn from the packs at speeds up to 200 miles per hour

flight was set at 15 miles. It was agreed that after preliminary laboratory studies, the Army Air Forces would furnish a C-47 transport plane for flight tests to be made at the Army Air Base at Fort Dix, N. J.

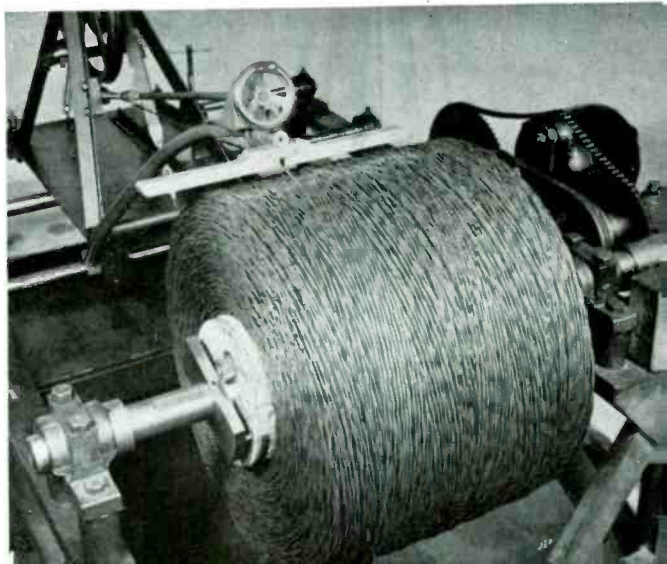
The results of the early flight tests were inconclusive and it soon became evident that a more comprehensive project was needed to include studies of a variety of wire types and other packing and payout methods. The project was therefore expanded and, while W. M. Bishop and W. P. Frawley continued laboratory and field work on "criss-cross" coils, studies of other methods of packing were undertaken by C. C. Lawson and a group supervised by D. Mitchell.

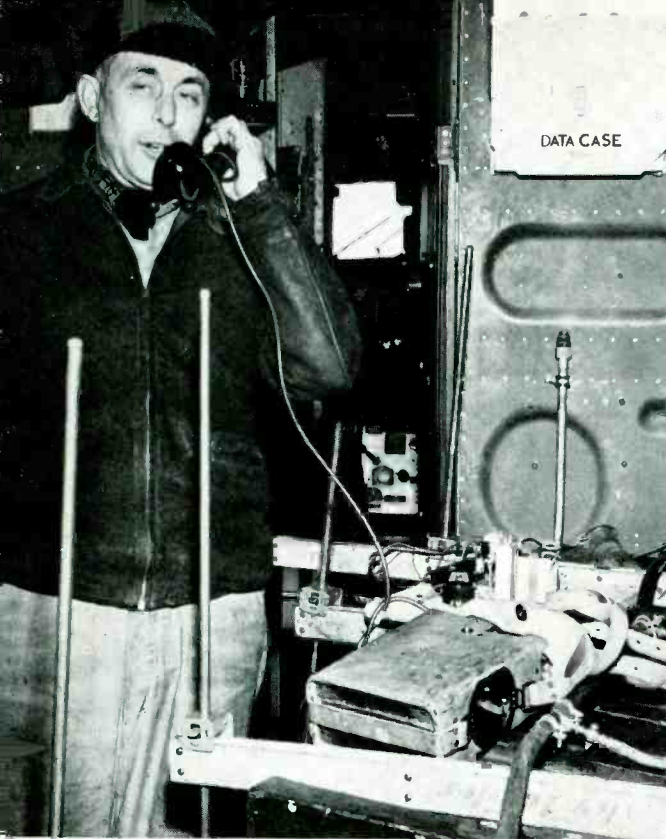
An outdoor laboratory was set up at Murray Hill, N. J., including a 40-foot tower

In the final method of packing, the two wires, twisted together as manufactured, are wound on a specially designed machine into "criss-cross" or "universal" coils, similar in form to the balls of lacing twine that are used by the telephone installer in central offices

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near the top of which experimental packs of wire might be placed. In a building several hundred feet away, a motor-driven drum was located by means of which wire could be drawn from the packs at speeds up to 200 miles per hour. At this laboratory, under the supervision of Mr. Mitchell, the performance of various types of coils and packs was studied with the aid of high-speed cameras and some electrical devices. Assisting in this work were H. N. Christopher,





After the end of the wire is dropped to the ground by parachute and chain weight and connected to a field telephone set, conversation can be carried on over the wire between plane and ground. W. M. Bishop, shown in the plane in the above photograph, talks to H. G. Jordan, shown in the photograph at the right

H. C. Fisher, F. S. Hird and L. Y. Lacy.

Flight testing was also speeded up by establishing of a field laboratory in a building that was provided by the Air Technical Service Command at Fort Dix Air Base and the assignment of a flight testing team supervised by H. G. Jordan and including H. H. Felder, H. R. Nein, and J. L. Doncourt. A total of well over 200 test flights were made in which the performance of the various types of coils and packs as well as intercoil splicing methods were thoroughly studied.

In July, 1944, test samples were obtained of a newly developed field wire insulated with polyethylene which appeared to have many advantages. Success was soon attained in one-mile flights of this wire wound in "criss-cross" coils. Gradually, the number of successful runs increased and the test lengths mounted from one mile to two miles

and then to four and six. Finally a successful 16-mile run, the specified maximum, was made over the flat but wooded terrain at Fort Dix. As a final check of the system over heavily wooded and mountainous terrain, the demonstration flight was made over the Great Smoky Mountains, as described previously. Here ground elevations along the course varied from 1,500 to over 5,000 feet. Some of the spans of wire from crest to



crest of the ridges were over one-half mile long. When these tests were completed, the line was turned over to the National Park Rangers and remained in service for five weeks, until a one-inch coat of sleet brought it down.

Following the Smoky Mountains tests, further work was done to adapt the "criss-cross" coil system to other types of field wire. As finally turned over to the Army Air Forces, the system may be used with C-47 cargo planes to lay either the new plastic-insulated wire referred to above or the heavier present standard field wires used by the Armies of the United States and Great Britain. During February, 1945, W. P.

Frawley accompanied a group of A.A.F. personnel on a series of flight tests in which the system was used to lay these heavier wires at temperatures as low as -40° F. with complete success.

In the standardized system the two wires, twisted together as manufactured, are wound on a specially designed machine into "criss-cross" or "universal" coils, similar in form to the balls of lacing twine used by the telephone installer. Each coil contains one or two miles of wire, depending upon the wire type. These coils have advantages over the ordinary layer-by-layer winding in that when removed from the winding form, they are self-supporting and easy to handle. The various layers are also locked in such a manner that it is impossible to start two layers at the same time during payout.

Each coil is encased in a square wooden box with a hole in each side about one-half the outside diameter of the coil.

When a mission is to be flown, the number of boxes required are loaded into a C-47 plane and lined up in echelon from the open doorway to the forward end of the cargo space and secured to the floor. The outside end of each coil is carefully spliced to the inside end of the following coil. The inside end of the first coil is led outside the plane through a pipe about six inches in diameter and brought back into the cargo space, where it is attached to a parachute and a suitable weight. After taking off, the pilot flies over the starting point of the line as identified by landmarks or panels on the ground and a member of the crew throws out the parachute. As the wire thrams out

Sixteen miles of field wire are in these boxes fastened to the floor of a cargo plane. The outside end of each coil is carefully spliced to the inside end of the following coil. The inside end of the first coil is led outside the plane through a pipe about six inches in diameter. This pipe and the method of installing the boxes is shown in the headpiece





Flight testing crew at Fort Dix Air Base

from the pipe at speeds up to 250 feet a second, it settles to the ground with the parachute. Eventually the other end of the wire pulls free of the plane and is picked up by the second ground party. Over rugged terrain, more slack is needed and that is secured by flying higher, since at the higher altitudes the weight of the wire in the air causes it to pay out at a rate somewhat faster than the speed of the plane.

On the evening of March 15, 1945, at the Fort Dix Air Base, the Army Air Forces and the Laboratories gave the first public demonstration of the wire-laying system for the nation-wide radio audience of "March of Time." Details of the system were disclosed to the press on March 21 during a tour of inspection of the wire-laying apparatus at Fort Dix. The effectiveness of this new method as a war aid, particularly in decreasing the loss of life, will soon be demonstrated in actual combat in the Pacific areas.

THE AUTHOR: P. W. BLYE joined the American Telephone and Telegraph Company in March,

1919, after receiving the degree of S.B. in Electrical Engineering from Massachusetts Institute of Technology. As a member of the transmission division of the Department of Development and Research, he was engaged for several years in the development of special testing apparatus and methods required in inductive coordination studies. He was subsequently assigned to developmental studies dealing with the wave-shape and inductive influence of power systems, including methods for their control. Since 1941, as Transmission Engineer, Mr. Blye has supervised a number of war projects, including the air-laid wire job described in this issue.



Four-Wire Switching for Crossbar Toll

By L. G. ABRAHAM
Toll Transmission Engineering

CROSSBAR toll switching, installed in Philadelphia,* was designed not only to meet present conditions, but also to conform to present trends in toll-system practices. One of its novel features is the use of four-wire switching, which is here employed for the first time in the United States. This feature is expected to prove more and more advantageous as the use of four-wire

*RECORD, April, 1944, p. 355.

circuits continues to increase. Most of the longer voice-frequency circuits are already of the four-wire type, and carrier circuits—which are the equivalent of four-wire circuits—are steadily being found economical for shorter and shorter distances as various improvements are incorporated in them. As a result, practically all lines longer than about fifty miles, at least along congested routes, will be of the four-wire type in the near future.

This use by the telephone industry of four-wire circuits for its longer toll lines, and two-wire circuits for its shorter lines, including the lines direct to subscriber premises, is similar to railroad practice, which employs double track for the more heavily traveled routes, and single track for the less important branches. The parallel is interesting in spite of the fact that the reasons dictating the needs of a double track are not the same as those leading to the use of four-wire telephone circuits.

With railroads, the difficulties with single track arise from the necessity of permitting trains going in opposite directions to pass each other. Turn-outs are placed at intervals along the line, and by correlating train schedules with the spacing of these turn-outs, a considerable amount of two-way traffic can be handled. The heavier the traffic, however, the more numerous must be the turn-outs, and the more complicated the scheduling becomes as traffic increases, a point is ultimately reached

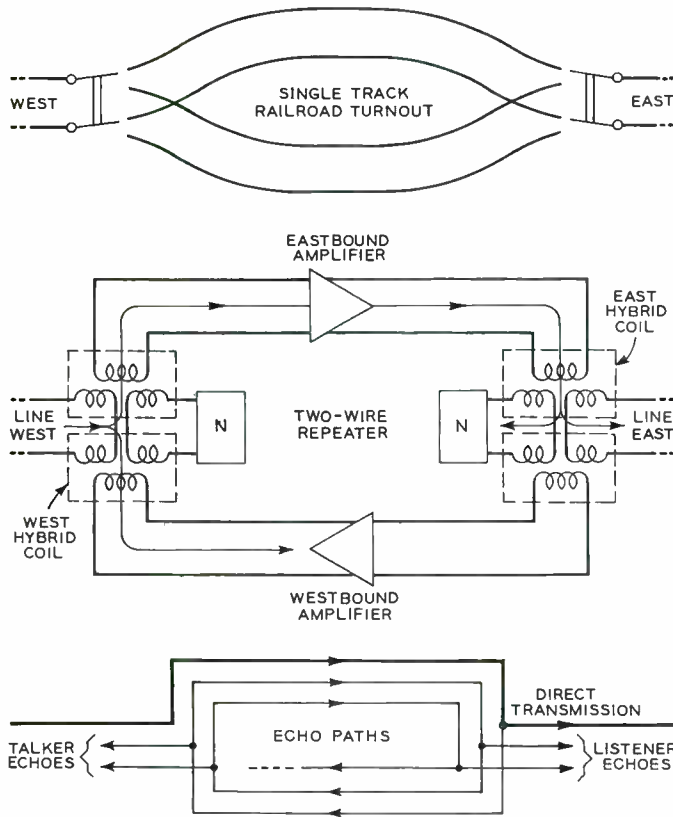


Fig. 1—A 22-type repeater, employing two hybrid coils, as shown in the middle diagram, may be likened to a railroad turn-out, shown in the upper diagram. The lower diagram shows various talker and listener echoes due to imperfect balance at the hybrid coils

when double track is much more economical.

Two-way telephone traffic, on the other hand can readily pass over a two-wire line, but unless the lines are short, amplifiers are required to make up for the losses suffered by the voice currents in passing over

half going to the west-bound amplifier, where it is dissipated, and half to the east-bound amplifier, where it is amplified. The amplified power then divides at the east hybrid, with half of the power going to the network and the other half to the line east.

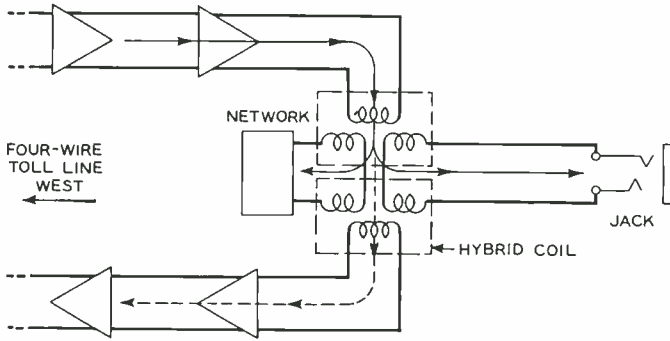


Fig. 2—With two-wire switching, a four-wire toll line must be transformed to a two-wire circuit by a hybrid coil as indicated in the diagram above

Equal division between network and line, however, occurs only when the impedance of the network exactly equals that of the line. In practice, a perfect balance is never obtained, and as a result of the lack of balance, some of the east-bound speech passes across the east hybrid to the west-bound amplifier, as indicated by the lower diagram. Here it will be amplified, and will continue westward toward the talker as a "talker" echo. Because of unbalance at the west hybrid, part of this speech

will pass across the west hybrid, will be amplified by the east-bound amplifier, and thence will continue over the line to the east as a "listener" echo. This circulation around the amplifying path may continue to form additional talker and listener echoes, but in a workable circuit the succeeding echoes rapidly become weaker and weaker. A similar

phenomenon occurs, of course, with the west-bound speech.

them. Since amplifiers increase the amplitude of the speech in only one direction, however, two of them are employed at each amplifying point with devices at each side of them, corresponding to the turn-out switches of the railroads, to allow the output of each amplifier to pass to the proper outgoing line without permitting it to cross to the input of the amplifier for the other direction of transmission. These devices are called hybrid coils.

A repeater with its two hybrid sets is shown in the middle diagram of Figure 1, where the resemblance of the hybrids to railroad switches at the ends of a turn-out, shown by the upper sketch, is obvious. Here the hybrid set is shown as windings on two cores. This is one of the forms commonly employed, but other forms are also extensively used. In the boxes, marked N, are balancing networks, which ideally should have the same impedances as the lines in the two directions. Under such ideal conditions, speech power in the two directions follows the paths of the light lines and arrows. That from the west, for example, divides at the west hybrid—

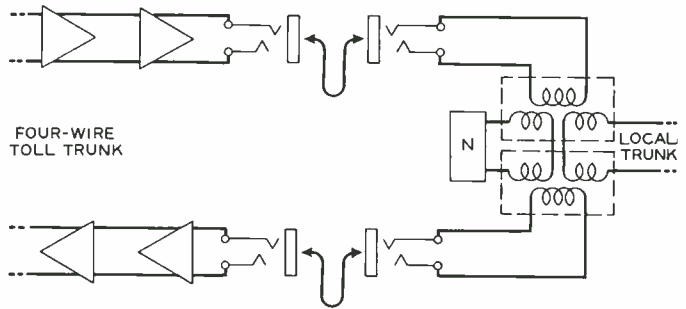


Fig. 3—With four-wire switching, no hybrid coil is required at the end of the four-wire line

How objectionable the echoes are depends on their volume relative to that of the speech, and on the time interval by which they lag behind it. The volume of the echo, with other factors fixed, depends on the

loss across the hybrid coil where the echo occurs, which in turn depends on the degree to which the network balances the line.

In any normal circuit, echoes are never allowed to assume objectionable proportions, but the presence of possible echo paths places restrictions on the gain that may be used at the amplifiers, and is objectionable because of these restrictions. In Figure 1, for example, the amount of echo returning to the west talker depends on the value of the net loss from the talker to the repeater and thence back to the talker plus the loss across the hybrid coil at the east side of the repeater. This total loss must be kept great enough so that the echoes are of unobjectionable value. If the loss across the hybrid is low, therefore, the net loss over the two sides of the line must be greater. This means that the gain supplied by the amplifiers must be kept below a value determined by the loss in the section of the line to the west of the repeater.

Whenever the networks are permanently associated with their line, such as at repeaters, they may be of the precision type, and the balances will be very good. With short lines, therefore, having only one repeater, the echoes are not ordinarily objectionable because both the volume of the echo and the time interval will be small. With long lines and several repeaters, on the other hand, there are echoes from each repeater, and for some of them the time interval may be relatively long. While each echo may be no greater than with a single repeater, the greater number of them, and the longer time intervals involved, may make them quite objectionable.

It is largely because of this multiplying of echoes on two-wire lines that four-wire circuits are preferred for the longer lines. With four-wire circuits, a separate pair of wires carries the speech in each direction, and each pair of wires has its own one-way amplifiers. No hybrid coils are required at the amplifiers, and thus echoes from repeaters are avoided.

Since subscriber lines are of the two-wire type, how-

ever, and since until comparatively recently most of the toll lines also were two-wire, switching has been done on a two-wire basis. At toll offices where the circuits are switched, therefore, four-wire toll lines must be reduced to two-wire circuits, as shown in Figure 2. The balance in such situations is not very good, however, because the two-wire lines that may be connected at the right are of different impedances because of varying lengths and types of circuit. It is not practicable to change the network for each connection, and so a compromise network is used. As a result, the balance is poorer, and the loss across the hybrid is less.

By using four-wire switching, however, there is no hybrid coil at the end of the four-wire line where an echo could occur. If the line were to be switched to another four-wire line, there would be no hybrid coils at all involved at the switching office. When it is switched to a two-wire line, however, hybrid coils must be used at the end of two-wire circuits to provide a four-wire termination as shown at the right of Figure 3. Since the network under these conditions is permanently associated with the line, however, it may—except for very short lines—be of the precision type, and thus the loss in the echo path is high, and the conditions are better than those shown in Figure 2.

With a poor balance at the hybrid of Figure 2, because of the use of a compromise network, the net loss of the four-wire circuit to the switching point must thus be relatively high, and if the listener at the end of the two-wire trunk switched to the four-wire circuit at this point is to receive adequate volume, the loss in the two-wire trunk must be relatively low. With four-wire switching

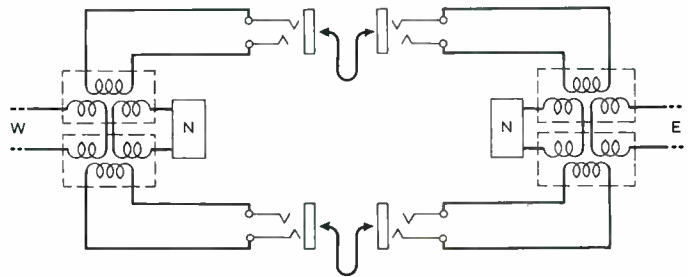


Fig. 4.—When two two-wire circuits are to be connected by four-wire switching, the loss in the hybrid coils at the ends of the two-wire lines are made to cancel

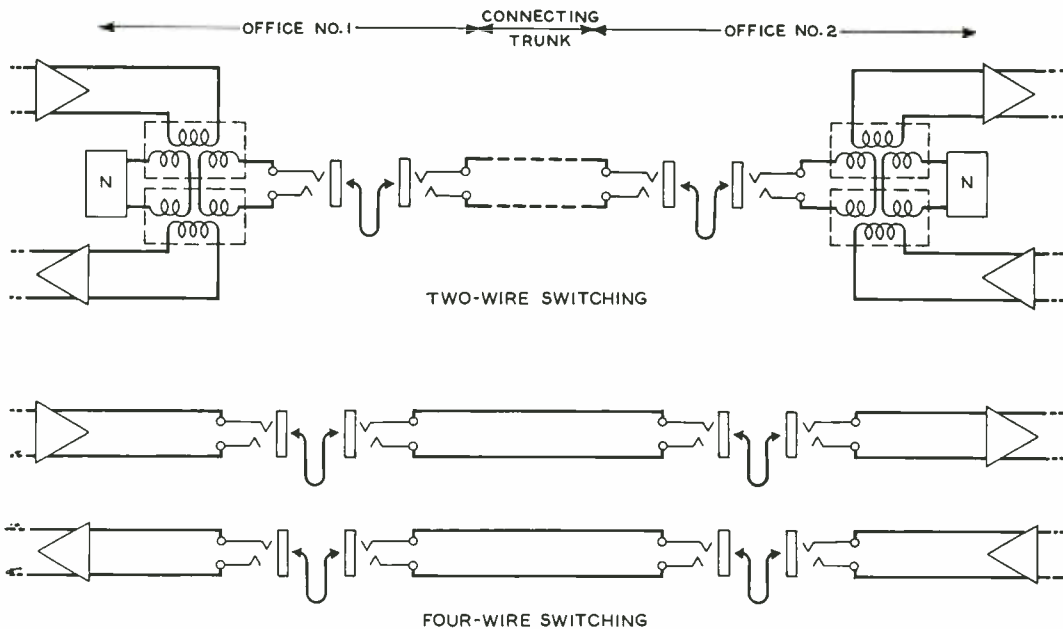


Fig. 5—Where four-wire switching is used in large cities with two or more toll offices, a through four-wire circuit is possible as shown in the lower sketch, and thus there are no hybrid coils to cause echoes. With two-wire switching as shown in the upper diagram, however, two hybrid coils are involved

as indicated in Figure 3, on the other hand, the net loss of the four-wire circuit to the switching point may be made relatively low because of the good balance of the hybrid coil of the two-wire line. As a result, the loss in the two-wire trunk may be relatively high and still allow ample volume of the speech at the listener station. Since high-loss lines

may employ smaller conductors or fewer repeaters, and in general be less expensive, economies are secured by any arrangement that permits a more extensive use of them. Four-wire switching as adopted in the No. 4 toll switching system is thus advantageous in permitting a more extensive use of high-loss, and thus less expensive, two-wire circuits at the ends of toll connections.

With four-wire switching, all two-wire lines must be equipped with hybrid coils. This might seem to work a hardship on four-wire switching when two two-wire circuits are to be switched together without repeaters, as shown in Figure 4, since two hybrid coils will be required at the switching office, and a hybrid coil ordinarily introduces a loss of 3 db because speech energy coming up to it is divided into two equal parts, only one of which is ordinarily usable. With the conditions shown in Figure 4, however, speech coming in from the west divides at the hybrid—half passing over each branch—and reaches the east hybrid. By properly poling the connections at this hybrid, the energy in the two halves may be made to add in the east-bound line, and thus the

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from the University of Illinois in 1922 and 1923, respectively. In July of the latter year he joined the Department of Development and Research of the American Telephone and Telegraph Company as a member of the Transmission Development Department and was transferred to the Laboratories in 1934. His work has been chiefly in connection with toll circuits, and he has devoted most of his time to securing optimum overall performance of message circuits.

usual 3 db loss in each hybrid is cancelled.

When two high-loss two-wire circuits are switched together, additional gain is required. In this case, amplifiers may readily be "switched in" between the four-wire branches of the two hybrids.

Four-wire switching will be particularly advantageous in large cities having two or more separate toll offices. With two-wire switching, the trunks interconnecting the toll offices introduce additional net loss, since gain cannot be added in the toll circuits because of the poor balances at the hybrid coils in each office. The arrangements for two-wire and four-wire switching are indicated in Figure 5. With four-wire switching, no hybrids are involved at all, and thus the loss in the trunks connecting the two offices may be offset by removing pads at the four-wire repeaters.

A further improvement from the use of four-wire circuits is possible from a reduction in the number of echo suppressors required in tandem. With four-wire circuits and four-wire switching, only one echo suppressor would be required for any one con-

nection, while with two-wire switching they may be in the circuit between each two switching points. When only one echo suppressor is employed, "lock-outs" and other objectionable features associated with voice-operated devices are eliminated.

Taken all in all, the advantages of four-wire switching are considerable. Many terminal repeaters may be eliminated, and all that will be required in their place are a few switched-in repeaters that will be used for only a relatively few connections where two high-loss circuits are connected together. In addition, less expensive, high-loss connecting lines may be employed because available gain can be used, which is not possible with the poor balances present with two-wire switching. As the telephone plant comes to be operated more completely on the four-wire basis, there will be fewer limitations on improvements in the use of telephone conference circuits and on future developments such as automatic alternate routing of toll connections. At the same time, the reduction in echoes will result in better overall transmission.



M. J. KELLY AND R. R. WILLIAMS ELECTED MEMBERS OF THE NATIONAL ACADEMY OF SCIENCES

At the recent annual meeting of the National Academy of Sciences, M. J. Kelly, Executive Vice-President, and R. R. Williams, Chemical Consultant, were elected members. Other members of the Laboratories who have been similarly honored in the past are O. E. Buckley, C. J. Davisson, Harvey Fletcher, and H. E. Ives. F. B. Jewett is president of the Academy.



Historic Firsts

HIGH-SPEED SUBMARINE TELEGRAPHY

ON SEPTEMBER 24, 1924, engineers of Bell Telephone Laboratories, at that time the Engineering Department of the Western Electric Company, demonstrated submarine cable transmission at a speed of 1,900 letters per minute to officials of the Western Union Telegraph Company. This was about four times the total duplex speed of any of the older cables of comparable length, and marked the beginning of a new era of submarine cable telegraphy.

Two developments made possible this outstanding increase in speed, and both were contributions of Bell Laboratories' engineers. One was the permalloy-loaded cable; the other was the specialized apparatus used at the terminals of the cable.

Following the development of the high-vacuum electronic tube* in 1913, Bell Lab-

oratories' engineers undertook its incorporation in an amplifier for submarine cables. All previous amplifiers had been of the electro-mechanical type, and the application of vacuum tubes required an entirely different approach. At this time only non-loaded cables were available, and the amplifier was originally developed for cable of this type. With the invention of permalloy and the development of loaded cables, however, the design was changed to meet the radically different characteristics of the new cable. One of the many difficulties encountered in designing the amplifier was that of obtaining transformers effective at frequencies as low as one-tenth of a cycle per second. The utilization of permalloy proved to be the answer to this problem also.

*RECORD, May, 1943, page 283.

The development of cable amplifiers was delayed by the preoccupation of the Laboratories with war projects, but by 1919 the general principles had been pretty well settled. The greater speed possible with the new facilities was demonstrated to the Western Union Telegraph Company, which quickly consented to more extensive tests. Success with a trial length of 120 nautical miles at Bermuda resulted in the authorization of a 2,300-mile cable from New York to Horta in the Azores, and this cable was laid in September, 1924.

Within a few years it was extended to Emden, and another cable was run to England via Bay Roberts, Newfoundland. For all these projects, the cable, the amplifiers, and the printing telegraph equipment, which was employed to utilize to the full the speed capabilities of the new cable, were designed by the Laboratories; the Western Electric Company built the amplifier and the printing telegraph equipment, and supplied the permalloy for the cables. The

cables themselves, however, were made by manufacturers abroad.

One of the elements of the terminal equipment that greatly contributed to the high speed was the synchronous vibrating relay. This re-inserts at the receiving end the basic signalling frequency, which has been too greatly attenuated by the cable to be usable. As a result of these various developments, a five-channel multiplex printing system was installed that provided two channels to London, two to Berlin, and one to Rome—all over a single permalloy cable to Horta.

This entire development, which in the space of a few years had revolutionized submarine telegraphy, was carried on by a group of engineers and scientists of the Laboratories under the direction of Dr. O. F. Buckley.

The photograph at the head of this article shows the bringing in of the end of the 120-nautical-mile cable of the trial installation at Bermuda. Dr. Buckley, wearing a cap and looking into trench, is in the center.

PRESIDENT GIFFORD ADDRESSES STOCKHOLDERS

At the annual meeting of stockholders of the American Telephone and Telegraph Company on April 18, President Gifford said in part:

“Just now, of course, the direction of all of our effort is set—it is toward the war. The telephone business in this country is being run in the manner that will best promote the war effort. What this is, is determined partly by the Bell System, partly by various governmental agencies including the armed services, but in all cases with the closest coöperation between the company and the Government.

“Bell Telephone Laboratories and the Western Electric Company, the research and manufacturing branches of the Bell System, are the largest single contributors to the development and production of electronic and communication material for war purposes. There is hardly a unit or ship in the armed services, either the Army, Navy or Marine Corps, that hasn't Western Electric equipment of some kind.”



Tactical Pole Lines

By J. A. CARR

Outside Plant Development

WITH war came demands for a lightweight open-wire pole line that could be erected easily and quickly in combat areas to provide circuits over long distances for voice frequency and carrier operation up to about thirty kilocycles. To meet these requirements, the Laboratories developed for the U. S. Signal Corps a simplified line construction. Lightness was obtained by using a small gauge copper-steel wire of high strength, a cross-arm limited to eight wires, a minimum of hardware, and poles made from solid 4-in. x 4-in. sawed timber. Square poles fabricated from 2 x 4's were found unsatisfactory except for temporary or emergency use. A further saving in weight over that of the usual line was made by spacing the poles 150 or 200 feet rather than 130 feet apart, as in general commercial practice.

Small round poles were also specified for the more permanent lines or where storm loading conditions or the use of two cross-arms require additional strength. Since tactical lines have to be set under a wide range of soil and climatic conditions, both types are treated with preservatives to prevent deterioration from attack by fungi and insects.

The square poles, Figure 1, are twenty feet long and weigh about seventy pounds each, whereas the smallest American standard round pole of the same length weighs about 115 lbs. Besides being easy to handle by one man, the square poles economize shipping space. About twenty of them can be stowed where only ten of the smallest standard poles of the same length could be accommodated. A complete line with square poles spaced 150 feet apart weighs approximately 25 per cent as much as the conven-

tional toll line of the same wire capacity with 130-ft. pole spacing.

The light weight of these poles and other materials permits placing them by hand, thus saving construction time and freeing men otherwise required to operate power machinery. Using pole spans of the greatest practical lengths expedites the work besides saving material.

The timber products are prefabricated to adapt them to a variety of uses. To mount the crossarms and prevent them from tipping when not braced, the poles are bored and notched deeply. This also permits using them as push braces. The crossarms are

bored for insulator pins to space the wires of pairs eight inches apart and through the sides for support braces. Bolt holes for attaching the crossarms to poles are provided at three points along the arms so that they can be used either full length with single poles or as H fixtures. Sawed in half they make two four-pin arms. These holes also permit a full length arm to serve as a pole-top extension fixture, Figure 2, or as a side arm member like that in the headpiece. A half-length arm can be used as a foot support for a lineman when working on a pole-top extension, or as a log anchor for guys. A light guy made of line wire and with sleeve joints has been provided; also a stranded one for greater strength.

One of the contributing factors to the stability of the line is the eighty-mil copper-steel line wire. This weighs somewhat less than the equivalent gauge of copper and has more than twice its strength.

Notable contributions to the lightness of the line structure and toward minimizing the time of erection were made by the transposition system used to guard against inductive effects between pairs and from nearby power sources. By making the distances from one wire to its mate eight inches and that to the nearest wire of an adjacent pair sixteen inches, and by eliminating the

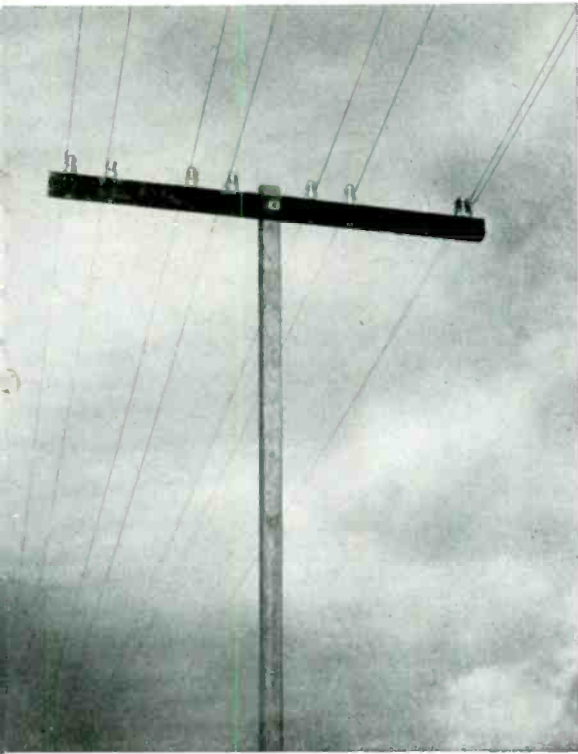


Fig. 1—Light-weight telephone poles, made of 4-in. x 4-in. sawed timber, have been provided for military lines. They are twenty feet long and each weighs about seventy pounds



Fig. 2—The crossarms also serve as side arms and pole-top extensions. A half-length arm can be used as a foot support for the lineman



Fig. 3—Light-weight attachable ladder

pair with a wire on each side of the pole (pole pair), it was possible to use transpositions of the rolling type spaced unusually far apart. In making this transposition the wires of each pair are rolled one over the other in the distance of two spans and are kept separated by supporting them at the intermediate pole on a double groove insulator. Transposition arrangements are provided for lines with one and two crossarms. Since those with one arm are most frequently installed, the simplest transposition patterns were selected for such installations to make it easy for the construction personnel to memorize them and avoid the time that would otherwise be lost by referring to manuals. If pairs are added to the line, the transpositions in those already in place do not have to be relocated as is sometimes necessary in commercial practice.

With this transposition system only two types of insulators are required: one with a single wire groove for non-transposition points and another with a double groove for the rolling transpositions, Figure 1. Both of these insulators are supported by wooden

pins instead of by the steel pins or by steel pins and steel brackets used on commercial carrier lines, thus minimizing weight.

The shape and small dimension of the square pole make it difficult to climb with the conventional lineman's climbers without the chance that the workman may cut out or strike his ankle with a gaff. To avoid this hazard, a ladder, easily constructed by nailing wooden steps to the sides of a 2-in. x 4-in. timber, Figure 3, is held in place against the face of the pole by two opposing and offset metal brackets which surround the pole near the top. In placing the ladder, it is first turned at an angle until the pole fits between the offset brackets. The ladder is aligned with the pole and is ready for use.

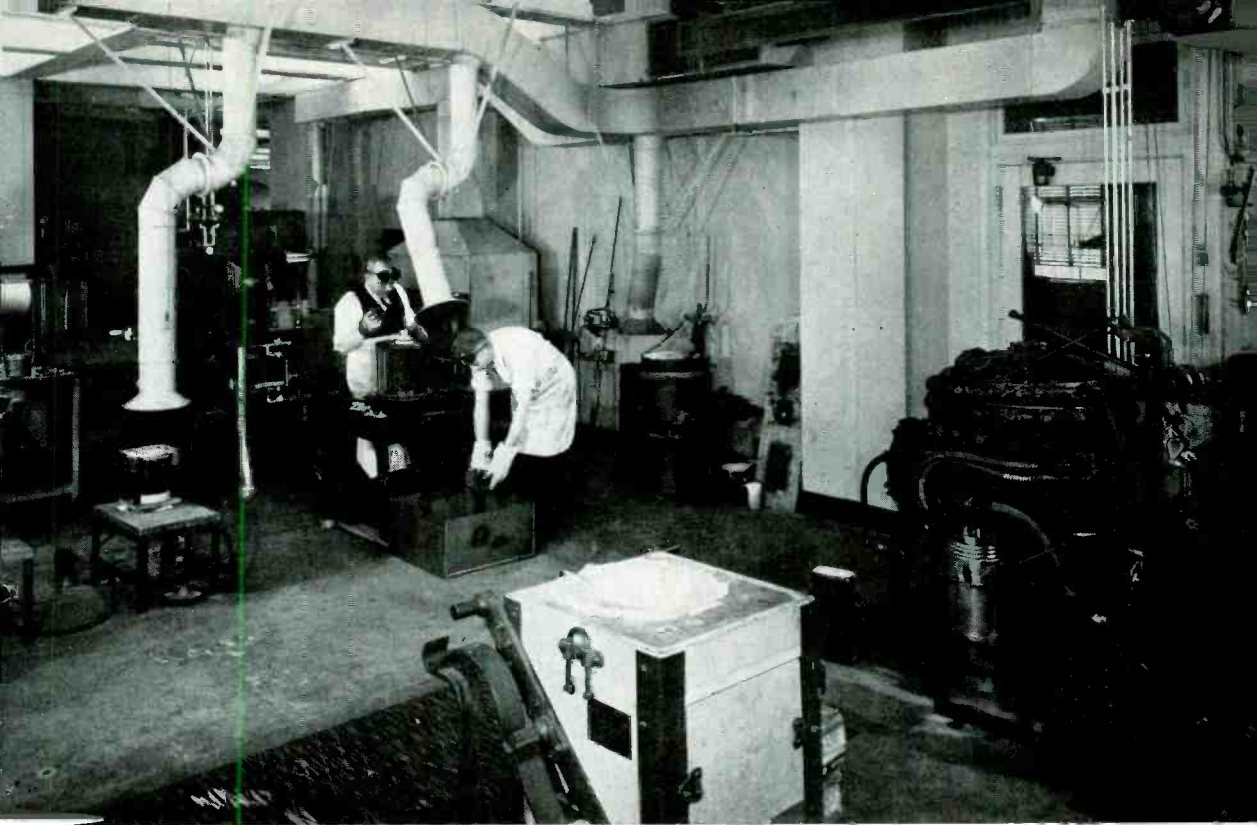
To determine the usefulness of a line of this construction, the U. S. Signal Corps erected one approximately thirty miles long in Florida for a field trial. The time required to erect the line was determined and its mechanical performance and crosstalk and noise levels were studied. Leakage characteristics of the insulators and transmission performance of the line at voice and carrier frequencies were also investigated. Laboratories' engineers aided in these trials. The results were satisfactory and this type of line was adopted as a Signal Corps standard. Subsequently, a technical manual was prepared by the Laboratories for training and field uses. Lines of this construction are in use in many of the war areas.

THE AUTHOR: J. A. CARR was graduated from the Virginia Polytechnic Institute in 1919 with



the B.S. degree in Electrical Engineering. The following year he was an instructor in that subject at the Massachusetts Institute of Technology. Mr. Carr joined the Development and Research Department of the American Telephone and Telegraph Company in 1921 and continued

there until his transfer to the Laboratories in 1927. Since that time he has been associated with the Outside Plant Development Department, principally in systems development work.



MOLDING AND CASTING

Many parts of apparatus, difficult to obtain promptly in the present emergency, are now molded and cast in the Metallurgical Laboratory at Murray Hill. The steps taken there in preparing baked cores for sand castings and the pouring and stripping of the metal are illustrated here.



At the left, D. M. Wallace selects a core box with a radial arrangement of four patterns around a single gate to make horseshoe shaped magnets. Above, he takes the core-sand mixture for filling the box, shown in the next page

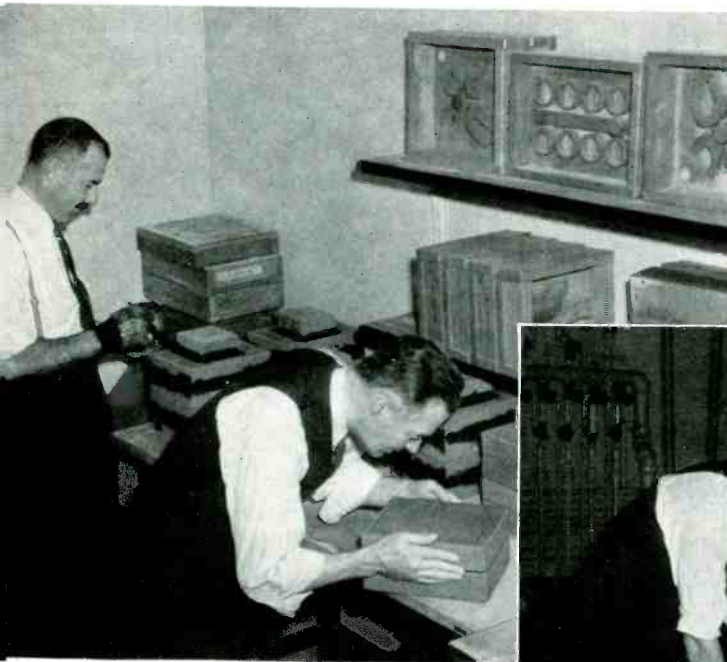


After dusting the patterns with parting sand, Mr. Wallace fills the core box



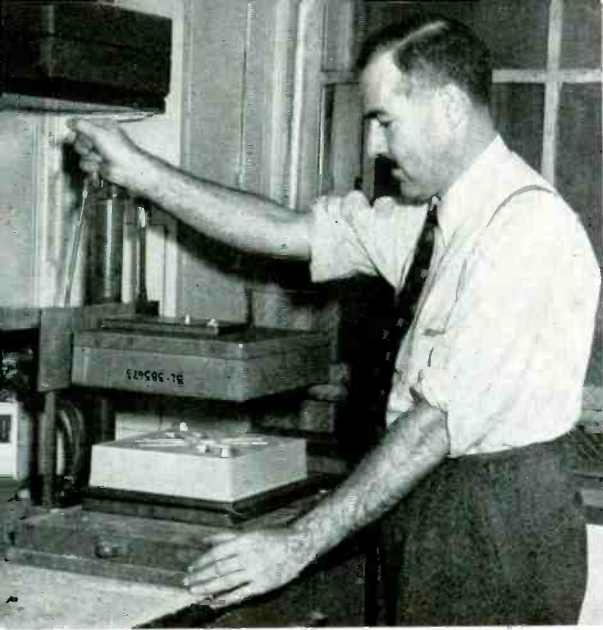
He rams the sand mix and then smooths and finishes the core

C. V. Wahl (left) and Mr. Wallace stack and glue the cores, preparatory to filling



The molten metal from the furnace in the background is poured into a stack of cores. Left to right, O. J. Finch, J. M. O'Brien and O. J. Barton



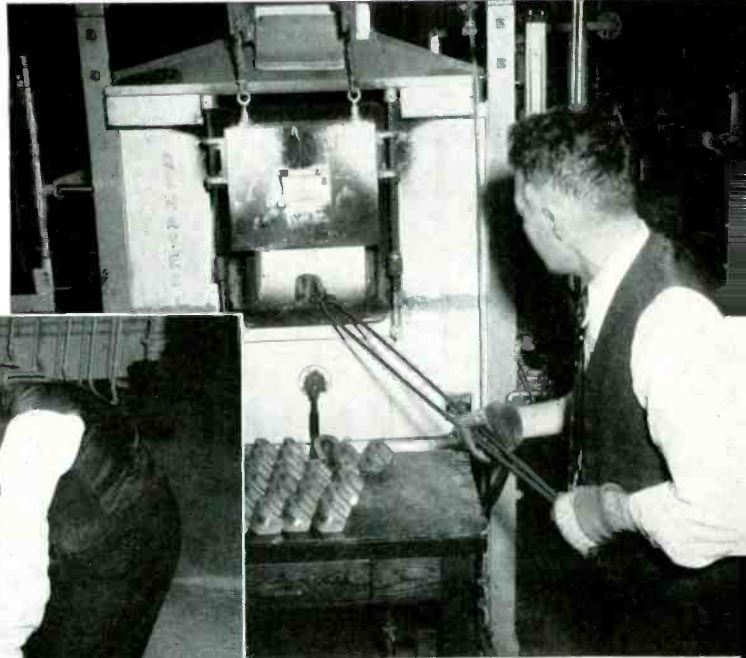


C. V. Wahl removes the box from the core with this vibrating machine



The freed core is then placed in an oven for baking

Mr. Wallace places the castings in a furnace to heat treat them



After the castings have solidified completely, they are shaken out of the molds, placed on a cooling bed, and finally separated from their gages and risers



The Laboratories Rises to an Emergency

AMERICAN perseverance and a determination to quickly complete appointed tasks in spite of impeding obstacles underlies our outstanding successes in all theaters of the war. This spirit of accomplishment distinguishes not only our Armed Forces but the many engineering and industrial staffs that serve them in our laboratories and factories. It was this same zest for overcoming difficulties that over the week-end of April 15 drew scores of men and women from widely varied groups of the Laboratories to the shipping rooms at Chambers Street to get an important Navy contract out on time.

To furnish the Navy with badly needed electronic equipment at the earliest possible moment, the Laboratories had undertaken to produce thirty pre-production models of a large number of systems for which the Western Electric Company held the prime contract. The time allowed for completion was short, and technical and supply difficulties brought in unexpected delays. Delivery was finally agreed upon for April 15, and every person who worked on the job was determined not to let the Navy down.

Each of the systems is shipped in twenty-five cases, one of which weighs three-quarters of a ton. There were also thirty-three sets of equipment spares—each requiring twelve cases. Moreover, the greater part of the lot had to receive what is known as an "Export No. 2 Pack"—which means that each individual item had to be wrapped separately and made vapor-proof, and that each case with its many sealed packages had to be water-proofed. Either outer metal sealed boxes or wax paper wrapping followed by wax dipping was required for all the smaller packages, and vapor barriers or silica gel dehumidizers for the larger ones, and then complete water-proofing for all the packed cases.

Packing of the 1,200 odd cases was thus a major undertaking, and work on it was started as soon as the finished equipment began to come through—about the first of

March. By the middle of March, things began to pile up, and a night shift was added. Shortly after, eight men were borrowed from other departments to augment the already large group working during the day. By the first of April, Sunday work was commenced, and a split shift was superimposed on the day and night shifts. This split shift was formed by recruiting men to work four or five hours in the shipping rooms at the completion of their regular day's work.

By the morning of Saturday, the 14th, there still remained nearly 400 cases to pack, and it was obvious that even the augmented day and night shifts and the additional split shift would not be able to complete the work by midnight of the following day. A call for help went out. Men and women volunteered from the plant shops at Chambers Street, from the Commercial Relations Department, from the Accounting Department, and from several groups of the General Service Department. They worked all day Saturday and on until 2:30 a.m. Sunday morning. After a few hours' sleep they were again back on the job. Over a hundred reported on Sunday, and work continued into the night with only short pauses for meals. By midnight, the closing hour of the 15th of April, the last case was packed and accepted by the Navy. Critical combat equipment would not be lacking through unwillingness of the men and women of the Laboratories to rise to an emergency.

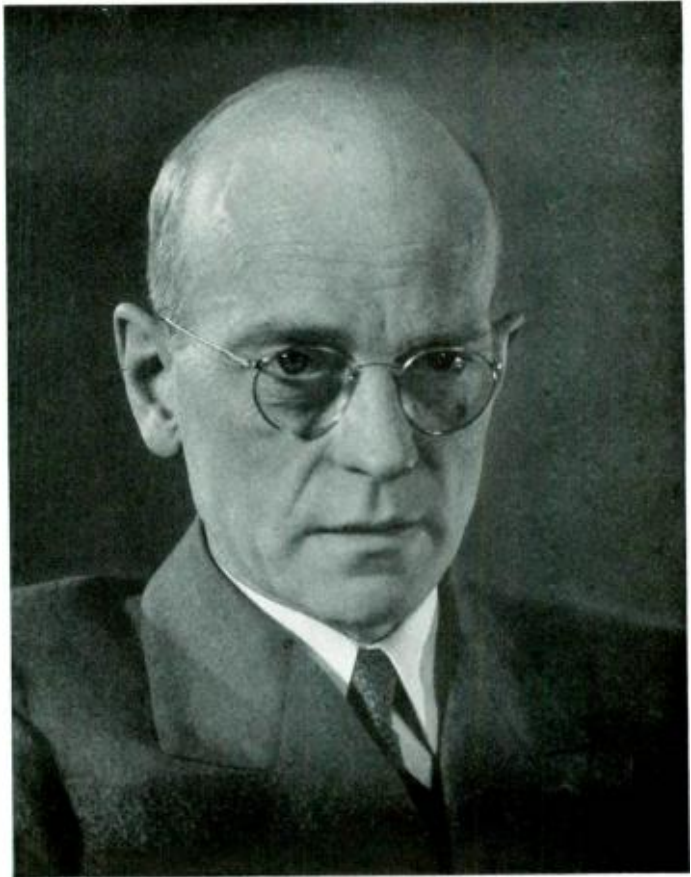
Although technically the work was over, there was still the matter of loading the cases into trucks and getting them to the express office for early shipment Monday morning. Many of those who had worked almost continuously for the last two days merely rolled up their sleeves a little higher and stayed on the job until ten the next morning, when the last case was delivered. The Navy had its needed equipment on time; the men and women of the Laboratories had seen to that; and they reckoned the cost as merely one of the many contributions to the Navy's continued success.

John Mills

Whose 33 years in the Bell System ended with his retirement on April 30

THREE phases make up the Bell System career of John Mills; but for an understanding of them, there must be prefixed a fourth which includes his undergraduate years at University of Chicago (B.A., 1901); his fellowship in physics at University of Nebraska (M.A., 1904) and his eight years at Western Reserve, M.I.T., and Colorado College. In that epoch he developed his flair for teaching, and along with it his objective handling of ideas. Basic building-block of John Mills' universe is the idea; he will concede the electron and the proton to the physicist; but ideas influence behavior, and so are fundamental to whatever Man does, be it good or bad. And since ideas are imparted mostly by words, it was during his years of teaching that he acquired the solid competency in words which has distinguished his authorship. At Chicago, along with Frank B. Jewett, he had been a disciple of Millikan—his first book had Millikan as a senior co-author—and at the same time he formed an enduring friendship with Jewett. It was natural that, wishing to live in the East, he should ask Jewett, then an A T & T engineer, for a job.

So began the second phase of the Mills career at a time—April 1, 1911—when A T & T was instituting a research group in long distance transmission; specifically for the Transcontinental Telephone Line. Loading theory was well advanced, but the practical art was anything but smooth, due to variable coil spacing, erratic changes in coil inductance from lightning surges, and the



like. Irregularities were much less tolerable when repeaters were to be used. To this problem John Mills applied himself. A probability study enabled him to estimate the allowable repeater gain in terms of line irregularities; measurements subsequently verified his predictions. F. H. Colpitts said of his contributions:

“Mills' work constituted a most important contribution and formed a solid basis for the engineering of lines for repeater operation.”

He was also among the first to recognize that echo phenomena might dominate the quality of speech transmission; the basic patent for echo suppressors is in his name.

After the Transcontinental came the early Transatlantic; John Mills' assignment to construction of stations and antennas was promptly and effectively carried through. Immediately thereafter, he transferred to the Engineering Department of Western Electric.

His first work was on general problems in

radio transmission and specifically on methods at a receiving station for reducing static. His conclusions, which still reside unpublished in the files, have been well justified by subsequent developments. In World War I he trained in radio the group of Western Electric men who became the nucleus of the Signal Corps research and inspection group of the A.F.P. The notes of that course, soon published as a text, "Radio Communication," were widely disseminated.

Third and shortest of the epochs in the Mills career was in Personnel; it began in July, 1922. It was a period of rapid growth, when scouts were visiting the universities far and wide; contacts made with Associated Companies on those tours proved most helpful to Mills' future work. But the outstanding contribution of those years was a new viewpoint: that college graduates should be hired, not to fill a particular job, but for their possibilities of growth. He proposed six "man specifications"—intellectual curiosity, ability and habituation to study, ability to learn from men, ability to cooperate with them and ability to lead them. Presented before the American Management Association, a paper on this subject was widely sought in reprint form.



John Mills participates in the weekly Business Forum program over Radio Station WMCA presented by the Commerce and Industry Association of New York. The subject, Your Invisible Servant—The Electron, was discussed by Mr. Mills, Otto S. Schairer of RCA and Stanley P. McMinn of Electronic Industries, with T. J. Miley as moderator

With the incorporation of Bell Telephone Laboratories, John Mills was named Director of Publication on February 1, 1925. He took over some existing functions, such as information services to the Associated Companies and the public, the Bell System Historical Museum, the solicitation of comments on technical articles and their ultimate clearance for publication. He planned a magazine of information on the work of the Laboratories, for distribution not only to its personnel but also to scientific organizations both industrial and academic. In September, 1925, the first issue of BELL LABORATORIES RECORD appeared; its articles, easily read, short and well illustrated, soon proved valuable source material. He also envisaged a series of book-length texts which would issue from the Laboratories and make available its scientific results. This series, which is now twenty years old, includes important works on speech and hearing, electromagnetic waves, filters and networks, and other important phases of our Laboratories' work.

Most spectacular of John Mills' contributions as Director of Publication have been in the field of exhibits. When it was determined that the Bell System should exhibit at A Century of Progress at Chicago in 1933, he formulated a basic philosophy of showmanship which stated that "the greatest public interest (will be) attracted by exhibits either of striking scientific novelty or of a type which permits individual visitors to participate." He perceived that "a Fair crowd is one of great mobility, of short-lived interest; one which looks upon the entire thing as a show and judges each exhibitor by the novelty, drama and attraction of the show which he puts on." At Chicago, the Bell System exhibit was dominated by "Oscar," with which was demonstrated the illusion of auditory perspective. Responsibility for the design and installation of the entire exhibit headed up in Mr. Mills.

Smaller exhibits followed at San Diego in 1935 and at Dallas in 1936, and then preparation began for the New York World's Fair and the Golden Gate Exposition to open in 1939. For these he conceived two new exhibits—the Voder, a device for the keyboard production of speech, and the stereophonic Audition for Visitors.

The last active years of many executives, seen through the eyes of their biographers are uneventful. By that time their function is one of inspiration, encouragement, and guidance, rather than creation. But John

Mills, while a constant inspiration to his colleagues, continued his individual productivity until almost the last day. Three days before he retired he had completed the scenario of a two-reel picture dealing with Laboratories war work in the fields of sonar and radar. During his last year he published his tenth book, "Electronics, Today and Tomorrow," already in its fourth printing, recorded in "Talking Books for the Blind" and chosen for a 100,000 copy edition for the Armed Services.

PAUL B. FINDLEY.

Time and Weather

Under the title "About ME 7-1212 and WE 6-1212," Joseph Field, in a recent issue of PM, discussed a visit he made to the Time and Weather Bureaus of the New York Telephone Company. Some of his comments are given below.

ALMOST 70,000 New Yorkers now phone M^Eridian 7-1212 every day to find out what time it is. Probably the war is responsible because so many clocks and radios are out of order and it's difficult these days to get them repaired.

M^Eridian 7-1212, set up in 1928, is located in the company's E. 30th St. building, in a glass-enclosed, sound-proof booth, that looks like a radio control room, set up in a corner of the Murray Hill central office, where switchboards stretch all around the room, in a kind of surrealistic border design. About 75 regular M^Urray Hill 4 and M^Urray Hill 5 operators, especially trained to say: "When you hear the signal the time will be . . ." in a smooth, clear tone, *without* inflection, take 30-minute spells.

DISCONCERTING

It would be disconcerting to the customer, said Mrs. Irene Weissenbach, the chief operator, a dark-haired cheerful woman, if it were to come over: "When *you* hear the signal . . ." or "When *you hear* the signal . . ." A good time-teller says it without emphasis on any word, in a smooth, flowing tone.

Eighteen-year-old Nancy Candullo, a pert little girl who has been with the company almost two years, and is one of the select 75,

said, however, that she had no trouble catching on.

A girl generally leaves her switchboard for the 30 minutes inside the booth without reluctance. She sits behind a desk, with a microphone strapped around her head, facing a panel which has two electric clocks. Every 15 seconds a green light on the panel flashes, she hears a buzz in her headset, and says: "When you hear the signal" etc.

(The clocks are synchronized with specially devised master clocks in Bell Laboratories and with Naval Observatory time in Washington through radio apparatus.)

The company has discovered that after half an hour the work gets monotonous, which is why the girls take 30-minute turns.

"It's fun," said Miss Candullo. "It breaks up the day, it relieves the monotony."

She forgets the time, she says, sitting at the desk, telling it every 15 seconds. Never has the thought popped into her head to vary the wording.

"I would never do that," she said. "It wouldn't be the way I was instructed."

During the World Series, the service was augmented by announcements of the score. Another girl sat in the room to do that and the interval between the time announcements was lengthened to allow her time to

Angie Avitabile
 A. R. Burrel
 R. I. Chappell
 J. Clark
 Rose Clark
 E. Corcoran
 U. J. De Luca
 Violet Diano
 C. Englebart
 Marie Fazio
 R. R. Ficke
 D. Footett
 Stanley Garbarezy
 C. J. Germano
 F. N. Grant
 Peggy Hirsch
 O. Jackson
 A. J. Kane
 Abraham Klein
 E. A. Klotz
 P. Koitto

Red Cross Blood Donors



"I'm in a position to give some first-hand reports on the use of plasma—it is the most important life saver we have today. Tell the folks back at the Labs to keep up their generous donations of blood—it is responsible for saving more lives than any other single item."—
 SERGEANT WILBUR INSULL, Medical Battalion, Rainbow Division.

J. Lalloy
 Ruth Lewin
 George Maley
 J. J. McNiff
 C. Mohwinkle
 Morris Nozette
 Allan Olander
 W. J. Parker
 W. Pelgorsch
 T. Pesik
 Gustave Provenzano
 Warren Rosebrook
 J. Schenek
 S. Sempe
 P. J. Tansey
 M. Thorburn
 T. W. Tordy
 A. B. Walthers
 W. Wieser
 M. Wisniewski
 James Yanno

give the score through another microphone.

There also has been a wartime increase in the number of calls coming into WEather 6-1212, the phone company's Weather Service, a glass-enclosed, sound-proof room, too, in its W. 50th St. building.

Compared to the 12,500 persons who phoned WEather 6-1212 to get the forecasts daily soon after this service was started in 1939, the daily average now is 29,000.

Last September 14, however, a record was set when 143,942 New Yorkers phoned in to get the forecast. That was the day of the hurricane.

WEATHER ROOM

The weather room is in a corner of the Information floor—the largest Information office, incidentally, in the world—and specially trained information girls take turns here, too, coming inside and recording the weather announcements.

Their training is similar to that the time girls receive, with even more stress laid on the avoidance of emphasis, no matter if the temperature is 10 below zero.

In a corner of the room, a teletype receiver is connected by direct wire to the U. S. Weather Bureau in the Whitehall Building, and four times a day, at 6:30 a.m., 10:30 a.m., 4:40 p.m. and 10 p.m., the forecast

comes in over the wire. Every hour the Bureau sends in the tem-per-at-ure, as the girls pronounce it, and humidity readings. A phone linked by a direct wire is also available in case there's a sudden change.

When the report comes in, an operator walks inside the room, plugs in her headset on a control board set up in front of her, and reads the forecast from the yellow slip of teletype paper. This is recorded downstairs on a thin, magnetic wire which endlessly reels around in a glass-covered machine.

As soon as the operator finishes making her recording, a supervisor listens in to make sure there is no emphasis, OK's it if there isn't, and the new announcement is plugged in on the wire in a matter of seconds by throwing a switch.

What you hear when you dial WEather 6-1212 is the recording, repeated every 30 seconds.

Weather forecast bureaus are located in Baltimore, Boston, Chicago, Detroit and Washington, D. C.

Persons and trades using the service include fishermen, restaurant owners, coal and oil dealers, amusement parks, ice companies, bakers, truckers—even the transportation system, which sometimes has to regulate the amount of pressure used in opening and closing train doors, depending on the weather.

The girls, according to Mrs. Kara, enjoy making the recordings because it breaks up their regular routine of answering questions. Most of them phone their boy friends to listen in, at first, and call WE 6-1212 themselves.

TEM-PER-AT-URE

We sat in the room and listened to Mrs. Edward Kara, a blonde, bright woman, read off the afternoon's weather forecast. "U. S. Weather Bureau Forecast for New York City and vicinity," she said in high, clear voice, reading from the yellow teletype slip. "3 p.m. tem-per-at-ure, 48 degrees. Humidity, 44 per cent. This afternoon cloudy. Highest tem-per-at-ure near 48 degrees. Windy. Tonight cloudy and colder. Lowest tem-per-at-ure 25 to 30 degrees. Fresh winds. Wednesday, mostly clear. Little change in tem-per-at-ure. Highest tem-per-at-ure 40 degrees. Fresh winds . . ."

A minute later we listened to it on a pair of

earphones while a supervisor listened in on another. The tem-per-at-ure came out clearly and strongly and the whole message (which has to be read in less than 30 seconds because that's how often it is repeated) was smooth and flowing.

Right now, the forecast ends with: "This is Red Cross month." Every few months the company appends some such trailer. Others have plugged the March of Dimes and the War Bond, wastepaper and tire conservation drives.

The Bureau of Publication

John Mills, Director of Publication, retired under the age retirement rule on April 30. Pending appointment of a new Director, R. L. Jones will be in general charge of the Bureau of Publication, and R. K. Honaman, Assistant Director of Publication, reporting to Mr. Jones, will be in charge of the subdivisions of the Bureau.

Whippany and Murray Hill people participated in the Paterson (N. J.) War Work Show as part of the war labor recruiting program in that territory. The exhibits were erected by members of the Laboratories and were well attended by the public. At the drafting boards, Muriel Lazear and F. W. Holland give demonstrations of their work, while F. J. Reilly at the microphone talks to the spectators via a Mirrophone. A. E. Valentine, at left in the background, is interviewing an applicant over a sound-powered telephone set



Understanding the Discharged Veteran

The following information is from an article by Major General Norman T. Kirk, Surgeon General of the Army. It provides an insight into a problem which we now are facing to a constantly increasing extent. It is a problem which in one way or another touches everyone.

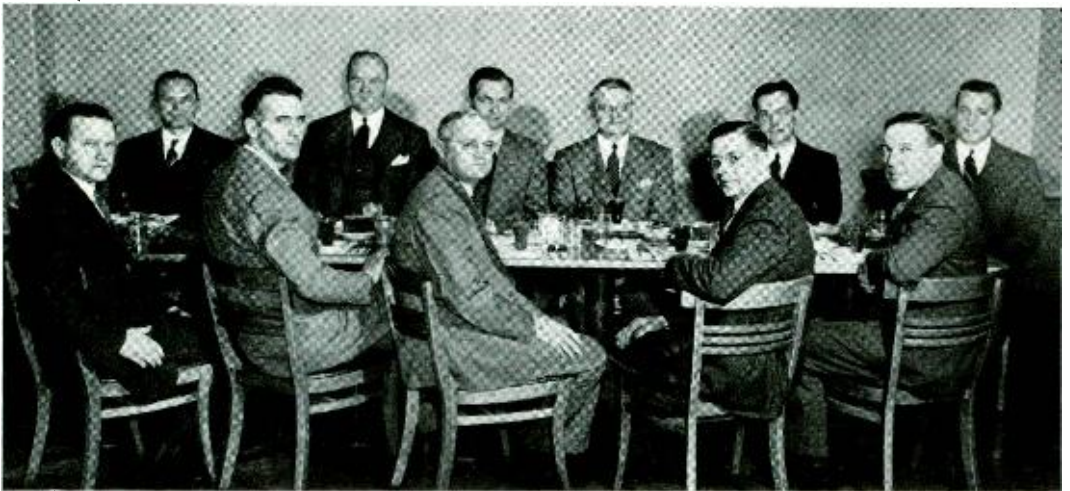
ON MY recent tour of the European battlefronts I was particularly interested in finding out how long it took for medical aid to reach a wounded man. Soldier after soldier told me that he had received medical aid within minutes after he had been hit. The medical soldiers are right alongside of those boys who are fighting in the front lines. They are prepared to give them first aid and get them back for treatment in the shortest possible time.

The evacuation of the wounded may be compared to a long conveyor belt. It starts when the wounded man is picked up by the medical soldiers, given first aid and carried to the battalion aid station for emergency surgery and medical care, often under artillery fire. From there he is taken

to collecting stations which prepare the men for transportation and to the clearing stations which have complete surgical equipment. He then goes to the evacuation hospital and from there to the general hospital far removed from the combat zone. If he cannot be returned to duty within a limited time, he is sent to a general hospital in the United States.

He may have lost an arm or a leg. He may have lost both arms or both legs. His face or head may be disfigured. He may be a nervous wreck from battle fatigue and labeled psychoneurotic or psychotic. But no matter what his condition is, I want to assure you that he will get the best care that medical science can provide.

All along the line of this medical con-



Northwestern Bell men now at the Laboratories have luncheon with two visitors from their former company. Left to right: W. H. Shad, F. S. Hird, H. B. Coryell, L. O. Arstad, Chief Engineer of the Iowa Area, Des Moines, L. E. Peterson, C. J. Johnston, C. L. Sampson, Assistant Vice-President, Omaha, W. G. McAvoy, M. I. Risley, B. C. Nourse, and S. J. McDermott. F. E. Wherland also attended the luncheon but too late for the photograph

veyor belt he has received treatment. His spirit has been developed. He has put his dependence upon the doctors and the nurses. He has seen others with possibly more serious wounds get well. He learns to take the loss of an arm, leg, eye or disfigurement in his stride. He believes he will soon be well to do a job and has complete confidence in what the doctors and nurses tell him.

The amputee is happy with others like himself. He is furnished a prosthesis and taught how to use it. The blinded man is taught to be self-reliant. Plastic surgery takes care of the facial disfigurement. His morale is high. He is ready to face the world. And then what happens?

When he sees his mother she breaks down and cries. When he walks down the street he is the subject of morbid curiosity. When he boards the street car someone tries to help him. These are the things that destroy his self-confidence and the work of months is sometimes undone in minutes.

The wounded soldier does not want sympathy. Neither does he want charity. Legislation and the grant of funds, embellished by ballyhoo, is not the answer to making him a useful citizen. He wants to be self-supporting and self-reliant. It is only humanitarian to subsidize him in accordance with his handicap, but he does not want pity, gratuities or sob-sister aid. Many of these men when properly trained have a higher earning power than when they entered the Army. They are normal beings and they want to be treated as normal human beings.

The most important thing which friends and relatives of the disabled veterans can do is to treat them naturally—treat them as normal men. Attention should not be forced upon them. People should not shudder at their afflictions and they should not be gushed over. These men are hypersensitive. If they have lost an eye or an arm or a leg they may feel, if friends or relatives un-



A Certificate of Merit was presented to the Laboratories for completing the 1944 Inter-Fleet Accident Reduction Contest of the Greater New York Safety Council without accident to any vehicle entered in the competition. Clifford J. Fletcher (left), Commissioner of Motor Vehicles of New York State, congratulates W. A. Tracy, Building Superintendent of the Laboratories, as Elisha S. Chapin, Department of Sanitation of New York City, holds the certificate

wittingly encourage that feeling, that the bottom has dropped out of the world they knew. But that isn't true. We all know men and women who have successfully overcome grave disabilities and have lived useful lives.

Be understanding, sure. The injured man needs to know that his family and friends care for him. That is very important. But they must also know that this soldier is no longer a "boy," except to his mother, who will always think he is, and he should not be so treated.

Through training and leadership he was, when wounded, a soldier—a soldier who could give and take—lick the best the enemy could offer. In other words he was a courageous, mentally and physically fit man. Don't ever let him lose this fighting spirit.

The wounded soldier must be allowed to do things for himself. If he finds he can tie or lace his own shoes, it is much better that he do it than it be done for him. He must discover that despite his handicap, he can do these and other things to give himself confidence and self-respect.

The employer's responsibility is to so place the disabled veteran in his organiza-

tion that his abilities and skills will be used to the best advantage. He should not be placed on a payroll to become a pensioner. He should be given a job that he can do. For example, by breaking jobs down into component parts, handicapped veterans can do useful and productive work.

Parents, relatives and friends should not attempt to minimize the result of his injury. They must be realistic and honest. They should not tell him he looks fine, when he doesn't. But they can tell him he will soon be as good as new. These wounded and disabled servicemen have no desire to be martyrs. They don't want to be treated as heroes. They have rendered a great service to our country. They have made a great sacrifice. So a great responsibility rests on the public. Public behavior must be adjusted so that by ill-considered actions additional handicaps are not placed upon them.

The Telephone Business

President Walter S. Gifford, in the recent A T and T quarterly dividend statement, said in part, "The use of telephone service continues to increase and the load on Bell

Please put your RECORD in the "Correspondence-Out" box when you are through with it so that it can be sent to a Serviceman's family.

Telephone System facilities is at an all-time high. Moreover, while all war needs for service are being met fully and promptly, the number of applications for telephone service for civilian use which are being held because of lack of facilities (the largest item being central-office equipment) continues to increase and is now about 1,800,000 or 220,000 more than at January 1. This increase has occurred in spite of the fact that we have been able to increase the number of telephones in service by 117,000 during the first quarter of this year as compared with only 47,000 in the first quarter of 1944.

"The Western Electric Company, which is the largest producer of electronic and communications equipment for the Armed Forces, is still engaged almost exclusively in the production of war equipment."



George K. Shirling exhibits a porcelain insulator at a farewell luncheon given to him on his return to the Southwestern Bell Telephone Company. He had been engaged in the electrical design of radio receiving equipment since his transfer to the Laboratories in December, 1942.

Left to right: Dorothy McCallen, Mrs. Shirling, Mr. Shirling and H. B. Fischer



Lieut. Col. Frank A. Parsons Awarded Bronze Star

Lieut. Colonel Frank A. Parsons has received the Bronze Star for meritorious service on the battlefields of Europe. He is assigned to the headquarters of General Omar N. Bradley, where he is ammunition officer of the ordnance section. Colonel Parsons enlisted four years ago and has been overseas for fifteen months. Previously he was in England on a special mission.

Raymond P. Chapman Receives Battlefield Commission in Italy

Raymond P. Chapman, veteran of more than 34 months' service overseas, including combat duty in North Africa and Italy, recently received a battlefield commission of Second Lieutenant on the Fifth Army front in Italy. Formerly a technical sergeant, he became an officer in his company.

He left Fort Dix, New Jersey, with the Anti-Tank Company of the 135th Regiment, 34th "Red Bull" Infantry Division, and served in Ireland and England before taking part in the invasion of North Africa.

Acting first sergeant of his company at the time of his commission, Chapman has been with his unit throughout the fighting in Tunisia, including such major engagements as Fondouk and Hill 609. In Italy he was in action at the crossings of the Volturno River,

Cassino, the Anzio beachhead, Rome, Leghorn, Pisa and the Gothic Line. The anti-tank company, in addition to its regular duties, has had a variety of tasks in combat, such as mine removal work and outposting in defensive positions and in emergencies has carried wire, rations and ammunition forward as well as removing the wounded in the mountainous sectors of Italy. Chapman has been awarded the Combat Infantryman Badge and the Purple Heart for wounds received at the start of the offensive from the Anzio beachhead.

He has a brother, Captain Stanley H. Chapman, with the Signal Corps in the Pacific.

Joseph O'Keefe

"As usual, we are moving about quite a bit. While in New Guinea I had a glimpse of a former Bell employee. I was riding in a jeep and we were kicking up the dust. We passed a group of sailors and I recognized one as being a former friend of mine. I called his name and he waved back and that was the last I saw of him. Strange how you meet people. Down here, as it is all over the world where the GI Joe is stationed, the familiar cry is 'Hey Joe' followed by a jabbering of Filipino and English. The children can speak English very well, which is a change from New Guinea. When asked to



sing a song, they promptly give out with 'Pistol Packin' Tojo, Lay that Pistol Down.' We give them candy, hats and shirts. They in turn give us Jap money. When the Japs evacuated, the natives must have raided the bank. The kids walk around with their pockets full of pesos. They are a great gang and glad we are back.

"One of the strange stories to come out of this war was told to us by a ten-year-old white boy. When the Japs landed here in 1942, this boy, his mother and father, a government official, went into hiding in the hills. For two years they lived with the guerrillas and the boy learned Filipino and can speak it as well as the natives. When we landed the news spread rapidly and they came down. The father is now a Naval Officer and the boy is healthy looking, but those two years will be imprinted in his mind until he dies. The Japs were surprised and thoroughly beaten. The guerrillas did a great deal in helping to wipe them out."

Privates Malone and Sheehan Killed in Action

PRIVATE HARRY A. MALONE, JR., of the General Service Department was killed in action in Germany on March 2, 1945. Private Malone entered the Laboratories in February, 1943, as a messenger in the

central service group. He was granted a military leave of absence on December 17, 1943, and was stationed at Fort McClellan, Alabama, for his basic training. He was then transferred to Fort George G. Meade, Maryland, for advance training before being sent overseas in June, 1944.

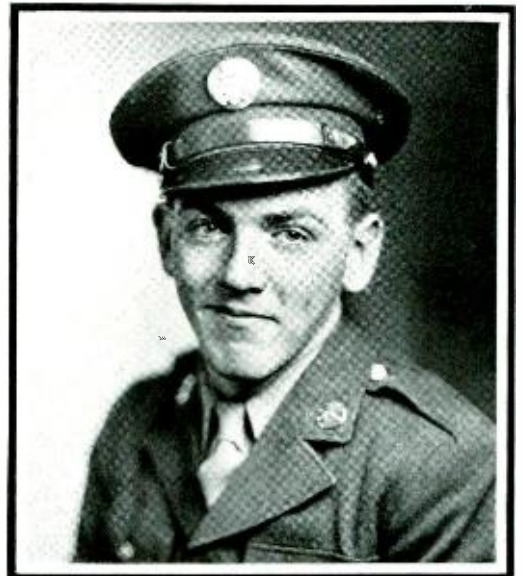
PRIVATE EUGENE H. SHEEHAN died of wounds received while in action against the enemy in Germany on March 20, 1945. Private Sheehan was also a messenger in the central service group. He entered the Laboratories in July, 1943, and left on a military leave of absence on September 5, 1944. He received his infantry training at Camp Croft, South Carolina, and in January of this year went to England, and from there to France and Germany.

Lt. David F. Tuttle, Jr.

"I've been at sea on the U.S.S. *Hornet* for some time. The last civilization I saw was at Pearl Harbor, in March of last year—quite a stretch to be out. We have no immediate hopes of returning soon, either. Our travels have covered the Western Pacific thoroughly, from the Bonins to the Admiralties and from the Marshalls to the coast of China and Indo-China. It's not too bad a life on a ship this size, but it's a long time away from home."



Private Harry A. Malone, Jr., 1925-1945



Private Eugene H. Sheehan, 1926-1945



Roll of Honor

KILLED IN ACTION

Lieutenant Ernest G. Graf
Ensign David F. Greenhagen
Private Sarkis Karibian
Private Edward A. Fern
Lieutenant Stanley W. Erickson
Captain Orrin F. Crankshaw
Private Harry A. Malone, Jr.
Private Eugene H. Sheehan

MISSING IN ACTION

Lieutenant Robert F. Healy
Private Joseph T. Murphy
Lieutenant Everett Urbanski
Lieutenant Thomas M. Pepe

PRISONER OF WAR

Lieutenant Ralph D. Horne

LEAVES OF ABSENCE

As of March 31, there had been 965 military leaves of absence granted to members of the Laboratories. Of these, 55 have been completed. The 910 active leaves were divided as follows:

Army 514 Navy 293 Marines 31
Women's Services 72

There were also 18 members on merchant marine leaves and 23 members on personal leaves for war work.

Recent Leaves

United States Army

Lyn Berbert	Glenmore M. Bloss
Bruce B. Bleecker	Francis X. Sullivan
George J. Van Delft	

United States Navy

Lois V. Jones	John J. McKeon
Manfred Krischik	Donald Schafer
Richard G. Urbanek	

United States Marines

Gloria R. Gilroy	Charles W. Hughes
Marianna Whaley	

Wilbur Insull

"At present our division, the Rainbow, is in the 7th Army. Although we haven't been in France very long, we have managed to see some action. My job is that of Surgical Technician in the division of Medics. I work hand in hand with the surgeons who are saving the lives of the boys as they come off the lines. Believe me when I say that sometimes the job isn't too easy! We operate in buildings in towns recently vacated by the retreating Germans. It is coincidental that we are at present occupying the local telephone exchange.

"I'm in a position to give some first-hand reports on the use of plasma. It is the most important life saver we have today. I have already watched it work its magic on casualties. Magic is just the word for its action. Almost immediately after the precious fluid starts flowing the change can be noticed. Tell the folks back at the Labs to keep up with their generous donations of

blood for plasma. It is the one item that is responsible for saving more lives than all else."

Frederick Schellhorn

"During the month of January my ship was operating off the coast of Mindoro and in the China Sea. As we approached the Philippines, we were told of the coming invasion off the Island of Luzon, and the fact that we would be in the general area.

"Those nights were fairly hot, and to make matters worse, we slept with our clothes on. Luck was with us. No enemy planes or ships showed up, thanks to the efficiency of the aircraft carrier blows aimed at those islands.

"The climate on Mindoro was like May in New York. The natives would paddle out to our ship in dug-out canoes. The whole family would come—just like our motor trips on Sundays back home. They traded bananas, sea shell necklaces, or Japanese money for various things we had."



Walter A. Farnham

"So far our crew has completed 37 missions, and with only three more to go we're keeping our fingers crossed. We're stationed in the Marianas Islands. It's rather nice out here although the weather gets a little too warm at times. I'm an engineer on a B-24, and it's our responsibility to load bombs, take care of the guns of the ship, etc., along with flying the missions. The ground crew takes care of the plane on the ground. I can say that we've raided various targets in the Bonins. The Japs can make it tough at times. Had us in their searchlights the other night. I've been hearing from my old department (4D) quite frequently.

"The other night I was fortunate enough to see a stage show put on by the natives here. They were real good, with a lot of talent among them. Even the little children get in and pitch."

Robert Dryden

"I am stationed in a town instead of the apple orchard which was my home for seven months. Instead of mud, we now have dust to worry about since spring weather is arriving here. I am now working in our repair shop, in the instrument section. Aside from repairing instruments which are used for test purposes in radio sets, we have those which are used in equipment made by Western Electric and developed in our own Labs. I am very proud to work with such fine equipment. Keep up the good work and we will continue to lead the world in electronic equipment.

"At present I am working on a meter test set to locate trouble easily and more quickly. It will save much time and work on our part. The original idea is from the BELL LABORATORIES RECORD, in which there was an article on a meter test set. I have managed to obtain, through salvaged equipment, the main parts and have resources to others I will need."

Charles Graham

"I am quite well and still hanging around in this part of the world called Holland. Things are comparatively quiet just now, for, as you know, the main concentration is down in Belgium. But by all indications that should be cleared up before too much time

has passed, and then I hope that we'll get moving again.

"Incidentally, I too see quite a bit of the Labs equipment since I'm in the anti-aircraft section of the Ninth Army Headquarters. And believe me, they really 'bring them down,' with it, too."

Patrick J. Smith

"I miss the RECORD a lot as I haven't received several of the recent editions, but I believe that they were probably lost through enemy action like some of my other mail. I was up on the front lines during some of the cold weather and as a result I am now back at the hospital recovering."

Ensign J. M. Woitovich

"I am at present assigned to duty in the South Pacific attached to a submarine division, having recently been graduated from submarine school at New London. I am enjoying my work in sub service immensely and find it interesting. I wish I could tell you more, but the confidential nature of most of the work done here by submarines prevents my going into any appreciable detail."

John J. Lordan

"I followed the advance from Anzio up as far as Civitevechia and then pulled out for the invasion of Southern France. I think I will remember my landing on D-day for a long time to come. The weather was beautiful and the water was fine for wading ashore. I visited Marseille while I was down there and I think it is a very nice city. After that I saw Plombieres, Luneville, Strasbourg, Sarrebourg and a few more places in this part of Europe.

"We had some exciting moments in Strasbourg as we were the first Americans into our section. The Krauts really left there in a hurry and we got quite a bit of their equipment that we put to our own use. I have seen more of France in a few months than I saw of Italy or North Africa. On the 12th of this month I will celebrate my second year in the service, seventeen months of which have been overseas duty. I guess it has paid off though as our outfit has earned four battle stars during this time and a commendation from General Mark Clark."



Lieut. Thomas M. Pepe Missing in Action

It has been reported that Lieut. Thomas M. Pepe, a pilot in the Marine Corps, is missing in action in the Philippines. Lieut. Pepe entered the Laboratories as a drafting assistant in February, 1941. He left on a personal leave of absence for civilian pilot training on November 15, 1942, and he was granted a military leave of absence December 15, 1942.

Lieut. Pepe took his civilian pilot training at Loudonville, New York. He then trained successively in the United States Naval Air Forces at Cornell, Chapel Hill (N. C.), Peru (Ind.), Pensacola, Jacksonville and Santa Ana. He was sent overseas to the Pacific with the First Marine Air Wing group last December.

Martin C. Nielson

"We had a very enjoyable trip over and can consider ourselves very lucky. We really traveled in style on our LST. Some of these troop transports I hear about are pretty crowded and uncomfortable.

"At present we are under a pretty tight camera restriction and we can not take pictures, but the first chance we get we are going to send a photograph."

Frank Hulley

"I am flying from bases in Italy in the box car of the air, the B-24 bomber. Despite all you may have heard, it is a good plane—it gets you there and back and that's what counts. I've been on strikes over Italy, Yugoslavia, Austria, Germany, Czechoslovakia and Poland and after having a bird's-eye view of most of Europe, I'm quite ready to go back to the States—but that will take a few more months for me to finish my sorties. At present we are sweating out the big Russian drive, which we hope will end it in Europe.

"As for sunny Italy, I haven't seen too much of it yet, so I suppose I shouldn't be

over critical. The weather, however, that's a thing I've seen enough of to last me for years to come. It's not monotonous though—we alternate from rain, snow and mud to mud, rain and snow. Variety is the spice of life in this area.

"This is really a strange country. Any day you can see mule carts rolling along piled high with the father and his dozen children while ten paces to the rear walks the mother with the household goods piled on her head. If we used these women instead of GI trucks there would be no supply problem. They really use their heads."

William R. Davis

"I'm on Iwo Jima. We landed here on the 19th of February. This is the toughest island to take so far. We expect to secure the island soon."—William R. Davis with the Fourth Marine Division wrote this early in March.

Vincent Decker

"We are at sea again after a short stay at one of the islands out here. We were all back on the fantail enjoying the picture 'Mazie Goes to Reno' when all of a sudden we had one of those tropical downpours. Hop, skip and skat we were down below shedding our clothes, grabbing our soap and towel and back out to have our shower on mother nature. Rain, as you can see, has become an important factor in our daily life and at the slightest inkling of that wonderful stuff we are out there waiting for it. This cloudburst lasted fifteen minutes. We had a good shower, got dressed and were back on the fantail just in time to continue with the picture."

Robert R. Stephens

"The trip to the Marianas took quite a while and the novelty of being at sea soon wore off. It wasn't too bad, with movies and boxing to pass the time. However, I sure was glad to see this place.



Lieut. Thomas M. Pepe



LIEUT. W. B. SAGE
San Marcos, Texas

ENS. B. H. SOMMER
Merchant Marine

"At present, this is a lot like state-side duty. Metal barracks, hot water, showers, good chow and we even eat off trays. So, overseas right now means only palm trees and rain—100 per cent full meaning.

"Have been assigned for the present to a service squadron, just doing work details—a nice name for some not so nice jobs. Am hoping for a transfer to an operating squadron which according to the 'top sergeant' isn't very far off."

George A. Seibel

"I'm in France and it might be of interest to know that my company is attached to the Seventh Army under General Patch. I'm doing maintenance work over here. France is a beautiful country. This is Christmas Eve, we have a lovely tree and are promised a turkey dinner tomorrow; not bad. Follow the doings of the Seventh and you can tell what part of France I am in."

Charles E. Kempf

"The island we're on now is a fairly large one, in the Northern Solomons, with a couple of volcanoes on it. Only one of them is active and that isn't very active. We do feel an earth tremor once in a while, but I'm told that's nothing to worry about from that direction. The chief thing that has me bothered right now is the heat. I don't know just how hot it does get here, but I have seen a thermometer showing 128 degrees at ten-thirty in the morning. To make matters worse, our outfit is stationed at the beach and there's little or no shade."

Carl W. Bachmann

"By the papers at home I guess you know all about my Rainbow or 42nd Division and

how we gave the Jerries a run for his money. By this time you have read about the victories of the 7th Army. These are won at a high price. We will all be glad to get home again.

"I read in *Stars and Strips* about some of the equipment used in B-29's over Japan that sounds similar to some I worked on at the Labs. One boy in our squad was in anti-aircraft. We spoke of our good old M-9 director which I think was the first thing I worked on with you people. He says it is good, particularly the computer unit. You can feel proud of having helped the war effort."

Lt. Kenneth C. Oestreicher

Lieut. Kenneth Clifford Oestreicher, with the 15th AAF in Italy, recently flew his 25th combat mission over enemy-occupied Europe. He is a navigator of a B-24 Liberator.

Lt. Oestreicher is participating in the current 15th AAF bombing assaults on Nazi oil and rail communications targets in North Italy, Germany, Austria and parts of Yugoslavia. He has been awarded the Air Medal with cluster for his combat flying.

Matthew Tomb

"We've been quite busy out here ever since we hit this area. I never thought I'd be sitting on Tojo's doorstep, but here I am, nevertheless. We're having swell weather every day and plenty to do. It all helps to make time go faster. I just had the good fortune to get another stripe a while back."

Robert McMurrough

"Just received the RECORD here in Germany and glad to hear from the Labs. I'm fully recovered from a slight wound back in France in December."



COL. A. J. ENGELBERG
San Bernardino, Calif.

LIEUT. D. S. DUGUID
Pacific



Charles McDonald

"Am at my second stop in the Philip- pines. Concrete and macadam roads, rail- roads, and civilized people. After New Guinea, and the Netherlands Indies, this is O.K., but I still say New York City is the only place for me. The people here are very intelligent, and well educated. The Japs as usual are nasty and non-coöperative."

Louis A. Del Fabro

"I'm up here at Middlebury, Vermont, preparing for a commission. The Navy has just changed its mind about the length of time officer candidates should spend pre- paring themselves so that it has been in- creased by approximately one year. At this rate I'll be able to retire when I do receive those bars."

Julian M. Wiener

"Have added Luxembourg to my list of stops and I'm looking forward to my next, you know where. I cannot complain, things are pretty fair now that the cold weather has passed. The end is in sight and the sooner the better."

Peter H. Shearer

"I am now in Belgium and have been here since September. We are keeping the loco- motives running so that the stuff will keep moving to the front. We are all hoping to be back soon."

Charles Kossman

"Being back in the U. S. constitutes an answer to my greatest hopes and prayers. Trench foot had kept me in bed for what seemed like a very long time, but at last I think I see a furlough coming."



J. P. FRASER
Turner Field, Ga.

R. W. BLASCHKE
Atlantic

RECENT PROMOTIONS of members of the Laboratories: Ensign Marvin Bracken; Pfc. Arthur M. Doyle; Monroe W. Dring, RT 3/c; Lt. Margaret Gray; A/C Henry Henkel; Sgt. Harold H. Hoffman; William F. Jappe, S 1/c; Sgt. Clinton A. Jaycox; Ernest N. Johnson, S 1/c; Margaret M. Kenny, AerM 3/c; 2nd Lt. John A. Lasco; Domenick Maccia, S 1/c; Joseph U. Meats, EM 2/c; Cpl. Robert H. Meuser; A/S Ernest F. Neubert; Joseph E. O'Keefe, RM 3/c; S/Sgt. Harold Phares, Jr.; Seferin E. Pulis, RT 3/c; Thaddeus E. Rybka, MMS 3/c; James L. Smith, EM 2/c; Major Lambert W. Stammerjohn; Cpt. William A. Sumner; T/4 William H. Tappen; T/5 Julian M. Wiener; Cpl. John H. Anderson; Captain Nils H. Anderson; Coxswain Walter B. Bachman; Pfc. Helen A. Di Stefano; Cpl. Edward J. Dixon; Edward J. Dugan, S 2/c; T/Sgt. Charles A. Haas, Jr.; Daniel T. Hayes, F 2/c; Joseph H. Hill, RT 3/c; Sgt. Wilbur Insull; Sgt. John H. Isleib; Charles A. Liscum, S 1/c ART; Arthur C. Luebke, F 2/c; Major Frederick B. Monell, Jr.; Lieut. Col. Frank A. Parsons; Carl E. Smedberg, CMM; Cpl. Raymond Yerden.

FREDERICK W. HOLD has been in the Philippines for several weeks.

LT. COL. WARD K. ST. CLAIR writes: "I have been transferred from Rhoads General Hospital and it looks as if the next move will be a return to duty."

ROBERT W. BLASCHKE, Electrician's Mate 2nd Class, U. S. Navy, formerly a night watchman at Murray Hill, visited there recently on his return from over two years of foreign service in the Atlantic and Medi- terranean areas. He took part in the Nor-



RAYMOND YERDEN
Pacific

R. C. RYAN
Chicago, Ill.



mandy invasion on a mine sweeper and has called at many of the ports in Europe and Africa in connection with this assignment.

DONALD A. LOUGHLIN is on active duty in the Pacific. "There isn't much I can say.



R. T. MONAHAN
North Africa

J. R. MAY
Camp Livingston, La.

Liberties here aren't very good but we make the best of it. The people treat us swell."

FLIGHT OFFICER HERBERT E. EARL, JR., is now serving with the 8th Air Force in England. "I must say that the English treat us fairly well and their country is very neat and pretty. Life in general is okay. Besides flying our daily missions when weather is good, we do get time off to entertain ourselves."

CLINTON A. JAYCOX writes: "It is always good to hear from home. To me, now, home is the whole of the U. S. A. and not just a small place."

RUTH B. MURDOCK, formerly of the Transmission Apparatus Development Department, who left the Laboratories last November to join the Red Cross, is now in Europe as a Red Cross staff assistant.

FRANK J. OSOLINIK is stationed at Robins Field, Georgia, after detached service in Nebraska and Texas. He has been working on the installation of high-frequency radio equipment. This two-way ground to air communications equipment is used primarily for homing purposes.

RUSSELL VALENTINE is on active duty in the Pacific; CHARLES GRAHAM is in Holland with the Ninth Army; PEDER M. NESS is on duty on an LST in the Pacific.

SEFERIN E. PULIS is stationed at the Naval Research Laboratory in Washington, D. C.; LOUIS R. BELL is at the Presque Isle Army Air Field in Maine; JAMES L. SMITH

is attending the Navy's interior communications school in Washington, D. C.; LAWSON F. COOPER has been sent overseas.

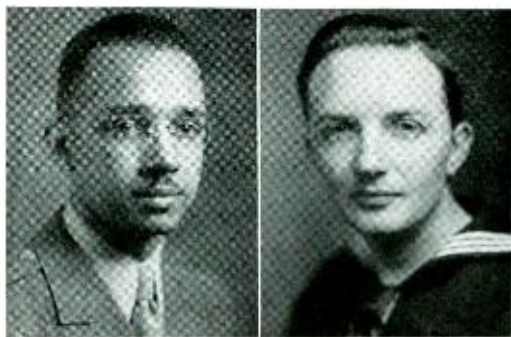
CHARLES R. STORIN has "'swapped' the 'Get the Message Through, Signal Corps' for 'The Queen of Battle, Infantry.' At present (and for an indefinite time) I'm stationed at a camp where we are training re-classified men to become Infantry men. I'll probably be here for some time as I'm part of the cadre."

MARSHALL L. GLAAB has just completed a course in radio mechanics and electronics. He is now stationed at Boca Raton Field, Florida, for radar courses.

RALPH NELSEN and JOSEPH U. MEATS are in the Marianas Islands; THOMAS JOHNSON is now in the amphibious force in the South Pacific; FRANK J. HOWE is somewhere in Germany seeing combat service with the 30th Division; THOMAS A. PARISEAU is in a Troop Carrier Squadron overseas; JOHN F. MCCARTHY has been retained at Camp Lejeune, N. C., as an instructor.

ARTHUR M. DOYLE is somewhere in England. "The country here is not unlike Westchester County, New York. Excellent chow. Congenial comrades."

JOHN O'SHEA is waiting for a ship, which is to be commissioned May 8th; HAROLD W. RAIMERT has completed two terms in the Navy V-12 program at Cornell University.



W. L. FARMER
Washington, D. C.

R. I. HEINRICKS
Portsmouth, Va.

KENNETH F. MCKENNA is at Davisville, Rhode Island. He has been assigned to Station Force as a photographic technician after completing the course in photography which was given there.

ROGER W. WALTER is "on the last lap of our weather equipments training here in



mid-west. We graduate as radio sound operators and maintenance men in April."

MARGARET M. KENNY is in Washington, D. C., attached to Navy Weather Central and working at the Navy Communications Annex; R. F. GRAHAM has been transferred to Corpus Christi, Texas, where he will receive the final seven months of his training in the Navy Air Corps.

WILLIAM F. JAPPE is a gunner in the armed guard of the U. S. Navy, and is a member of a 32-man crew aboard a merchant vessel. Recently he was in England, on the way back to the U. S. from France.

LIEUT. FRANK F. HANLON recently arrived at a U. S. Strategic Air Force Station in England.

FRANK NAVRATIL has been transferred from the Infantry to the Air Corps, after being hospitalized from trench foot and has been placed in Limited Service in the 8th Air Force in England.

JOSEPH R. MAY, night supervisor at Murray Hill until he joined the Army in December, 1943, is now a cook at Camp Livingston, Louisiana.

ROBERT A. HAWLEY visited here in February. He is going to Signalmen's School at Sampson, New York; ROBERT J. GIESER is in training at the Naval Air Station in Corpus Christi, Texas.

GEORGE E. FUCHS has been sent overseas recently; RICHARD I. FORREST is in Italy with an Infantry company; HERBERT C. DEVALVE "had a bit of trouble so am sojourning in a hospital for a while." He is in the European theater.

ROBERT C. EISELE is at the U. S. Naval Air Station in Peru, Indiana.

RICHARD I. HEINRICH visited West Street recently. He had graduated from the Washington Navy Yard optical school and was being transferred to advanced optical school at the Norfolk Navy Yard in Portsmouth, Virginia.

ALFRED T. STILLER is now in Germany; HENRY LAMPERTY, JR., is now somewhere in France; G. B. TAYLOR has returned to the States and is now assigned to a new submarine—the U.S.S. *Carp*.

J. P. FRASER, formerly laboratory mechanic at Murray Hill, is an aviation student at Turner Field, Georgia, where he is training to be a bomber pilot. He visited

Murray Hill recently while on furlough.

HONORA FERRIS wrote in recently that she is working as an airplane mechanic at North Island in San Diego.

ARTHUR BRANDT writes: "At the present time am at Kingman, Arizona, in the process of changing duties, from that of instrument trainer instructor to aerial gunner."

ROBERT ANGLE writes: "Greetings from jolly old England. Been over Germany eleven times now and it isn't too bad. Have



DAVID WEBSTER
McCook, Nebr.

J. G. STORDEUR
Camp Blanding, Fla.

been receiving the RECORD regularly and I always look forward to it. It's great being able to trace my friends."

GEORGE BEHRINGER is now going to Naval radio operators' school in Sampson, New York. "We are using some Bell Labs equipment in our work."

ALOIS H. LOBISSESSER writes: "After a short stay at Camp Crowder, I came back to Fort Monmouth. At present I am assigned to the Officers' Replacement Pool, while attending the Eastern Signal Corps officers' school."

ARTHUR LUEBKE is attending electrical school and EDWARD J. DUGAN is attending quartermaster school. Both are at Bainbridge, Maryland.

JAMES J. FEENEY writes: "I am now at Goose Bay, Labrador, as a CW radio operator for AACS. Our base is quite nice, and we have a number of winter sports to choose from during our off-duty hours. This is the only place that I have ever found that is colder than the corner of West Street on a winter morning."

CAPTAIN NILS H. ANDERSON is stationed at Camp Croft, South Carolina; CHARLES A. HAAS is stationed in Berkeley, California.

EDWARD J. DIXON has been sent overseas.

History of First Aid Training at the Laboratories

FIRST AID training started at the Laboratories on an informal basis in 1928 when several short First Aid courses, with periodic reviews, covering artificial respiration, control of bleeding, and bandaging were given to selected groups of employees at the Hudson Street Tube Shop, then a part of the Laboratories. The courses were conducted by J. S. Edwards, who was qualified as a First Aid instructor in 1924 by the New York Telephone Company prior to his transfer to the Engineering Department of the Western Electric Company.

With the expansion of the Laboratories, which resulted in the occupying of leased areas such as the Davis and Graybar buildings, it was considered desirable to train selected members of the Laboratories in First Aid so that they would be able to give emergency care in the event of accident or

sudden sickness at these locations where medical facilities were not readily available. During the fall of 1930 three classes were held and 39 persons were trained, following the basic course prepared by the Bell System in collaboration with the American Red Cross. At the same time negotiations were started with the American Red Cross for a joint agreement of the Laboratories with that organization similar to that followed by other Bell System companies. Arrangements were not completed at that time. However, the persons previously trained were given refresher First Aid training periodically, and these individuals in 1933 gave First Aid care to 935 of their associates.

In July, 1937, negotiations were again started with the American Red Cross, and later that year a joint agreement was executed whereby the Laboratories were for-



The National Committee on Awards for the American Red Cross has awarded Certificates of Appreciation and Service Medals to J. S. Edwards, L. E. Coon and W. W. Schormann for the outstanding service they have rendered in teaching and promoting First Aid. The Certificates were presented to these men by James J. Tattersall, Director, First Aid, Water Safety and Accident Prevention of the North Atlantic Red Cross Area. Above, Mr. Tattersall (right) makes the presentation to Mr. Coon. Seated, left to right, are R. L. Jones, W. Fondiller, Mr. Edwards, Mr. Schormann and G. B. Thomas

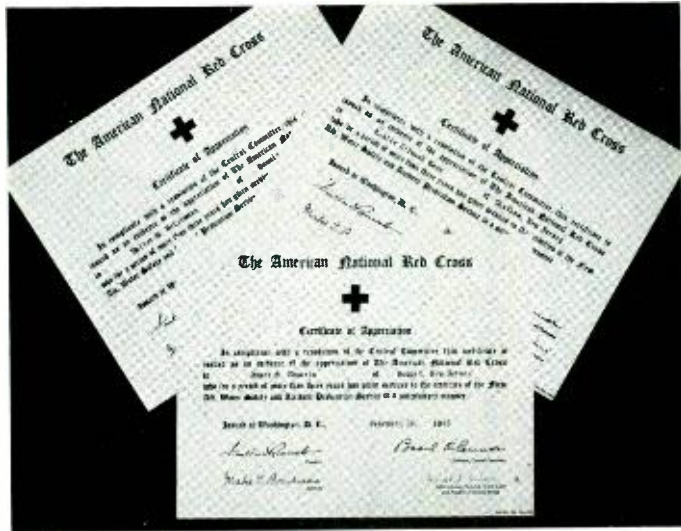
mally authorized to conduct First Aid courses and to issue joint Bell Telephone Laboratories and American Red Cross certificates. These negotiations were initiated by Mr. Edwards and W. W. Schormann, and these men were qualified as the first Laboratories' instructors. In October of that year the first classes were conducted for which certificates could be issued. Early in 1938 Dr. L. M. Thompson, Special Field Representative of the Red Cross, visited the Laboratories, examined the classes which had been taught by Mr. Edwards and Mr. Schormann, conducted a three-day instructors' course and 15 persons who completed this course satisfactorily were then qualified as instructors.

In the next two years 211 members of the Laboratories were trained in First Aid and were issued Standard Certificates. This training was given by instructors supervised by Mr. Schormann under the direction of Mr. Edwards. In the spring of 1939 Mr. Schormann was transferred to other work, and L. E. Coon assumed Mr. Schormann's previous duties and became qualified as an instructor early in 1940.

In November, 1939, the first of a series of annual First Aid conferences was held at the Laboratories, the purpose of which was to give refresher training to those employees who were rendering First Aid service for the Laboratories at the outlying locations. In September, 1941, Mr. Edwards and Mr. Coon attended a three-day Bell System-American Red Cross First Aid conference at Princeton, New Jersey, following which a revised agreement was entered into by the Laboratories and the Red Cross, and Mr. Edwards and Mr. Coon were designated as supervising instructors, which qualified them to conduct instructor training courses and appoint instructors. In 1942 Ruth Robinson, who had received her First Aid training with the Laboratories, was given special training by an Area Representative of the Red Cross and was also designated as a supervising instructor. Outside of the Bell System, there

have been very few companies privileged to have supervising instructors.

As a part of the Laboratories' air raid precaution program, provisions were made for First Aid service. Volunteers with recent training in First Aid were organized into First Aid squads under the leadership of First Aid instructors or holders of Advanced



American Red Cross Certificates of Appreciation presented to J. S. Edwards, L. E. Coon and W. W. Schormann

First Aid Certificates, and assigned to posts on every floor at each Laboratories location. First Aid kits were provided and stretchers, blankets, and splints were stored in specially designated areas. There were 125 squads formed, involving trained personnel of 573. It is probably not an exaggeration to state that the Laboratories was much better protected from a First Aid service standpoint than any other industrial concern in the metropolitan area.

From Pearl Harbor until December, 1944, First Aid training at the Laboratories was continued under the supervision of Mr. Edwards with the assistance of Mr. Coon, and in that period 525 Standard Certificates, 256 Advanced Certificates and 56 Instructors' Certificates were added to those previously issued. As of January 1, 1945, 846 members of the Laboratories had completed the Standard Course and were awarded certificates, 256 the Advanced Course, and 80 members qualified as instructors. Of this

group, those who were selected by their departments to render First Aid to their associates cared for 10,200 cases since 1931.

Bell Chorus to Sing at Town Hall

The Bell Chorus will present their twelfth annual spring concert on Tuesday evening, May 8, at Town Hall. The Chorus has prepared an ambitious program and will have Anne Nisbet, the Harpist of Phil Spitalny's "All-Girl Orchestra" as guest artist. The group will present a first performance of six unusual choral vignettes of India from manuscript copies prepared for them by the composer, Charles Wilson Lawrence. They will also sing the richly melodic and colorful *Coronation Scene* from Moussorgsky's opera, *Boris Godonov*.

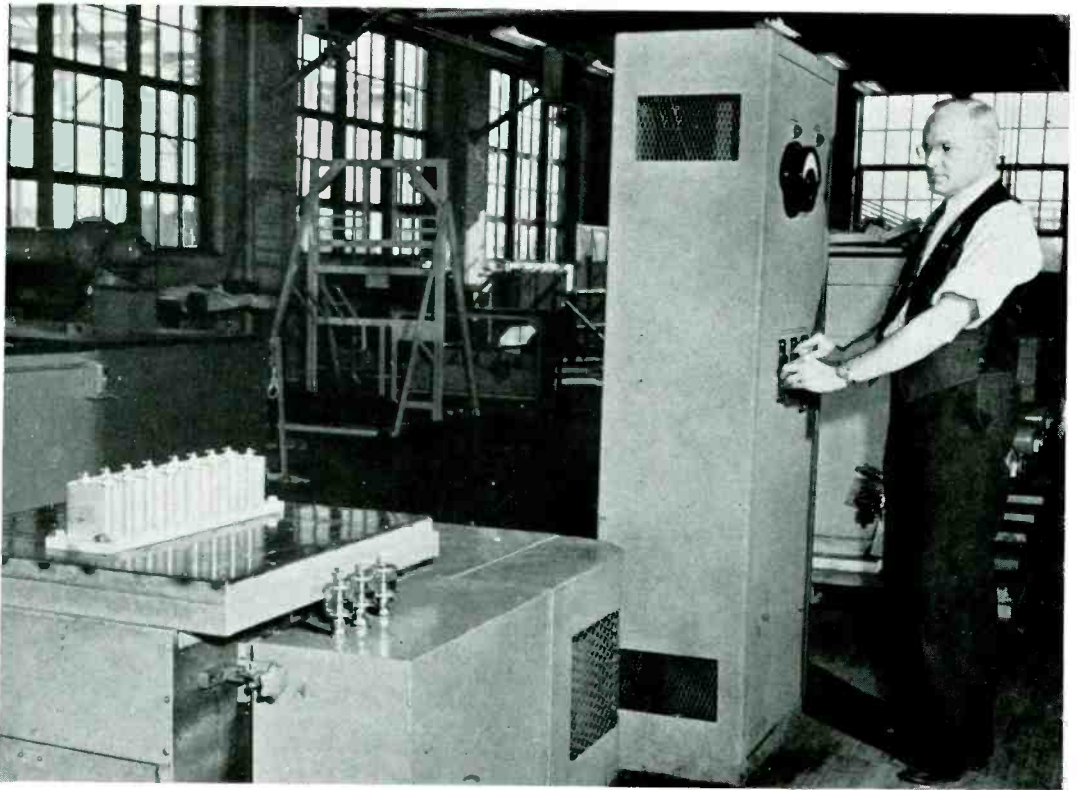
Tickets for the concert may be purchased at West Street from Hilda Muller, Ext. 1902, or at Graybar-Varick from Allen Blackman, Ext. 2024

F. R. Lack Elected a Director of Western Electric

At the annual meeting of the stockholders of the Western Electric Company held on April 10, Frederick R. Lack, vice-president and manager of the Radio Division, was elected to the board of directors.

Mr. Lack has been associated with Western Electric Company and its research affiliate, Bell Telephone Laboratories, for 33 years, having entered the Manufacturing Department of the former in August 1, 1911, as an assembler. During World War I he enlisted in the Signal Corps and saw action in France and, upon his return in 1919, he was assigned to development work on radio.

Entering Harvard as a special student in 1923, he earned his B.S. degree with high honors in two and a half years. Coming back to the Bell System as a member of the Laboratories, he engaged at first in studies pre-



"Shacky" is the nickname for the machine shown in this photograph. It is in the test laboratory at the Hawthorne plant of the Western Electric Company and it helps to make sure that war products will withstand the vibration encountered in tanks, jeeps, planes and ships. The table of the device vibrates, simulating actual field conditions.

The Greater New York Fund

The 408 agencies participating in The Greater New York Fund cover a broad field of health and welfare work. They are conducted under Catholic, Jewish, Protestant and Non-Sectarian auspices. They fall into the following categories:

- | | |
|--|---|
| 106 Hospitals and Various Medical Care Agencies. | 89 Child Welfare Agencies. |
| 20 Nursing and Health Agencies. | 25 Institutions for the Aged. |
| 43 Agencies helping Families and Un-attached Adults. | 118 Recreational and Group Work Agencies. |
| | 7 Coördinating Services. |

In human terms these services mean—in one year:

- | | |
|---|--|
| 1,207,920 persons cared for in hospitals, clinics and convalescent homes. | homes, day nurseries, shelters or kindergartens. |
| 700,744 visits by nurses to 158,064 individuals. | 2,207,898 youngsters and adults used recreational facilities provided by neighborhood houses, young people's associations and settlements. |
| 421,700 consultations by family service agencies with 46,191 families, including 164,355 persons to help solve acute family problems. | 79,233 children and adults given summer vacations. |
| 76,575 children cared for in foster | 4,561 men and women cared for in homes for the aged. |

liminary to the short-wave transatlantic radio. As part of these studies, Mr. Lack carried on a research program on the use of piezo-electric crystals in radio frequency generators. In charge of vacuum tube development from 1935 until late 1938, Mr. Lack directed the engineering of tubes for use on ultra-high frequency radio and for high power operations.

He left the Laboratories in December, 1938, to become commercial manager of the Western Electric Company and on October 1, 1939, was appointed manager of the newly formed Specialty Products Division. In April, 1942, Mr. Lack was elected vice-president of the Western Electric Company and in June, 1942, became manager of the Radio Division of the Company. On November 1, 1942, he resigned to become director of the Army and Navy Electronics Production Agency. He resumed his present Western Electric activities in May, 1943.

Honorable Service Button

More than a million veterans of the Armed Forces are now entitled to wear the Honorable Service Button which is issued to each individual on his discharge from the Army, Navy, Marine Corps and Coast Guard. While this button should entitle its wearer to the respect of Americans everywhere, the War Department is frequently informed that the public does not generally recognize the meaning of the emblem. Some veterans with long combat service overseas, now returned to civilian life, have the unpleasant experience of being challenged for their failure to appear in uniform. The service button should be recognized by all.





1—Helen Krisalis is demonstrating to Katherine Bliiotis the first step in making mercury contact switches, which is the wire cutting operation



2—Marie Zvaleko watches Ann Belmont cut the glass tubing which eventually will form the envelope in which the metal details of the switch are sealed

Women War Workers

MAKING mercury contact switches for use in communications equipment by the Armed Forces is an important project in the Laboratories' war work. The production of these switches in Building T was undertaken on a pre-production basis for the Western Electric Company.

3—In this hydrogen furnace which Lillie Gibson is operating, the metal details are de-gassed and cleaned before being sealed in the glass tubing



4—Here Joyce Ford is electrically welding a sub-assembly of the switch





5

5—At the plating station Edna Cox and Ora Wilkins are nickel plating the details that have previously been electrically welded



6

6—Helen Lee and Laura Jones make the first seal, which consists of putting the top part of the switch into the glass envelope

7—The second seal, which Phyllis Mockler is making, completes the metal-to-glass work necessary to finish the switch



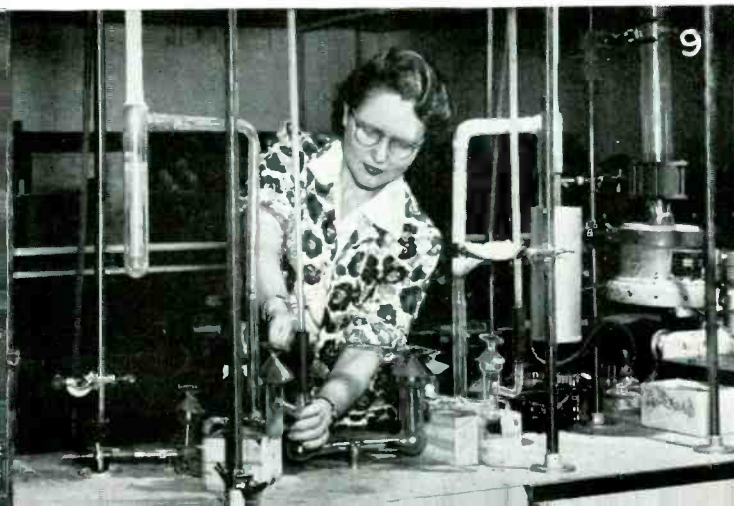
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8—This is called the pumping and filling station. Florence Dørrer (standing) and Eleanor Drews (seated) are injecting mercury, evacuating the air from the tube, filling it with a gas under pressure, and then sealing off the tube by welding



8

9—At this filling station Patricia Irvine is working on another type of glass sealed switch, the dry reed type. Except for the lack of mercury and the difference in the manner of pumping, filling, and sealing, the operations are similar to those of the mercury contact switch



9

Organization charts are her specialty. **ETHEL SAUTER** draws them up, sends them out to the printer, has them issued and sees that they are distributed throughout the Laboratories and outside companies. Studying chart work and drafting of charts at night helped her in this work. Miss Sauter is also supervisor of the typing and filing service for the Accounting Department. She has been with the Laboratories for sixteen years.

Ethel lives in Glendale, Long Island, with her mother. For diversion she likes knitting, bridge, and swimming.



ETHEL SAUTER

The operation and control of payroll work on Social Security taxes for weekly rated members of the Laboratories is the responsibility of **PATRICIA KOHLER** of the Accounting Department. Some of her duties include maintaining individual tax records, determining the proper State and Federal code to be used for each payment made, coding of salary adjustments, and the preparation and processing of various forms used in this type of payroll work.

Mrs. Kohler came to the Laboratories five years ago, starting as a messenger at West Street. She transferred to the Accounting Department in July, 1941. Her husband is an instrument and tool maker at the

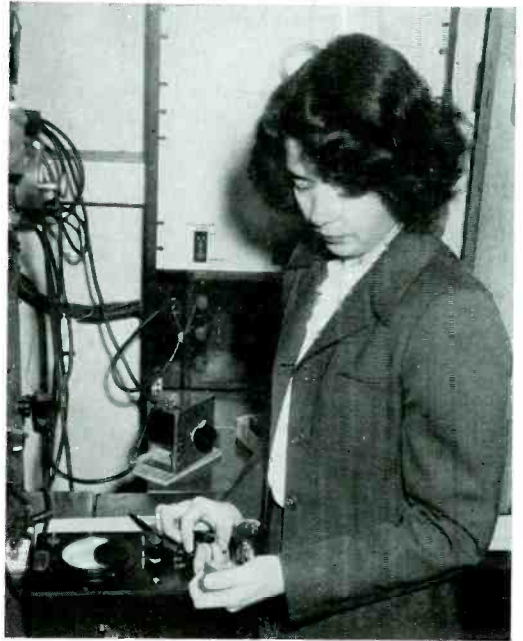


PATRICIA KOHLER

Graybar-Varick building. For outside activities, Patricia enjoys horseback riding, swimming, and reading.

* * * * *

ELEANOR BARCKLEY, a member of the Women's Auxiliary Army Corps until it was changed to the WAC and made part of the Army, finds working at the Laboratories is



ELEANOR BARCKLEY

also an important way of contributing to the war effort. During her training in the WAAC Eleanor attended radio school. When she resigned she came to the Laboratories as a technical assistant in the Apparatus Development Department at Murray Hill.

She works on the development and testing of the noise cancellation lip microphone for the Armed Forces which consists of various specification tests and tests necessary before improvements are introduced.

Miss Barckley graduated from Trenton Teachers College and did graduate work at Columbia University. Before entering the Armed Forces she taught English in the high school at Wharton, New Jersey.

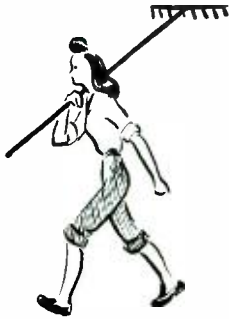
Take a Victory Vacation



Every year thousands of seasonal workers are needed to help New York State farmers harvest fruit and vegetable crops. Helping raise food for our soldiers, sailors and marines is as important as releasing a

soldier for active duty. Food is as vital as ammunition for winning the war. A large proportion of our overseas cargo to our Armed Forces is taken up by food supplies. Without food soldiers can't fight.

So many men have gone—and are still going—into the Armed Forces, that it's up to every man and women left behind to step



into their places on the home front. You can do your share in this important work by enlisting in the United States Crop Corps or the Woman's Land Army. Complete details may be obtained from Mrs. C. A. Smith, Room 159 at West Street, Extension 1449.



“Neither snow, nor rain, nor heat, nor gloom of night stay these couriers from swift completion of their appointed rounds—”

Laboratories Arts Group

With a membership of over 50 artists ranging from the neophyte to the professional with one-man shows to his credit, the Laboratories Arts Group made a promising start at its first meeting on March 29. Organized by I. J. Frisch as part of the Bell Laboratories Club, its members include those whose experience ranges from no art training at all to 15 or 20 years of study. Some have studied in famous art centers in Europe such as Vienna and Nuernberg. Nearly all of the art schools in New York City and Philadelphia are represented.

Weekly sketch classes with costume models are being held in the auditorium at West Street. The mediums in which the members work are as varied as their experience—sculpture, oil painting, water color, pastels, various black and white techniques, and even pasting up colored papers.

An exhibit is planned for June which will be held in the auditorium. There will be five groups in the exhibit for which prizes will be awarded: sculpture, oil painting, water color and pastels, black and white, and miscellaneous.

Anyone in the Laboratories interested in joining the Arts Group may contact Mr. Frisch in I-41 at West Street.

April Service Anniversaries of Members of the Laboratories

<p>10 years</p> <p>H. W. Cosgrove Henry Karaban F. J. Reilly</p>	<p>W. V. S. Evans Marion Gray T. J. Grieser Evelyn Kinne John Kovac U. A. Matson W. A. Mehmel H. A. Milbury H. G. Miller Karl Morlock Ruby Murphy George Nielsen L. A. Oberle W. C. Pitman, Jr. Catherine Reilly</p>	<p>G. N. Thayer K. E. Wheeler G. G. Winspear</p> <p style="text-align: center;">20 years</p> <p>Thoralf Aamodt A. J. Allan Hilton Anderson R. C. Carlton F. S. Gocher E. L. Le Bright J. J. Martens P. P. Nichols C. V. Obst</p>	<p>25 years</p> <p>H. I. Beardsley N. C. Brower R. W. Chesnut G. M. Classen R. D. Gibson W. S. Hane J. F. Hart E. F. Kingsbury C. W. Luckek Donald MacKenzie S. A. Milne C. E. Mitchell A. E. Nelson R. P. Yeaton</p>	<p>30 years</p> <p>H. B. Coxhead Helen Ford</p> <p style="text-align: center;">35 years</p> <p>L. E. Dickinson O. B. Jacobs</p> <p style="text-align: center;">40 years</p> <p>H. A. Larlee W. R. Luther</p>
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News Notes

A. W. PAGE, vice-president of the A T & T, has been appointed a temporary special consultant to the Secretary of War in the public relations field.

JOHN MILLS was the author of an article entitled *Electronics* published in the March issue of *The Bug*, the monthly publication of the United States Coast Guard Training Station at Atlantic City.

S. A. SCHELKUNOFF spoke on *Methods in Electromagnetic Theory—A Comparative Survey* before a general meeting of the Basic Science Group of the New York Section of the A.I.F.E.

B. S. BIGGS, with Professor J. C. Elgin of Princeton, is conducting a twelve-week evening course on synthetic rubber technology. This is part of the program of the United States Office of Education to train men and women for war industries and is being held in Trenton by Princeton.

E. K. JAYCOX's paper, *The Spectrochemical Analysis of Copper Base Alloys*, presented before the annual meeting of the Optical Society of America, was published in the Society's *Journal* for February.

B. L. CLARKE attended an N.D.R.C. Committee meeting at Washington.

C. H. SAMPLE presented a talk on salt spray testing before the Newark Branch of the American Electroplaters' Society.

J. LEUTRITZ and D. R. BROBST, with E. J. Gruen of the Western Electric Company, visited the Fiberglass Corporation plant at Newark, Ohio, to discuss problems arising from the use of glass braid for wire coverings.

W. O. BAKER attended a research meeting

on synthetic rubber at the Rubber Reserve Company in Washington.

G. DEEG visited Nashua, N. H., to discuss plastics molding problems.

R. M. BURNS spoke on *Corrosion of Metals* before the Lehigh Valley Chapter of the American Society for Metals at a meeting held in Bethlehem on April 6.

A. C. WALKER, at a regional meeting of the Textile Research Institute held in Spartanburg, S. C., spoke on *Abrasion Test for Textiles*.

F. J. GIVEN and J. R. WEEKS were at Hawthorne during the week of March 31 on matters concerned with condenser paper and other items for war equipment.

V. F. BLEFARY was in Haverhill, Mass., in connection with pulse transformers.

P. P. CIOFFI was at Hawthorne in regard to permanent magnets.

P. S. DARNELL attended a conference in Washington in connection with resistors.

Engagements

Elmer L. Skinner, U.S.M.C.—*Claire F. Gibson
*John C. Pfaff, U. S. Army—Muriel Jenkins
Ens. James J. Doherty, U. S. Navy—*Margaret Kilroy
Edward C. Newton, U. S. Navy—*Hilda Muller
*William A. Poulson—*Elizabeth Ann Reeves

Weddings

*Major Howard J. Keefer—Isabella Buckner
*H. H. Buck—Gloria Gabriel
Chester L. Colbert, U. S. Navy—*Ruth MacIntyre

*Members of the Laboratories. Notices of engagements and weddings should be given to Miss Mary Ellen Wertz, Room 803C, 14th Street, Extension 296.

J. A. KATER visited Hawthorne in connection with condenser problems.

G. V. LAGO was at Zanesville, O., for three days on transformer problems.

C. D. OWENS, at Hawthorne, discussed testing networks.

M. WHITEHEAD visited the Aerovox Corporation in New Bedford to discuss matters relative to electrolytic capacitors.

A. W. ZIEGLER visited the Ucinite Corporation in Boston on the manufacture of parts for sealed crystal units.

A. J. GROSSMAN, at the Dane Electronic Laboratories in Boston, discussed the development of special networks.

R. A. SYKES went to Washington to confer with members of the Bureau of Ships on crystal problems.

G. M. THURSTON also discussed crystal problems at the Aircraft Radio Laboratories in Dayton.

W. J. KING visited the Air Technical Service Command at Dayton on high-voltage cables and connectors. With C. A. WEBBER, he went to Chicago on similar problems.

D. T. BELL, at the Hawthorne plant of the Western Electric Company, discussed apparatus for gun directors.

E. B. WOOD, at Philadelphia and Providence, conferred with engineers of the Philco Corporation and of the J. L. Entwistle Company on methods of marking color designations on radio hook-up wires.

A. L. SAMUEL spoke on *Electron Ballistics in High-Frequency Fields* before the Basic Science Group of the New York Section of the A.I.E.E. This was the sixth lecture of the *Electron Ballistics Symposium* conducted by the Group.

W. O. SHARP, on April 16, gave an informal talk on *Vacuum Tubes* before the Men's Club of the First Methodist Church of Richmond Hill, New York.

J. G. PETKUS discussed manufacturing problems with

engineers of the Heywood-Wakefield Company at Gardner, Mass.

W. C. BURGER, H. E. CROSBY, C. F. FOWLER and W. A. TRACY attended the luncheon award meeting of the Commercial Vehicle Section of the Greater New York Safety Council on April 12. The presentation of the Certificate of Merit to Mr. Tracy is shown on page 171.

C. J. CANKIK and J. H. SHEPARD were at the John Oster Manufacturing Company, Racine, Wis., in connection with problems of small motors.

J. M. DUGUID and H. J. BERKA visited the Nela Park Laboratory of the General Electric Company in Cleveland where they discussed central-office lighting.

MOTOR problems were discussed when C. L. DEELWATER visited the Haydon Manufacturing Company at Torrington and Forestville, Conn.

R. H. ROSS visited the Fractional Motors Company, Chicago, and the Hawthorne plant of the Western Electric Company

WAR DEPARTMENT
OFFICE OF THE UNDER SECRETARY
WASHINGTON, D. C.

26 January 1945

TO ALL WAR DEPARTMENT CONTRACTORS:

The Director of War Mobilization and Reconversion has recently issued an appeal for the cancellation of all conventions, trade shows and other group meetings requiring the attendance of more than 50 persons unless determined to be essential to the prosecution of the war, for the reduction of all such meetings involving the attendance of 50 persons or less, and for the elimination of all other forms of non-essential travel. This appeal is directed to government and civilian agencies alike. The War Department desires to cooperate fully in this program and is carefully scrutinizing its own travel to that end.

The volume of personal travel incident to the holding of numerous conventions and similar meetings throughout the country is a matter of increasingly grave concern to the War Department. Despite the fact that fewer coaches and other passenger units have been available during this war than were available in 1918, organized military movements alone have required the transportation of more persons during the past twelve months than during the whole period of our participation in World War I. The demands which the Armed Forces will continue to make upon our domestic transportation system to sustain the large-scale offensives now under way and to prepare for major offensives yet to come must be met. In addition, increasing numbers of personnel returning from overseas, including returnees on furlough and wounded personnel, must be provided adequate transportation facilities.

In view of these heavy military demands, I feel that it is incumbent upon me to ask you and all your personnel to join in this undertaking to eliminate unnecessary travel. I am confident that your full support will be forthcoming. In these critical times, none of us can afford to gamble on the ability of the carriers to stand up under the burden of unprecedented essential traffic, while we indulge in the luxury of wasteful traffic of any kind.



ROBERT P. PATTERSON
Under Secretary of War

where he discussed small-motor production.

IN CONNECTION with the termination of the fifty-mile equalization trial on the Minneapolis-Stevens Point coaxial system, J. F. POLHEMUS visited these points, as well as the intermediate main repeater stations.

C. V. TAPLIN visited Cleveland, Chicago, and Pittsburgh in connection with dial system maintenance items for panel and cross-bar systems.

S. A. LEVIN and B. DYSART were in Minneapolis during March making a series of tests on the Minneapolis-Stevens Point coaxial system.

J. A. CARR was in Huntsville, Ala., from March 3 to 9 with E. B. Griffen of Long Lines and E. Weller of the O. and E. to observe field trials of new methods of point transposing line wires.

R. H. COLLEY and C. H. AMADON attended a construction supervisors' confer-

ence at Baltimore to discuss pole production, supply and treatment with representatives of the A T & T, Indiana Bell, Ohio Bell, Chesapeake and Potomac of Washington, Chesapeake and Potomac of Maryland, and Bell of Canada (Western Area).

DR. COLLEY discussed problems relating to crossarm and insulator pin production and treatment with producers and joint-use consumers in the Baltimore area. He also visited Madison, Wisconsin, and the Minneapolis-St. Paul area in connection with pole preservation problems.

A. H. SCHIRMER discussed *Protective Grounding of Electrical Installations on Customers' Premises* at a meeting of the Industrial Section of the St. Louis Electrical Board of Trade on April 10.

E. B. CAVE appeared before the Board of Appeals at the Patent Office in Washington relative to applications for patent.

“THE TELEPHONE HOUR”

(NBC, Monday Nights, 9:00 P.M., Eastern War Time)

MAY 14, 1945

Seville from “Suite Espagnole”	Orchestra	<i>Albeniz</i>	Roumanian Rhapsody No. 1	Orchestra	<i>Enesco</i>
When I Have Sung My Songs		<i>Charles</i>	Sweetest Story Ever Told	Helen Traubel and Chorus	<i>Stults</i>
The Cuckoo	Bidu Sayão	<i>Lehmann</i>			
Jesu, Joy of Man's Desiring	Orchestra	<i>Bach-Cailliet</i>			
Estrellita		<i>Ponce</i>			
Mocinha bem feitinha	Bidu Sayão	<i>Berger</i>			
Introduction and Tarantelle	Orchestra	<i>Sarasate</i>			
Addio from “La Bohème”	Bidu Sayão	<i>Puccini</i>			

MAY 21, 1945

Ecstasy		<i>Rummel</i>			
O Lovely Night	Helen Traubel	<i>Ronald</i>			
Cortège from “Le Coq d'or”	Chorus and Orchestra	<i>Rimsky-Korsakoff</i>			
Vissi d'arte from “Tosca”	Helen Traubel	<i>Puccini</i>			

MAY 28, 1945

(To be announced)

JUNE 4, 1945

Jockey on the Carrousel		<i>Kern</i>			
from “I Dream Too Much”	Lily Pons and Male Chorus				
Dancing Doll	Lily Pons	<i>Poldini-LaForge</i>			
Jardin d'amour	Orchestra	<i>Traditional</i>			
Song of India from “Sadko”	Lily Pons	<i>Rimsky-Korsakoff</i>			
Polka from “The Bartered Bride”	Male Chorus and Orchestra	<i>Smetana</i>			
The Carnival of Venice	Lily Pons	<i>Benedict</i>			

Bell Laboratories' Club has no more tickets for these programs because its limited supply has already been distributed to applicants.