No. 23

RESTRICTED

SIGNAL CORPS

TECHNICAL

INFORMATION LETTER

OCTOBER · 1943

ARMY SERVICE FORCES · OFFICE OF THE CHIEF SIGNAL OFFICER

NOTE, PLEASE: ROUTING OF THE SCTIL

A recent survey indicates that many Signal Corps officers never see this publication. This despite the fact that the distribution to units appears to be adequate. The conclusion is that in too many cases copies are either pigeonholed by the recipient or are circulated among too few of the personnel for which intended.

It is intended that every Signal Corps officer (as well) as selected civilians and non-commissioned officers in key positions) have the opportunity to go through the SCTIL each month and it is urgently recommended that the attached copy be so routed that this aim will be accomplished in your unit.

In some instances it may be found that additional copies are required to make practical. In general it is felt that one copy can adequately individuals although this is a factor which varies with organizat be determined by the officer in charge. In event that more , a request stating the additional number desired should be addressed to the OCSigO (SPSAY).

TO SIGNAL CORPS PERSONNEL

This means is taken to transmit a note of appreciation from Major General J. B. Allison in reply to a Birthday Greeting extended by General Ingles on behalf of personnel of the Signal Corps:

> "Yesterday I was three score and ten and nothing pleased me more than your little note of the 13th wishing me a happy passing of my 70th mile post, conveying also the felicitations of the Officers and Enlisted Men and the Civilian Personnel of the Signal Corps. I am getting pretty old, but when I can give about five hours daily to my garden work and have a nice note like this it helps me grow old with much pleasure and satisfaction. I wish you would extend my appreciation to the Officers, Enlisted Men and the Civilian Personnel of the Signal Corps."

General Allison was Chief Signal Officer from 1 January 1935 to 30 September 1937, the date of his retirement.

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WAR DEPARTMENT · ARMY SERVICE FORCES

OFFICE OF THE CHIEF SIGNAL OFFICER

OFFICE SERVICE DIVISION · SPECIAL ACTIVITIES BRANCH

SCTIL

PURPOSE

Signal Corps Technical Information Letter (SCTIL) is issued monthly for the purpose of keeping officers in charge of field activities informed on the newest training methods, operational procedures, equipment under development, standardization or procurement, and providing other pertinent information as coordinated in the Office of the Chief Signal Officer.

SOURCE OF MATERIAL

This Letter is compiled largely from information available in the divisions and branches of the Office of the Chief Signal Officer. All Signal Corps training centers and other agencies are invited to submit items of general interest. Such items should reach the Office of the Chief Signal Officer (SPSAY) not later than the 15th of each month for inclusion in the Letter of the following month.

DISTRIBUTION

Distribution of the Letter is made to army, corps, and division signal officers; commanding officers of signal companies and battalions; service command and department signal officers; post, camp, and depot signal officers; the signal officers of bases and task forces; Signal Corps inspection zones, procurement districts, training centers and laboratories; directors of Signal Corps ROTC units; signal officers of Army Air Forces and Army Ground Forces headquarters and major commands; overseas headquarters; units of the Office of the Chief Signal Officer and of Headquarters, Army Service Forces.

If any such activity is not receiving the letter or is receiving too few or too many copies for its present needs, a memorandum addressed to the Chief Signal Officer (SPSAY), Washington, will rectify the condition.

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This Letter is for information only. Requisitions for new types of equipment should not be submitted on the basis of data contained in this Letter.

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"WHEN TIME PERMITTED ALL CIRCUITS------WERE FASTENED FROM SEVEN TO TWENTY FEET OFF THE GROUND TO CLEAR TROOPS AND VEHICLES." HERE NATURE SUPPLIED THE POLES.

SIGNAL COMMUNICATION IN JUNGLE WARFARE

In jungle operations signal and communication personnel are meeting and overcoming problems which challenge their strength, endurance and ingenuity to the utmost. It is believed that the experience of these specialists, who have pioneered and developed workable operating procedures under combat conditions, will be of considerable help to officers and men training for jungle operations and of interest to all who are concerned with military communications. The information contained in this article has been consolidated from a number of reports from combat areas.

GENERAL CONDITIONS

Contrary to the popular belief which existed before the war, jungle terrain is not necessarily flat or always swampy. Primarily it is a densely overgrown mass of trees, vines and bushes, interwoven with waterways and narrow native trails. In the jungle itself the ground is damp and spongy. This is due to the numerous layers of half rotted vegetation which are seldom reached by the sun. Low areas along streams or in ravines are the most heavily overgrown and during heavy rains are quickly flooded by the rapidly rising streams. Hills may be wooded or merely covered with low brush and grass. Man-made or natural open spaces are scattered through and around densely wooded areas. Beaches along the sea coast and some of the streams provide good roads for vehicular movement.

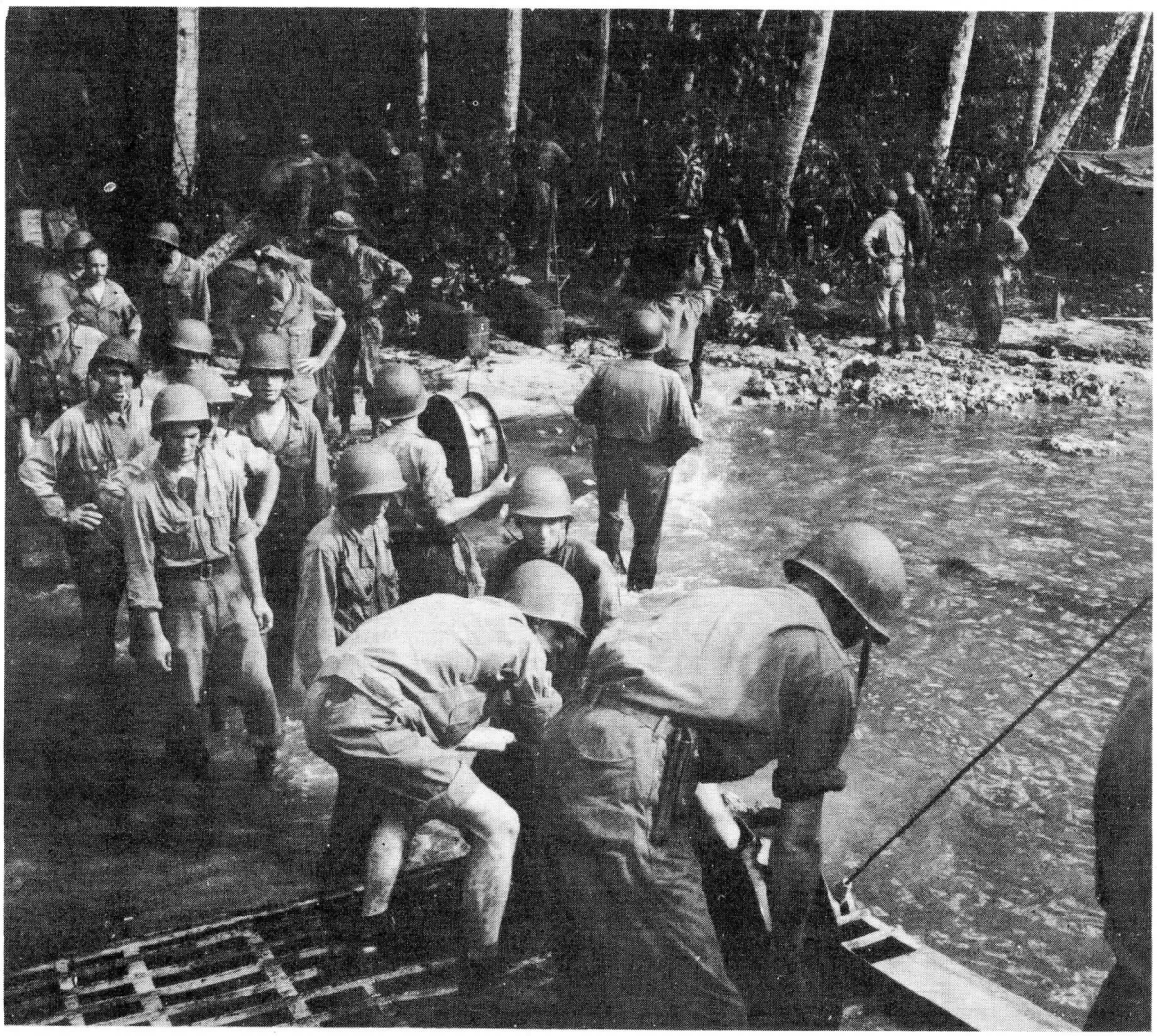
Disease, fatigue and fear of the jungle and of enemy tactics all take their toll in decreasing the ability of the uninitiated to live, move and operate efficiently in jungle combat. Only by physical and mental adjustment obtained through gradually increasing training operations in jungle areas outside of the combat zone can troops be seasoned to endure the hardships and continue operations successfully. Signal communication troops must be at least as well seasoned as combat troops, since their responsibility for installing, operating and maintaining communication systems continue even during periods of inactivity on the part of line troops. All troops must have a working knowledge of personal hygiene and first aid drilled into them until it becomes second nature. A number of suggestions and rules, based on military and civilian jungle experience, are listed in FM 31-20: "Jungle Warfare."

Concurrently with learning how to take care of themselves, communication men must learn to care for their equipment under the most adverse conditions encountered in global warfare. In many cases standard procedures for operation and maintenance, successful elsewhere, must be modified or completely changed. Leather, webbing and metal deteriorate quickly and soon reach a state of complete uselessness if not serviced frequently. This condition can be minimized by supporting equipment at least one foot off the ground but can

be completely overcome, in electrical equipment, only by a periodic drying process. Several ingenious types of drying ovens have been used for this purpose. Great cleverness is required in devising waterproof covers and hardware such as terminal boxes or in waterproofing those supplied.

TACTICAL OPERATIONS

Since jungle fighting is performed largely by Infantry, moving as patrols, squads or platoon columns in offense or holding strong points in de-



SIGNAL SUPPLIES BEING HAND-CARRIED FROM THE RAMP OF A LANDING BARGE.

fense, communication nets and routes must be planned to meet the requirements of these tactics. Cavalry, armored force, artillery and air support are most effective when their operations extend beyond dense jungle areas. Jungle waterways are frequently followed by our own or enemy forces when making flanking or infiltration movements. Consequently, waterways may often become axes of communication.

The Japs usually set up strong defensive positions in ravines with numerous well camouflaged machine gun nests directing fire along narrow firing lanes. Trails between these positions were frequently marked by bright yellow assault wire. The average Jap captured had a low grade of intelligence but a high desire to die rather than surrender. They expected to be killed or at least tortured and were surprised by the treatment given them.

Cross-country movements by motor were as a rule impossible. Vehicles could be used only when roads or improved trails existed or could be cut and built by combat or engineer troops and even then 1/4-ton trucks were the heaviest vehicle that most of these roads would support. Consequently, heavy equipment often had to be left behind on the beaches and the lighter equipment transported to front line units by pack animal, native porters or the men of each combat unit. A native bearer can carry an average pack load of 30 pounds plus his own food and equipment. Observers recommended that soldiers be assigned to accompany unit pack trains and be made responsible for delivery, and that equipment be marked with various colors of paints to simplify identification. Equipment had to be made as waterproof as possible to withstand the high humidity and as sturdy and shockproof as possible to endure rough handling during transportation along jungle trails. In some cases supplies and equipment were dropped to isolated units from planes. Parachutes or heavy padding are needed to prevent loss in densely wooded areas or serious damage from impact.

Several references were made to the necessity for close liaison between division signal officers and the communications officers of lower echelons.

WIRE COMMUNICATION

The variety of problems indicated in the field reports serves to emphasize the fact that no hard and fast rules could be applied to the allotment of personnel to wire platoons or construction companies. As in most operations the T/O strength had to be augmented on occasion to get the job done. Superior headquarters were sometimes able to cooperate by sending additional trained personnel. However, at other times it was necessary to augment the wire sections with line troops who had had no communications training. It was sometimes found necessary to set up abnormally large wire crews, including 3 or 4 men who were always on the watch for snipers. Where jeeps were used for wire laying, the driver was armed with a sub-machine gun and performed guard duty when not driving. All linemen carried rifles, carbines or sub-machine guns. Maintenance of wire lines was usually performed during

the day since it was almost impossible to follow and identify circuits at night. When making repairs at night, crews were sometimes fired upon by troops of their own units, could not use lights to work by and had no way of identifying circuits except by field telephone tests. It was suggested that distinctive shapes of line tags or ridged clip markers could be utilized for this purpose. Recommendations were also made that numerous test points be installed to simplify maintenance and testing. It was generally urged that night operation in wire laying and maintenance be very strongly emphasized in training troops for combat.

Since jungle density made the use of radio and visual communication difficult or impossible, wire furnished the most reliable means of communication between ground troop units. Field Wire W-110-B was used as far forward as Infantry battalion CPs, and for all long point-to-point trunk circuits below division. Wire W-130 proved very successful for short magneto and sound powered telephone circuits installed from Infantry battalion to companies, from some of the Field Artillery battalions to firing batteries and for MP traffic control nets. It was also recommended in one report for constructing locals at the division CP when it was known that the CP would not be occupied for more than a few days. Five pair field cable was recommended for use in and to the rear of division CPs. Reel units RL-31 and RL-27 were employed extensively but the RL-26 could only be used in areas having good vehicular roads or when servicing wire in the rear areas. When possible, wire was laid along the banks of waterways, using RL-31s and 27s mounted in light boats. Circuits along these routes were seldom molested by either friendly or enemy troops and were easily accessible for maintenance. Lateral circuits were very useful as liaison or alternate command channels between adjacent units. Allied movements were not rapid and, since field wire insulation deteriorated rapidly, it was seldom considered worthwhile recovering wire that had been in service for some time.

Several reports expressed the need for a light weight, single conductor assault wire as the low resistance path afforded by jungle ground had permitted very satisfactory single wire operation. Ground return telegraph and teletype circuits were very successful for the same reasons. One observer expressed the belief that wire used by lower echelons should be of a contrasting color to the jungle foliage so that it could be followed to CPs by patrols and supply parties. However, the bright yellow assault wire used by the Japs for this purpose also served to guide Allied patrols into Jap strong points.

Not much difficulty was experienced from Jap wire cutting or tapping. Apparently they had not considered such tactics particularly useful, even though quite a few Japs can understand and speak English and occasionally operated behind Allied lines during infiltration movements.

When time permitted, all circuits were laid along alternate routes and fastened from seven feet to twenty feet off the ground so as to clear troops and vehicles. Standard field wire ties could not be used advantageously because insulation rotted quickly at tie points, permitting grounds and short

to develop quickly when strain placed on the wire stripped the insulation. When time permitted, scrap wire or marline was used to make basket weave ties though generally several slack wraps around the support had to be sufficient. Both of these ties permitted the wire to move laterally and helped to absorb vertical stresses caused by falling branches. Sagging the wire well between supports minimized breakage due to shocks from bombs, shells and from objects striking the wire. Troop, pack animal and vehicle movement along trails and roads made it necessary to place even the aerial circuits as far off the traveled path as the jungle density permitted. It was emphasized that even specially cut wire trails were used sooner or later by combat troops and that low wire along such trails were used sooner or later by combat troops and that low wire along such trails was sure to be damaged. When trails were widened by combat or engineering troops, wire lines along the trail were invariably damaged by machetes, vehicles or falling trees.

WIRE LAYING IN THE SOUTH PACIFIC AREA IS USUALLY A HAND OPERATION. AN EXTRA MAN SERVES AS GUARD AND GUN-BEARER.

Damage to insulation of all types of wire and high resistance grounds in all types of electrical equipment were caused by jungle dampness and presented acute maintenance difficulties. These difficulties were overcome by eliminating standard wire ties, separating the wires in cable forms, raising equipment off the ground and by frequently dehydrating equipment with either chemicals or drying ovens. Some equipment, not provided with lightening arrestors, was damaged by the severe electrical storms.

Some reports have noted the semi-permanent installation of open wire or field wire on crossarms in airfield and rear echelon areas. This type of installation was made only after enemy forces, including snipers, had been driven from the area. The consensus of opinion was that well constructed wire circuits were well worth the extra time required for their installation, since they provided better talking circuits, required less wire to construct and maintain and a smaller maintenance crew to keep the circuits in working order.

RADIO COMMUNICATION

All reports agree that jungle areas present greater radio operations problems than any terrain previously encountered but none class these problems as unsurmountable. The main limitations peculiar to jungle areas seem to be the screening effect of damp jungle foliage, the scarcity of good antenna sites, long periods of radio "blackout" (during which ranges were greatly reduced, due to tropical atmospheric conditions), heavy static due to electrical storms, the effect of ground dampness and high humidity on equipment, and the difficulty of obtaining good dry batteries. Another difficulty arose from a frequent requirement for the radios to operate over abnormally long distances.

Radio sets which could be easily carried as a unit by one man or having components that could be easily handled by 2 or 3 men received the most praise. Some heavier sets, as the SCR-193, were mounted in jeeps and employed as far forward as roads or improved trails existed. Various types of improvised waterproof covers for radio sets and equipment were tested and used. The whine of both the Allied and Jap man-powered generators attracted sniper fire in forward areas. Improvised or issue flat top and vertical wire antennas gave the best transmission and reception results in densely wooded areas. In forward areas fish pole antennas had to be screened from enemy view to avoid attracting fire. Jap sets captured contained good parts but were, for the most part, obsolete military types as compared with Allied equipment. In one case an Allied hand carried set captured by the Japs was used to send flash messages to Allied troops. The Jap pronunciation of English words and the use of authenticator codes squelched their successful use of this set.

Air-ground, ship-to-shore and inter-island radio nets were operated with much more success than the tactical ground nets. Remote control units were universally used when available and one report recommended that two well separated units be employed to insure continued operation of the transmitter if one operator control unit or remote control circuit was put out of action. Even though a minimum of enemy jamming was experienced alternate or secondary frequencies were allocated. No special radio restrictions were imposed and the normal SOP was followed in changing call signs daily. Messages were normally coded before transmission except urgent messages between lower echelons.

Except for rapid deterioration caused by dampness, radio maintenance problems were not particularly different from those of any military unit operating a considerable distance from a large supply and repair base. Since repair trucks could not be sent forward to make repairs in most cases, sets had to be sent to rear areas when damaged or inoperative. Unit replacement was essential.

Most of the reports emphasized the need for extensive field net operation training, under the worst conditions that can be simulated in schools.

A THATCHED ROOF AND SANDBAG WALLS PROTECT THIS JUNGLE TELEPHONE EXCHANGE.

MESSAGE CENTERS

Message center operation was normally the same as in other theaters, though in some instances personnel had to be diverted temporarily to other communication sections to meet special requirements. Recommendations for increasing or decreasing message center personnel varied considerably, indicating that message center specialists should be trained to operate the message centers of more than one echelon. Several reports expressed a need for light weight, waterproof canvas shelters and cases to protect message center equipment and forms at division and regimental message centers. Prearranged message codes were used extensively.

It was discovered that Jap message center duties included maintenance of the unit combat record and personnel file in addition to normal message center duties. When one of these enemy message centers was captured, much

valuable information was obtained.

One Allied organization had brought along a mobile message center, mounted on a light trailer, but such units were not generally recommended. When batteries or power units were available, electric lights were used in message center dugouts or huts instead of lanterns, since lantern fuel was difficult to obtain and since they created a fire hazard and generated more heat than the electric lights.

MESSENGERS

Numerous constructive remarks and suggestions were made in all reports on messenger service, although the messenger service was generally regarded as good. Local runners, mounted messengers, motor messengers and airplane messengers were the means most often mentioned. The use of bicycle, motor bike and specially trained dog messengers was also suggested. During bad weather or when messenger routes lay through bad terrain, two messengers were sent with the same message — sometimes using different means of transportation and different routes. In some units motor messengers carried signal supplies to lower echelons and brought back damaged equipment to the repair station. One report suggested the use of native drums, manned by colonial troops or trusted natives, as a last communications resort. Some units learned, by sad experience, that messengers had to be selected from among the most intelligent, alert and best trained soldiers in the unit. CPs, message centers and trails were seldom marked and a messenger had to employ all of his training and resourcefulness to get a message through. Messengers wore no distinctive insignia.

VISUAL COMMUNICATIONS

The use of visual signals, except air-ground pyrotechnics, was seldom successful when units were operating in the denser jungle areas. In such terrain daytime visibility was about ten to twenty yards. When high points, screened from the enemy and open toward Allied lines, could be located, lamps and flags were sometimes used. Panels could be and were employed to good advantage in marking front line positions and indicating enemy targets which were to be bombed. The Japs used their national flag and strips of colored cloth for panel and flag signaling. During an attack they marked their flank positions with rockets. Bird whistles, castanet and other sound producing devices employed by the Japs may have been used for signaling or merely intended for psychological purposes.

T/BA and T/E equipment, once its limitations in jungle country are realized, is generally adequate. However, confidence in the equipment is essential on the part of the users; they must feel that regardless of conditions under which they must operate, the message will be gotten through.

NOTES ON THE SIGNAL CORPS IN ATTACK

The following paragraphs have been extracted from official reports on the Sicilian Campaign and are presented here for the information — and thoughtful consideration — of all Signal Corps officers.

FROM REPORT OF COMMANDING OFFICER OF A SIGNAL COMPANY IN SICILY

In general, communications for the landing phase of this operation can be considered successful. This is attributed to the basic plan of loading which called for the proper priority of all communications equipment with radio and wire teams attached to combat teams and the remainder of the company tactically divided (equipment and personnel) into two separate signal units capable of furnishing Division Signal communications on a reduced but ample basis. The vehicles of both of these groups were combat loaded.

During this operation an acute shortage of dry batteries for all types of radio sets and field Wire W-110B developed during the first few days of the operation. If proper communications are to be realized on land after the initial phase of an amphibious operation are completed, a reasonable supply of these items must be made available.

An outstanding feature of this operation is the proven value of a radio repair section for both amphibious and land operations. It was found that radio repair work necessitated the ceaseless efforts of the Detachment of the "X" Signal Repair Company assigned to this Division.

FROM REPORT OF DIVISION SIGNAL OFFICER

The following lessons learned in the Oran operation and Tunisian battles were proved again in the Sicilian campaign.

1. Key transmissions by radio sets was proved again, except in lower units, to be superior to voice transmission in speed, accuracy, security and range.
2. Even in an extremely rapidly moving attack over a prolonged period wire communications can be established and maintained. As a rule of thumb — as long as the front line troops are not motorized but are moving on foot wire communications can be maintained.
3. In amphibious operations, for every important vehicular radio there must be a hand set carried ashore which will operate in the required radio net until the vehicular set is landed and arrives at the proper Command Post.
4. The most critical period during any landing operation is the first twelve hours. It is vitally necessary that perfect communications be estab-

lished on shore immediately after assault troops have landed. Therefore, signal equipment and vehicles must be given high priority on the unloading schedule and this schedule must be followed. One of the greatest contributing factors to the success of this operation was the quick establishment of good communications on the first day when the enemy made a strong counterattack. In the planning of such an operation special consideration must be given to providing a large amount of signal equipment, vehicles, and personnel on shore at an early hour.

FROM REPORT OF A STAFF GENERAL OFFICER

Map reading, for both officers and enlisted men, should still be stressed in training.

Camouflage is still not the best that can be obtained. The outlines of objects are in many cases not broken up by the net. Men can often be seen from the air in white undershirts or stripped to the waist, standing in the open and gazing up at the plane.

COMBAT PHOTOGRAPHY

When Joe Smith, who worked for the Davenport Times, and Fred Elbel, who worked for the Associated Press, came into the Army as Signal Corps photographers, they somehow pictured the war like the football games they had so often covered, where the photographer is extended the same courtesies and permitted the same privileges. They were to be given the freedom of the sidelines, and their biggest worry would be that they might, by the blink of an eye or the turn of a head, miss a rare and beautiful shot.

The Joe Smiths and the Fred Elbels are the cameramen coming into the Signal Corps from the commercial field of civilian life who must overcome a handicap imposed by the very tradition of their profession. As photographers of a football game, they needed none of the training of the players, they, in fact, did not necessarily need to know the plays nor the general strategy. If they were to photograph the war, they would need no drill or Infantry training. What has that got to do with the taking of pictures, they ask themselves. They sit in classes on Basic Army Training and on the Basic Principles of Photography with a "know it all" attitude, until the time when they are confronted with the bare reality of death staring them in the face, in a foxhole somewhere in the Pacific, in Africa, and in Europe. Somewhere during this time the Smiths and the Elbels, by training or by the Hard Way, will learn:

That at the front there are no sidelines for the cameraman.

That these cameramen must develop a new technique of taking pictures.

That at the front values focus to very simple things; either the cameraman gets his picture or he muffs it, either he stays on the battlefield or he crawls away, either his camera works or it doesn't. There is no in-between. The front is simply a matter of life and death.

That although his skill may determine the effectiveness of a single picture, the over-all effectiveness of all his pictures over a period of time depends upon the unassailable fact that he must be trained as a soldier.

In his basic training the cameraman will learn the organization of the Army. The Army is such a complex machine that if the cameraman is to know what he's shooting, if he is to be at the right place at the right time with the right picture of the right subject matter he must be versed in every branch of the service; he must know Army organization and equipment of all kinds.

The cameraman will learn in his Army training how to live under tough

conditions. If he is to take effective pictures over a period of time, he must be able to sleep in mud, cold, damp, wet. He must be able to lie in a cramped position for hours on end. He must be able to dig with his helmet a foxhole out of rocky ground. He must be able to lie on hot, burning desert sands. He must be able to withstand dirt and grime and grease and sweat.

He will learn in basic training the conditions under which a soldier fights. There will be times when the man on his right is an Infantryman waiting the next move with rifle and grenades, and the man on his left is shelling the enemy with the crew of a howitzer. To take pictures here and stay alive to take more, he must know the identification of enemy planes, how to pick out a Stuka, Zero, or Messerschmidt from a Spitfire or a P51. He must know how to handle different kinds of weapons and handle them well. He must know camouflage. At the front he will learn more specific things: what an enemy shell sounds like, whether it is a mortar shell or an 88, when to "hit the dirt" and when to duck. He will there develop the alertness of a soldier. As an alert soldier, he will be a better cameraman. At the front, with the tension of battle electrified and strained, a cameraman can get his pictures if he is alert to get a mental picture of the situation at a glance, automatically set his camera focus, check his camera stops, and figure out his shots while crouched in a foxhole, sweating out a screaming, nerve-racking artillery barrage.

As the cameraman learns these things in his basic training — how to live, and how to fight, how the Army works and moves — the inexorable conclusion cuts deep into his mind that taking pictures in the Army requires a different technique than that of snapping a football game. It requires ingenuity, inventiveness, specialized knowledge, and a multitude of impromptu tricks. And these he learns as he moves along in his courses of Army Photography. These courses are based on reports brought back from the battle areas and are constantly revised to meet changing demands and new ideas. They incorporate suggestions from individual photographers all over the world.

If the following suggestions are now incorporated in photographic training, let them serve as confirmation of that instruction; if some of them are new, it is hoped that they become a part of the cameraman's training.

Photographic training for the present modern combat photographer or cameraman should be confined to the practical application of photography. Being taught how to grind a lens is useless at the front, nor is there a place for the meticulous fellow who has to have the right filter or reflectors before he can shoot. Since in the combat zone he has to travel light and fast, a combat photographer or cameraman has to be able to improvise, invent and shoot with what equipment he has on hand. There is no place at the front for the cameraman who has used a Mitchell or a Wall camera all his life without knowing what an Eyemo can and will do. He should be taught to use the equipment he has and use it well. Men who have been in the combat zone and who have used every type of camera made have, through their experience, decided on what camera is best for combat work. More stress should be placed on the knowledge of the emulsion of his film, speed, contrast and

latitude of that film, so that he can judge his exposure at a glance without having to refer to a meter. Experience has confined this film to a few popular makes. He will learn to use that film, whether he has used another type or types all his life or not. The times are numerous when he can't stick his head up to take a reading, when his judgment depends on his knowledge of his film. A knowledge of the working parts of his camera is important and this can be taught only by actual experience in the handling of that camera. A camera should be and is as important to a cameraman as his rifle, carbine or pistol.

Important to any cameraman lying in a foxhole unable to check his scene with a view finder for the most suitable focal length lens is an extensive knowledge of the size of the image that can be made with a 1,2,3,4,6,8 or 10-inch lens, at distances from ten, twenty-five feet past to infinity. By knowing just what each lens will do at a set distance and the image size on the frame, then this change can be made in the protection of his foxhole and means one less time of sticking his head up to determine the proper lens and distance.

As almost every type of information that the Army needs and wants can be gleaned from this type of picture, training for newsreel type of motion pictures as well as stills should be stressed at all times, including record shots, publicity, information, newsreel and newspaper shots. The taking of a newsreel with continuity in the battle zone or combat areas is rather slim for the individual cameraman. He may be called upon to shoot a tank battle using all three of his lenses to get his long, medium and closeup scenes without even moving from his position, contrary to all his civilian experience. But this continuity works on a much larger scale with the addition of other cameramen placed at different locations to take care of cut-ins and close-ups, and the final job is edited by the War Department from the scenes made by the separate cameramen.

Because the supply line of photographic film is usually exhausted, due to the many priorities of other branches of the service, conservation of film at all times should be stressed. Incidental scenes of no consequence should never be made, just because it looks as if it would make a pretty picture with the use of a red filter. Since never before in the history of the Signal Corps have so many cameramen seen action in so many different parts of the world where the scenery is often breathtakingly beautiful, the temptation is great to experiment with Art. A knowledge of what is news is of the greatest importance. And any cameraman can expect that, due to censorship and governmental policy, only thirty percent of his original film will ever be used, if that much.

But no matter which of the several available kinds of films he is using or whether he is using a still or a newsreel camera, the cameraman going into the battle zone should have new and first-class equipment, with the minimum amount of necessary accessories. The lack of proper equipment and cameras during the Tunisian campaign was largely responsible for the low quality of most of the pictures of that campaign. A cameraman should be issued a

camera like a rifle. He should stick to that camera, sleep with it, cherish it, fondle it like a baby until he knows every ridge, every speck of paint on it. But it must be in first-class condition when he receives it; not a rebuilt camera, but a new one, that he can and will be able to keep in as good condition as his rifle. He should use no other camera but that one. When more than two cameramen handle one camera, the wear and tear is terrific. If a man has worked with a Mitchell camera all his life, he should be kept on a Mitchell, as there is plenty of work to be done behind the lines where this heavy camera can be used. If he is an Eyemo man, he should be kept on an Eyemo. If he wants to get action pictures, that's the camera to use. Versatility as a cameraman in the use of several different cameras is not for combat work, nor for the best results. A cameraman taking stills one day and motion pictures the next, two entirely different fields of approach, will gain nothing, and the quality of photographic work will be sadly lacking in pictorial and news background.

This war has brought out photography as one of the great factors in training the soldier. It is incalculably valuable as a record of battle for the planning of future tactics. It is the clearest medium of information for the folks back home. For these purposes, among others, the Army is training men to be competent, skillful cameramen. These men are not expendable. The Joe Smiths and the Fred Elbels who worked at Mateur and Kasserine Pass, who landed with the first wave in Sicily and Italy, and who stand by for the next jump, agree in sending advice to those now in training, and on their way over:

To serve well the Army cameraman must completely absorb all the available material on the specialized technique of photographing war fronts, and, above all, he must for his own preservation and those around him thoroughly train himself as a soldier.

(Adapted from a paper prepared by 1st Lieutenant Elton P. Lord,
Army Pictorial Service,
APO 512, C/O Postmaster, New York)

THE MESSAGE CENTER'S SERVICE

> "The purpose of the message center is to speed the transmission of authentic messages. The time required for all clerical operations of the message center --- excluding cryptographing --- should not exceed twenty seconds." --- From FM 24-5

Twenty seconds to go through the message center but those twenty seconds in the message center may save twenty minutes or even many hours in the time required to deliver a message IF the users of the message center cooperate.

How can you as a user of the message center cooperate? Well, in the first place, let the message center decide how the message is to be sent. They are in the best position to determine the fastest as well as the safest way to send your message.

The message center has up-to-the-minute information concerning the operating condition of all channels of communication. When radio communication is established with another station, the operator immediately informs the message center of this fact. When static, interference, or jamming makes radio communication difficult or impossible, the message center is likewise immediately informed. When a line goes down the message center is notified and when a new wire circuit is established, the message center is informed. Messengers report to the message center not only to pick up and deliver messages but to report on the condition and hazards of the route traversed. At any given moment, the message center knows just what points can be reached by telegraph, telephone, radio facsimile, messenger, pigeon, lights, flags, flares, or finagling.

You may have personal information that a certain direct wire circuit is out and therefore decide that your message should go by radio. If you mark your message for transmission by radio, it will go that way even if it is not the fastest way at that time. Unless your radio message can be and is specifically authorized to be sent in the clear, it will have to be cryptographed. This takes time, but the message center has no choice in the matter when the message is liable to be intercepted by the enemy. Then, too, there may be a number of messages ahead of yours that have to go over that same radio circuit and perhaps static and interference is delaying transmission. All this while the message center may know of an indirect wire circuit that could get your message there faster. But your message will still go by radio because you marked it to go that way. That is, it will go by radio unless the message center can take the time to contact you for authority to do what they should have been allowed to do in the first place — send the message by the fastest available means.

In the case of certain types of messages, it is vitally important that

they reach their destination immediately, regardless of the number of other messages ahead of them. If your message is one of these, the thing to do is to indicate when the message should be sent, not how it should be sent. This can be done by assigning the message a special precedence. If a message is assigned a precedence of "urgent," it will be sent ahead of all other messages, excepting other urgent messages filed before yours. Remember, though, that the precedence that can be assigned depends upon the importance of the message and not upon the importance of the writer. The General's message about supplies for tomorrow will have to step aside while the Corporal's message about attacking enemy airplanes goes to the front of the line. When the precedence is not otherwise stated, the message is handled as routine. This classification covers ordinary fast messages customarily handled with the greatest possible expedition and delivered at once upon receipt.

Special precedences which may be assigned by the writer are "priority," "operational priority," and "urgent." "Urgent" is the highest precedence that can be assigned to a message (although the British do have a couple of higher ones) and is reserved for reports of initial enemy contact, initial amplifying reports, and other messages which might materially affect plans or course of action and must therefore be brought to the attention of the addressee at the earliest possible moment.

"Operational Priority" is reserved for important messages pertaining directly to operations, except ordinary movement reports, which cannot be classified as URGENT, but which nevertheless must be delivered as rapidly as possible for prompt action. This precedence will be given only to operational traffic.

"Priority" is the third highest precedence and is reserved for messages which are pressing and require the addressee's immediate attention upon receipt, but which cannot be designated as urgent or operational priority. Priority is the highest precedence that can be given to administrative traffic.

In assigning special precedences, be honest with yourself and other users of the message center. There must be relatively few messages of high precedence if the system is to be effective in providing expeditious handling of truly important messages. Use the lowest possible precedence that will accomplish your purpose. If your message need not be delivered before the following day, mark it "deferred."

Your message center has the necessary properly trained personnel. The Tables of Organization provide for that. However, the personnel allotted to the message center are sufficient to perform only the minimum functions incident to the handling of normal message traffic so don't call upon them to do headquarters stenographic or clerical work for which they are neither staffed nor equipped.

Don't send the message center a stack of mimeographed material and a list of addresses. When distribution of mimeographed or printed materials

to a number of addresses is desired, all copies required for each addressee should be delivered to the message center wrapped, packaged, or otherwise secured, and the bundle plainly marked with its destination. Each bundle will then be treated as a message and dispatched by messenger. But don't forget to send one extra copy for the message center's record.

The message center must keep a record of each message. The writer is supposed to submit his message in duplicate, but, if he does not, then the message must wait while a skeleton copy is prepared in the message center for their records. Unless you want your message to wait, use a carbon when you write your message and send the extra copy along to the message center.

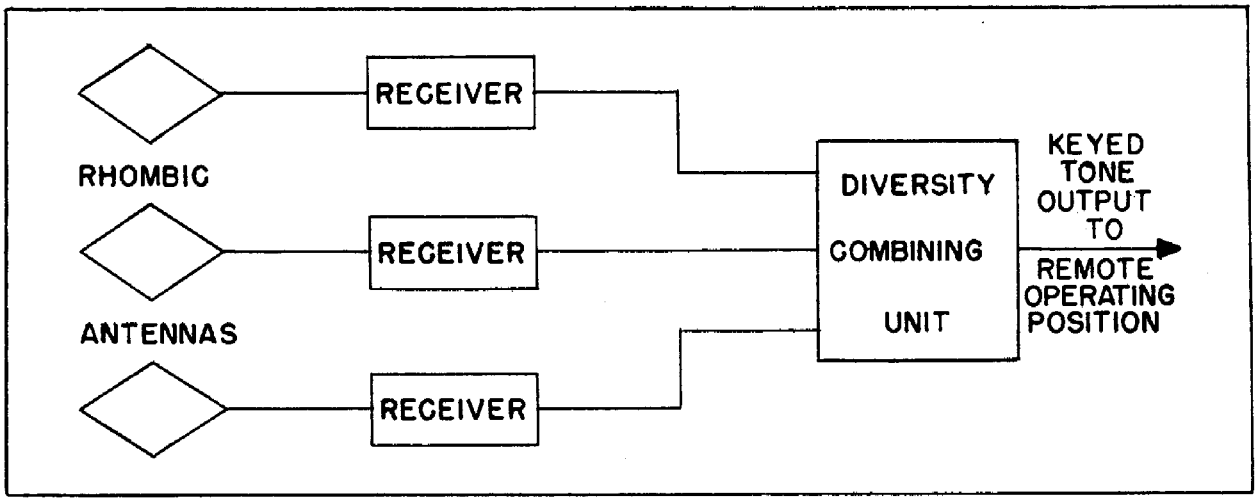
One last thing. If you know there is going to be an extra heavy message load at a particular time, warn the message center so they can plan for it. Message centers should operate with a varied number of men depending upon various factors affecting the volume of traffic to be expected during any given period. Flexibility in procedure and organization is therefore desirable and authorized.

If you cooperate with your message center, you can depend on it to speed the transmission of your messages. But remember that the twenty seconds is for the message center to do its own job; if it has to do part of your job too, you should expect some delay.

RADIO DIVERSITY RECEIVING STATION

It is the purpose of this article to describe a "spaced-diversity" radio receiving installation made at Fort Monmouth, N. J., by the 822nd Signal Fixed Radio Station Company. In this type of installation advantage is taken of the experimentally observed fact that signals induced from a single transmitter in receiving antennas spaced several wavelengths apart do not fade simultaneously. That is, at an instant when the desired signal fades to a low value in one antenna it may be at a higher value in a neighboring antenna and the next instant this condition may be completely reversed. Still greater advantage is gained if three such antennas are employed with automatic means for combining their outputs in such a way that the best of the three signals is made available at every instant.

Such a 3-position "diversity" system is illustrated simply in the accompanying block diagram. Here it is seen that each of the three Rhombic



antennas feeds into its own receiver and that the outputs of the three receivers in turn feed into a single diversity unit, commonly called a "combining" equipment. In this unit each channel works into an individual rectifier tube with these three tubes arranged for common automatic grid-bias, the value of which is determined by the voltage drop across a resistor common to all three circuits. Thus all tubes will be biased equally and to a value determined by the channel in which the signal is strongest at the moment. The result is that at any instant the combined signal output is primarily that of the individual channel in which the signal is strongest. Due to this automatic volume control action, the output of the other channels (which may carry excessive noise due to the weakness of the signal and the attendant raising of the threshold of sensitivity in the corresponding receivers) is suppressed.

The diversity receiver used in this installation is manufactured by Schuttig and Company. This equipment provides a means for combining the outputs from three rhombic antennas to produce a single keyed audio output signal free from noise and other undesired interference. An automatic grid bias control, operating on all three rectifying tubes, acts to cause the circuit having the highest signal level to control the equipment to the virtual exclusion of the other two. This signal is passed through a DC amplifier which keys the grids of a normally blocked AF amplifier. The grids of the AF amplifier are continuously excited by a local AF oscillator. The action of the DC signal on these grids produces a keyed audio-frequency tone at the output of the amplifier, such a signal being suitable for transmission to a remote operating position.

The equipment list of the complete installation is as follows:

Boehme high speed equipment.
3 - Rhombic horizontal receiving antennas.
3 - 2-Wire transmission lines from rhombics to receiving building.
3 - 4-Wire transmission lines from rhombics to receiving building.
3 - Hammerlund Super Pro, Model 2 PR-210-LX receivers.
1 - Schuttig diversity (combining) equipment.
Installation of parkway cable for 115-volt, 60-cycle power for receivers and to each 75-foot pole for clearance lights.
Open wire line (approximately five miles) from diversity to Boehme at signal center.
Standby power unit.

Orientation of the Rhombic Antennas on Great Circle Route

For a rhombic antenna to operate properly it must be pointed in the right direction, especially since these antennas are used for long-distance hauls. To orient a rhombic antenna properly, it must be laid out on the Great Circle Route and not by drawing a line between transmitter and receiver on a map. The error, in degrees, increases very rapidly after approximately 800 miles if Great Circle Routes are not used for the path of the transmitted signal.

A method for determining Great Circle Routes is given in an example on the opposite page. This method makes use of AGETON tables, which are for sale by the Hydrographic Office, Washington, D. C., price 90 cents ("Dead Reckoning Altitude and Azimuth Table" by Ageton). In using this method, it is necessary to do only addition and subtraction to obtain the true azimuth of a Great Circle Route. After the true azimuth of the Great Circle Route is obtained, it is, of course, necessary to add or subtract the magnetic declination for your position, which is the position of the receiving or transmitting rhombic to be installed.

The tolerance in orienting rhombics varies from approximately 4 to 20 degrees, depending upon the frequency the antenna is operating on. The high

COMPUTATION OF GREAT CIRCLE COURSE BY MEANS OF AGETON TABLES

A TRANSMITTER Fort Monmouth, N. J. LAT. (L_A) 40° 15' 30" N. LONG 74° 04' 30" W.

B RECEIVER Camp Crowder, Missouri LAT. (L_B) 36° 50' 00" N. LONG 94° 22' 00" W.

D $LONG_{AB}$ 20° 17' 30" W.

	ADD	SUBTRACT	ADD	SUBTRACT
D $LONG_{AB}$ 20° 17' 30" W.	A 45992			
L_B 36° 50' 00" N.	B 9670	A 22222		
R	A 55662	B 1741	B 1741	A 55662
K 38° 36' 30" N.		A 20481		
L_A 40° 15' 30" N.				
K ± L_A 1° 39'			B 18	
DIST 971.75				
A-B 16° 11' 45"			B 1759	A 55452
C_A N 95° 38' W.	AZ_A 264° 22'			A 210

True azimuth is 264° 22' 00". Magnetic declination at Fort Monmouth, N. J. = 11° W.
Magnetic azimuth = 264° 22' + 11° = 275° 22'.

LEGEND

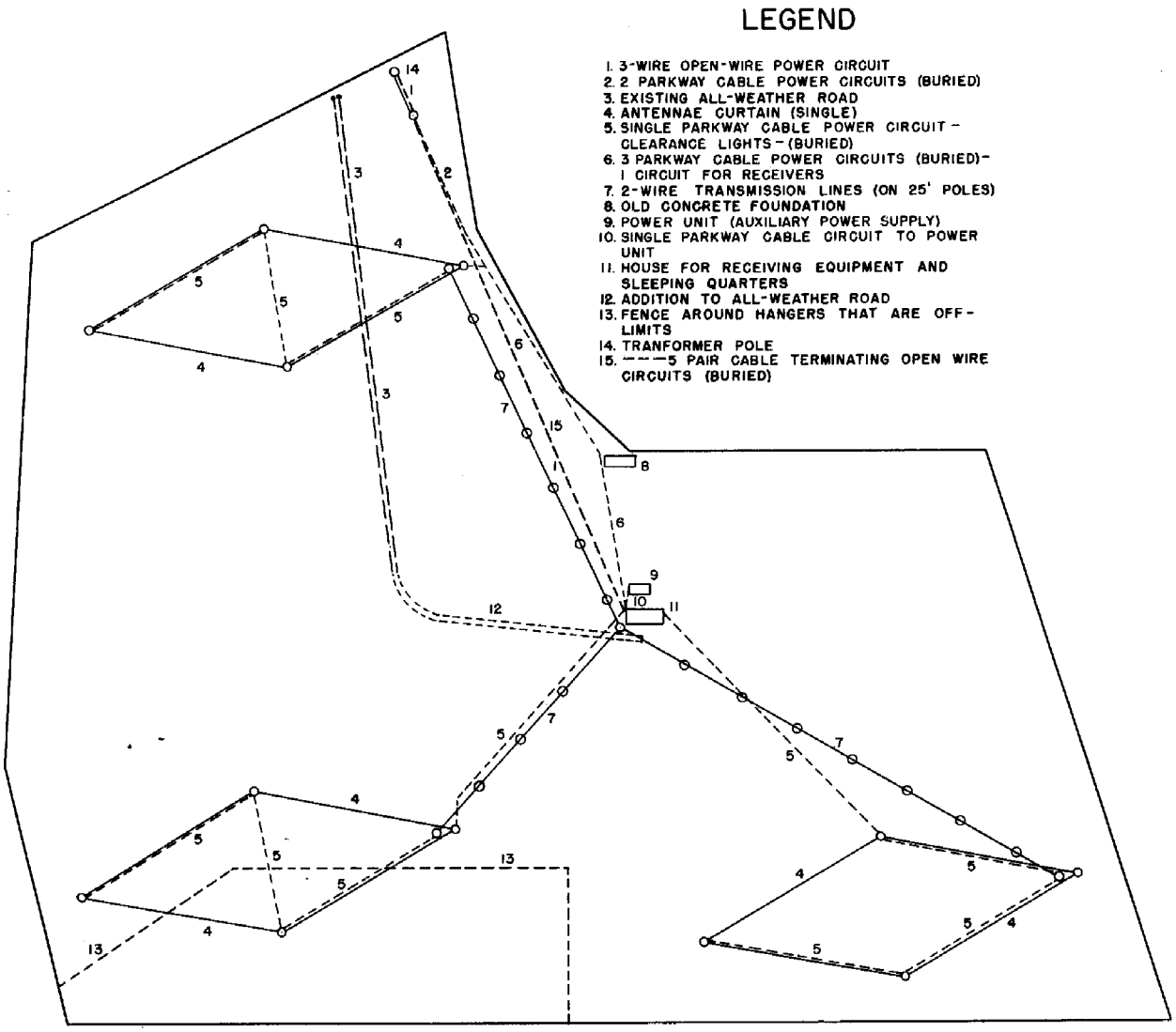
D $LONG_{AB}$	Difference in longitude between A and B
R and K	Auxiliary angles used in resolving the spherical triangle into two right triangles
A-B	Angular distance from A to B by great circle route
Dist	Distance from A to B (1 min. of angular dist is 1 naut. mi.)
C_A	Great Circle course from A to B (E or W of north in northern hemisphere; E or W of south in southern)
AZ_A	True azimuth from A to B by Great Circle course.

RULES FOR COMPUTATION

1. K is N or S depending upon whether L_B is N or S; i.e., K takes the same name as L_B.
2. If K has the same name as L_A, subtract greater from smaller to obtain K ± L_A; if K and L_A have opposite names add K and L_A to obtain K ± L_A.
3. If L_A and L_B have the same name (lie in the same hemisphere):
   - A. Take K from the bottom of the table when D $Long_{AB}$ is greater than 90 degrees
   - B. Take C_A from top of table when K is greater than L_A; and from the bottom of the table when K is less than L_A.
   - C. Take A-B from top of table except when D $Long_{AB}$ and K ± L_A are both greater than 90 degrees
4. If L_A and L_B have opposite names (lie in opposite hemisphere):
   - A. Take K from the bottom of the table when D $Long_{AB}$ is greater than 90 degrees
   - B. Take C_A from bottom of table except when K ± L_A is greater than 180 degrees
   - C. Take A-B from bottom of table except when D $Long_{AB}$ and K ± L_A are both less than 90 degrees
   - D. When K ± L_A is greater than 180 degrees, subtract 180 degrees before entering tables.
5. C_A is W of N (or S) when B is W of A; C_A is E of N (or S) when B is E of A.
6. To obtain AZ_A:
   - A. If bearing of C_A is N——W, subtract C_A from 360 degrees.
   - B. If bearing of C_A is N——E, take angle direct.
   - C. If bearing of C_A is S——W, add C_A to 180 degrees.
   - D. If bearing of C_A is S——E, subtract C_A from 180 degrees.

degree tolerance is for low frequency operation. Since a rhombic is not critical to frequency and therefore may be operated over a wide band of frequencies, it is necessary to lay it out with as high a degree of accuracy as possible. Most commercial installations are accurate to 15 minutes or better. An engineer's transit is the most desirable instrument to properly orient a rhombic; nevertheless a lensatic compass may be used with reasonable accuracy.

FIG. 1 - WAYSIDE FIXED RADIO STATION AREA



Reports from officers who have installed rhombics overseas state that in some installations the Navy supplied the Great Circle bearing and staked out the oriented rhombic. Other officers have made the installations without assistance. One officer installed a rhombic in New Guinea which he oriented with a lensatic compass.

Installation of Rhombic Antennas

Figure 1 shows the location of the three diversity receiving rhombics as installed at Wayside Fixed Radio Station area. This area is approximately five miles from Fort Monmouth and is broadside to the transmitting rhombic installed at Fort Monmouth.

It is very important to locate the diversity receiving rhombics so they will not be in the end fire of the transmitting rhombic and also far enough away so the transmitting signal will not interfere with the signal being received when operating duplex. This, of course, is extremely important when operating high speed (100 WPM to 400 WPM). In some commercial installations the transmitting and receiving rhombics are separated over fifty miles. No interference trouble has been experienced with the present installation when operating high speed duplex with 40-KC separation.

Each of the three rhombics shown in Figure 1 is oriented for Camp Crowder,

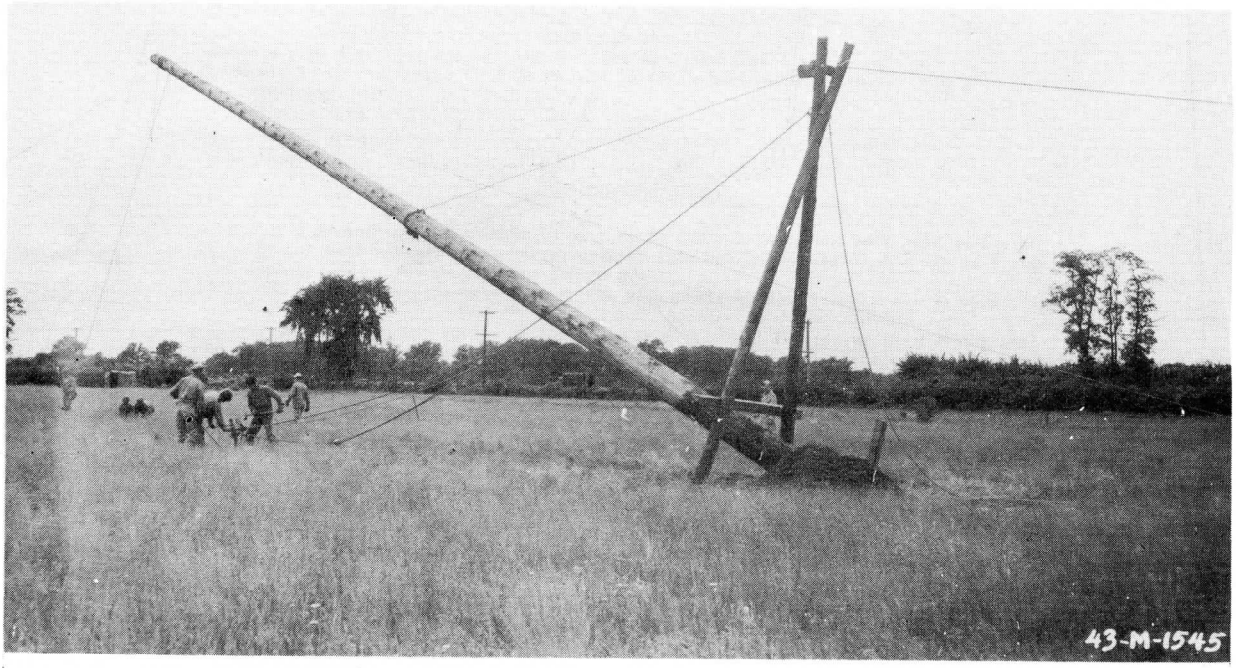


FIGURE 2— ONE OF THE 75-FOOT POLES GOING UP WITH THE AID OF A WINCH TRUCK. THE CABLE FROM THE WINCH RESTS ON TOP OF THE "A" FRAME.

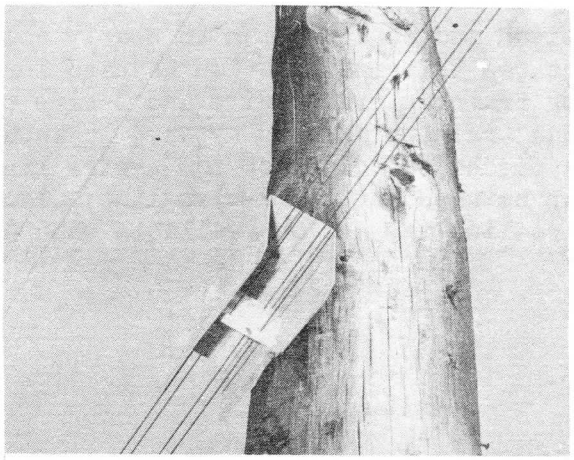
which is 275° magnetic azimuth. The area was not sufficiently large to space the antennas at least 1000 feet apart. One of the antennas is only around 950 feet from the center one, but from the center one to the other outer one is greater than 1000 feet. Fading has given no trouble in this installation over the short period it has been operated. The Crowder circuit cannot, however, be called the acid test for this anti-fading installation due to the relatively short distance and the low frequency (4320 KC Fort Monmouth — 4360 Camp Crowder) on which it is operating.

Figure 2 shows the method used to raise the twelve 75' poles. This method is simple and fast if a winch truck is available. The "A" frame is constructed from regular 25' poles, bolts, and a 6" x 6" timber. A trench approximately 15' long sloping to the hole and 5' deep at the hole is dug to reduce the strain on "A" frame, cable, and pole in initial stage of raising. By driving 2" iron pipe in the ground and snubbing guy ropes around these pipes, the personnel required for the pole raising can be reduced. The block and tackle shown on the "A" frame is to keep it from falling to the ground as the pole goes up.

Installation of RF Transmission Lines

Two-wire transmission lines were originally installed, due to the fact that material for 4-wire lines were not available. The 2-wire lines have been in use for one month and have given satisfactory results to date. The noise pick-up on the 2-wire lines has not been objectionable except when a motor vehicle is driven near the lines.

Recently material has been re-



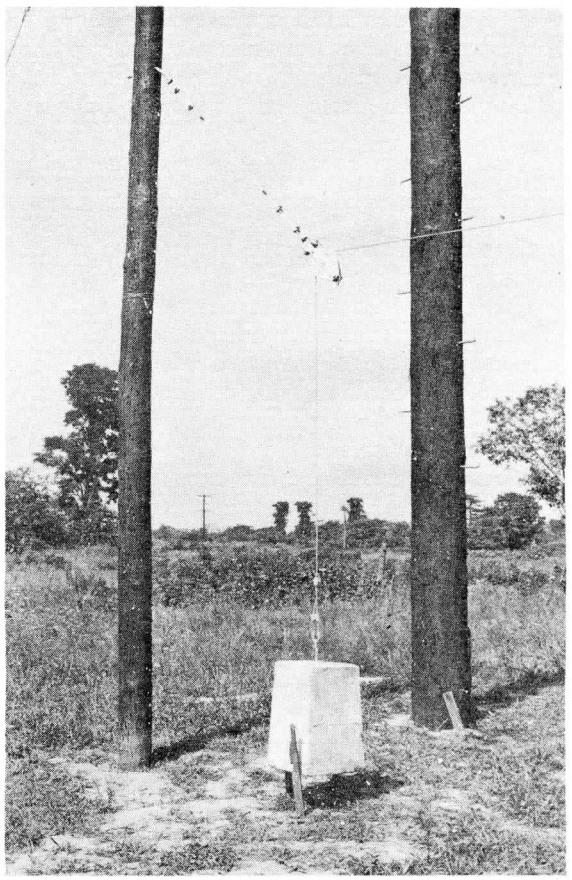


FIGURE 3- (ABOVE) - METHOD OF SUPPORTING 4-WIRE TRANSMISSION LINES.

FIGURE 4 - SUSPENDED COUNTERWEIGHTS MAINTAIN 4-WIRE LINES TAUT.

ceived and construction is nearly completed on the 4-wire transmission lines. Because this installation is used for installation training as well as operating training, the 4-wire and 2-wire transmission lines were installed to provide training on both types. It should be pointed out that special equipment is needed to construct the 4-wire line, whereas standard pole line material can be used for the 2-wire line; also that the special material needed for 4-wire line may not be available when overseas installations are made.

FIGURE 5- WHERE ALL TRANSMISSION LINES ENTER THE RECEIVING HOUSE. THE 4-WIRE LINES MAKE THIER ENTRY AS TWISTED PAIR.

The 4-wire transmission line is the most desirable type of installation since it is a balanced line which reduces noise pickup. Figure 3 shows a close-up of the 4-wire line which is installed on the same poles as 2-wire line. Figure 4 shows a concrete block, used to keep each 4-wire line taut. The entrance of the 2-wire and 4-wire lines to the receiver building is shown in Figure 5. The 4-wire line entering building from the left in this figure has the twisted pair conductor attached which completes the lead into the building. The standby power units are covered over with canvas in this figure and are to the left of the building.

Additional poles are to be added for more rigid support for the 4-wire line since the spacing should not be much over 30 feet.

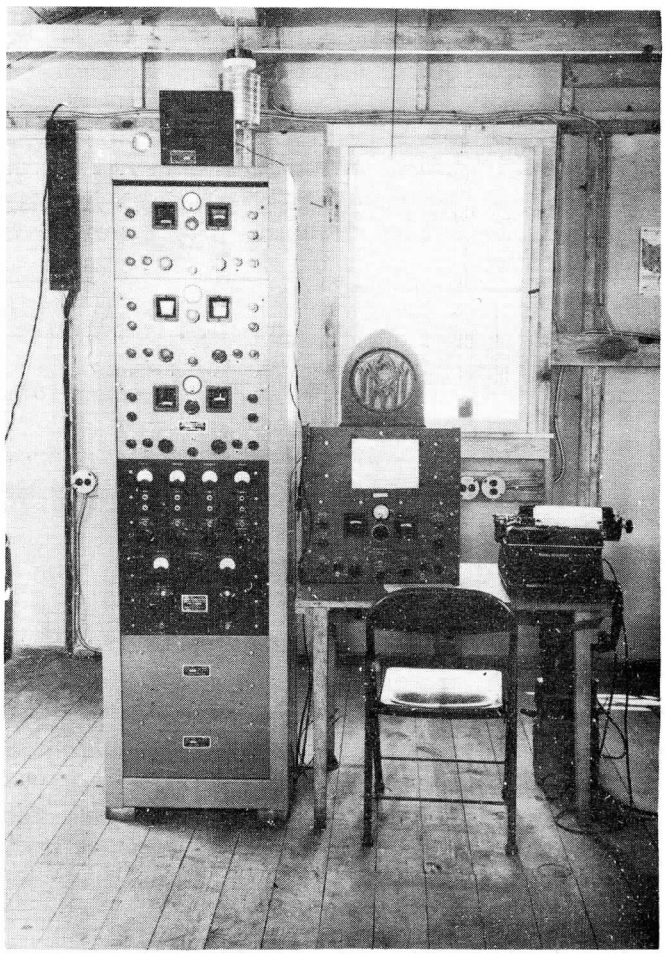


FIGURE 6— THE DIVERSITY RECEIVING EQUIPMENT IS ALL CONCENTRATED ON A SINGLE RACK.

Electric Power Installation

All power lines, except one span, were run underground with parkway cable. The location of these cables is shown on Figure 1. The switching central was installed in the receiver building. Three toggle switches are for clearance lights on the 3 rhombics. The entrance switch has the two feeders from commercial power and one feeder goes to standby units. This is a double pole, double throw switch, making it possible to connect commercial power or standby power to installation. Clearance lights were installed on each 75' pole.

Installation and Operation of Boehme High-Speed Equipment

The Boehme equipment was installed in the signal center of the 822nd Signal Fixed Radio Station Company, which is located on the main post at Fort Monmouth. The two motor-generator sets for the Boehme were installed on racks (downstairs from the operating room). This type of installation was made to

conserve floor space, and to date the operation has been very satisfactory.

Figure 6 is in the receiving building and shows the three receivers, the diversity unit and two receiver power supplies, in order from top to bottom. The rack furnished with this equipment is not high enough to mount the power supply for the third receiver, so it is mounted inside the bottom of the rack and is accessible from the rear.

Miscellaneous

All 75' poles have lightning arrestors installed on them at present. These lightning arrestors consist of solid #6 copper wire extending approximately 2 feet above the pole and running down the pole to a 2-inch horn gap 3 feet from the ground. The lower side of the horn gap is connected to a ground rod.

Two days after the fifth 75' pole was set it was struck by lightning which splintered the pole. After this accident lightning arrestors were installed on 75' poles prior to erection.

Sleeping space for six men is provided in the receiving building. Facilities for preparation of a separate mess is to be provided here also.

EXPEDITING SHIPMENT OF SIGNAL VEHICLES

At times there has been apparent misconception as to the classification of vehicular signal equipment at shipping ports with the result that some of it has been classified as "Ordnance vehicles" and thus subjected to delay in shipment. The following is quoted from Army Service Forces Memorandum No. S105-17-43 in this connection:

"All signal equipment mounted in vehicles is, because of its mobility, a vital necessity for the performance by field units of their primary mission. Therefore, every consideration will be given to expediting shipment of this equipment.

"Many items of vehicular signal equipment are contained in one or more vehicles, and it is imperative that the complete set be shipped at one time on one transport. Reports have shown that many shipments have been received overseas of only a part of the equipment. Lacking the complete unit, the equipment received was worse than useless and only took up valuable cargo space.

"Special consideration will be given to shipping vehicular signal equipment complete in the priority assigned by the oversea theater commanders for signal radio communication equipment."

RAPID RESTORATION OF OPEN LINE SERVICE

A description of a method which utilizes rubber covered cable for rapid restoration of service in damaged open wire lines has been prepared in the 32nd Signal Construction Battalion and is here presented as a matter of interest:

The simplicity of this method and the fact that installation is extremely rapid are favorable considerations. Its use has resulted in a complete repair being made in 20 minutes. Service in one instance was restored in 3 minutes where a pole, cross arm and the wire were demolished by a dynamite charge. This was accomplished by using a 6 man crew and a 3/4 t. weap-

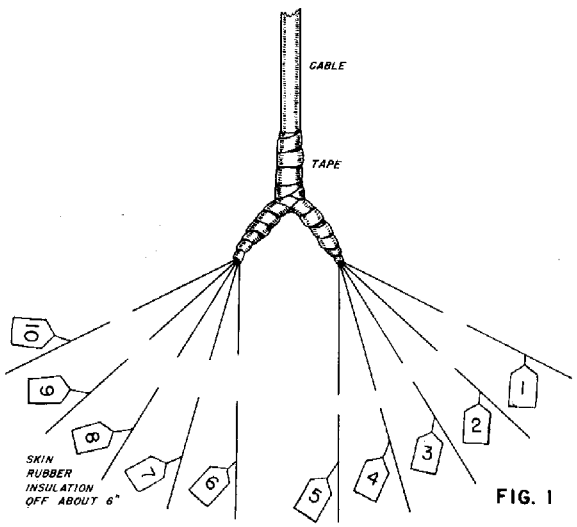


FIG. 1

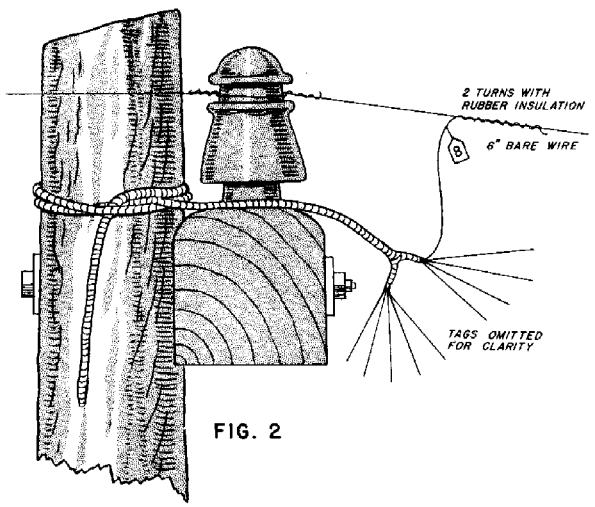


FIG. 2

ons carrier. Men can be taught to perform cable restoring service with 2 or 3 hours instruction. Other methods may prove just as effective but the method discussed has the advantage of great flexibility gained by the use of rubber covered cable.

Two precautions must be observed in making use of this method. First, the cable should be handled with care because sudden strains encountered while pulling the cable from the reel may injure the wire strands. Second, a standard method of placing the cable must be employed; i.e., start to place the cable facing away from the office, make the random splice at the pole nearest the central office, and make the transposition connection with the far end of the rubber covered cable if a transposition must be included.

The materials and personnel required and the method of installation used in this service are outlined as follows:

Materials and Equipment Required

1. Approximate 1000' of 5-pr. rubber covered cable wound on a Reel DR-5 and mounted on a Reel Unit RL-31 or Reel Unit RL-26 with a brake unit.

2. A light truck such as a weapons carrier can be used to the best advantage because of its maneuverability.

Personnel Required

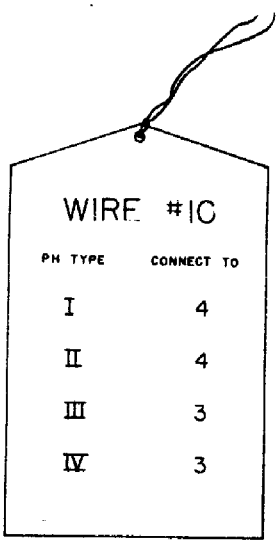
Six linemen and a chauffeur taken directly from a construction section; or a maintenance team consisting of a chief lineman, two linemen and a chauffeur driving a weapons carrier.

Prior Planning

1. The 5-pr. cable is fanned out and tagged on each end, with the tags numbered from 1-10. (If the cable is color coded, make use of it in numbering and tagging conductors; otherwise the conductors will have to be identified with a buzzer or other device.) The 1-5 group is separated from the 6-10 group by taping each bunch near the butt of cable (Figure 1). For a standard ten-pin crossarm, the outside pins are 56 inches from the center of the arm. Therefore, each group of the rubber covered cable should be fanned out to 65 inches, to allow for sag from side to side and the six inches of bared conductor for splicing (Figures 2 and 3).

2. Tags on one end of the cable will list the open wire conductors to which the cable wires will be connected.

3. With untransposed circuits the cable wires and the open wires are kept from being transposed by the use of the numbered tags on each end of the cable. With transposed circuits the transpositions are controlled by transposing the numbered tags on the far end of the cable. One end of the cable will have tags showing the wire number (in the cable) and the open wire to which each will be connected, regardless of which of the four types



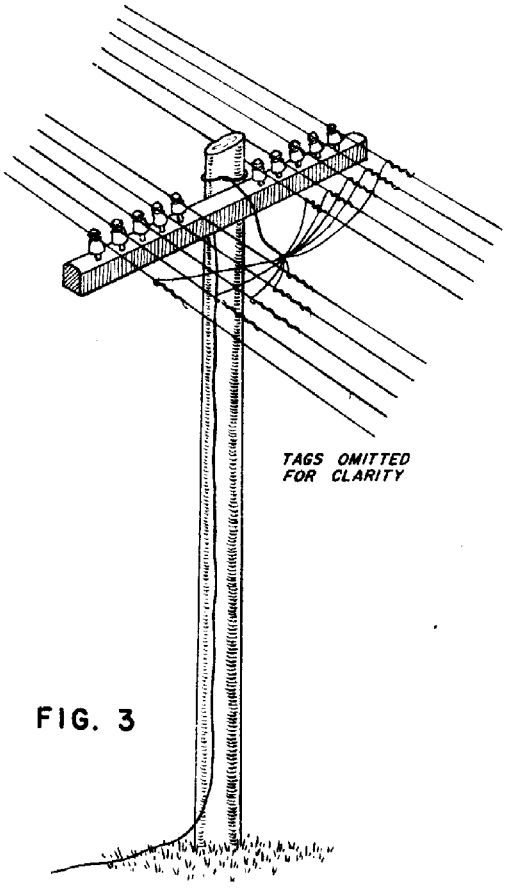


FIG. 3

FIG. 4 - TAG FOR PHANTOM GROUP. THIS SHOWS THE OPEN WIRE TO WHICH A CABLE WIRE WILL GO IN EACH TYPE OF PHANTOM.

of phantom tranposition is involved. (See Figure 4). This work should be performed beforehand.

Method of Installation

1. Mount reel unit on the truck and string the cable between poles which are located two spans away from each end of the damaged span(s).

2. Another method is to wind the cable on the reel as a loop so the ends of the cable are exposed when the cable is completely wound on the reel. The truck is then driven to the approximate center of the damaged section and linemen carry the cable by hand in opposite directions until they pass the damaged section.

Field Procedure

1. FIRST MOVE - 6 men and a driver in a light truck start at the second pole this (central office) side of the damaged span(s), two linemen drop off at this point and climb the pole, taking the cable end with them. They loop the cable over the top of the pole and then each man takes his respective 5-pr. group of wires and connects them to the open wire. (See Figures 2 and 3). After they finish their work, they test the lines back to the office with a Telephone EE-8-A and then assist in the regular repair of the line.

2. SECOND MOVE - The truck and 4 linemen move to the first pole adjacent to the damaged span(s). One lineman climbs the pole and starts cutting off the open wire so as to clear the circuits of any local trouble. He leaves sufficient wire on the crossarm to enable the new wire to be spliced on without difficulty. This man can remain on the pole and assist in splicing in the new line wire.

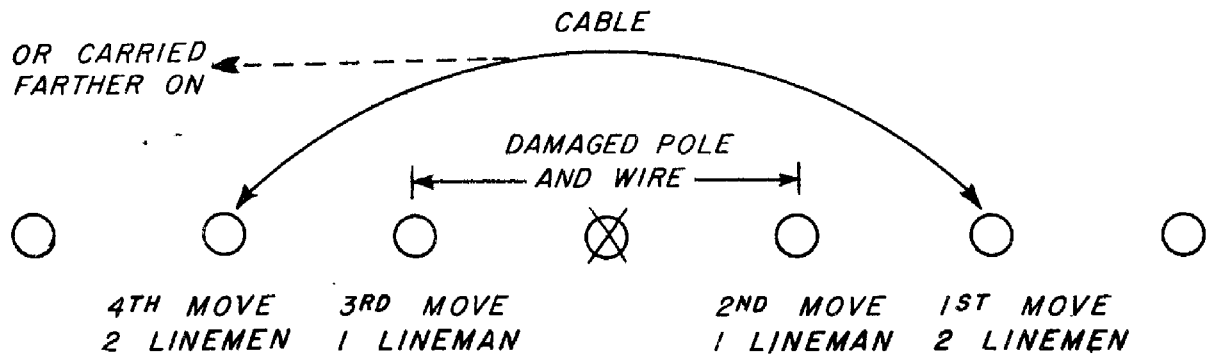


FIG. 5 - DISPERSION OF 6-MAN TEAM AND CHAUFFEUR. CABLE SHOULD BE LAID APPROXIMATELY 50' AWAY FROM POLE LINE TO AVOID DAMAGE FROM TRUCKS.

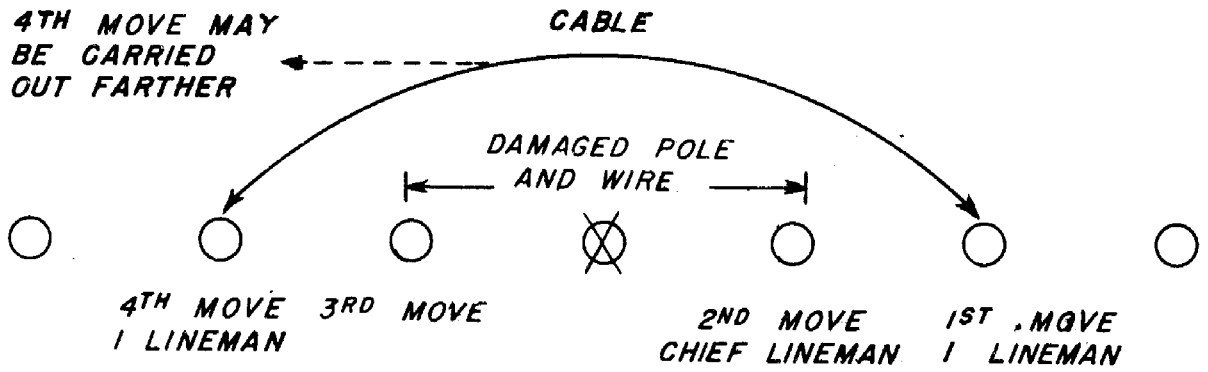


FIG. 6 - DISPERSION OF MAINTENANCE TEAM. CHIEF LINEMAN CUTS AND CLEARS WIRE AT 2ND AND 3RD MOVES.

3. THIRD MOVE - The truck and 3 linemen move to the last pole adjacent to the damaged span(s), and one lineman clears local trouble as in the second move.

4. FOURTH MOVE - The truck and 2 linemen move to the second pole past the damaged span(s) and the 2 linemen proceed as in the first move. Or it may be faster to run the cable completely off the reel, which will possibly take the end of the cable past the second pole beyond the damaged span(s); this is done rather than stopping and pulling the excess cable off by hand, which would cause the team to lose time (See Illustration 5).

Use of Maintenance Team

1. A maintenance team composed of a chief lineman, two linemen and a chauffeur can perform the expedient repair, using the same materials. (These men are a regular part of the T/O for a construction company. Their work is primarily maintenance and repair, restoring service, locating and clearing trouble and installing drops.)

2. The only change in the procedure is that the chief lineman clears the local trouble at both ends of the damaged span(s). Also, they normally leave the regular repair (heavy construction) for the construction crew.

EQUIPMENT NOTES

EQUIPMENT COORDINATION

SIGNAL CORPS BOARD REPORTS APPROVED BY THE CHIEF SIGNAL OFFICER

Signal Corps Board Case No. 518 - Running Board for Open Wire Construction. Approved 16 August 1943.

Running Board LC-47 is a standard tool used by Signal Corps Linemen. It consists of a steel frame on which are mounted swivel eyes to which the conductors are attached. By means of this tool pair and phantom, transpositions may be thrown as the conductors are drawn from the reels.

Tables of Organization have authorized the issue of Running Board LC-47 to the following organizations:

T/O 11-27, Signal Company, Construction
T/O 11-89, Signal Company, Construction, Armored Signal Battalion
T/O 11-227, Signal Company, Heavy Construction, Aviation
T/O 11-277, Signal Company, Light Construction, Aviation.

The Signal Corps Board found that a running board is not necessary in constructing "rapid" and "semi-permanent" field, open wire lines. In unusual situations where its use might be desirable experienced personnel can readily improvise substitute equipment.

However, for heavy construction projects, additions to existing lines and the replacement of damaged commercial facilities during an advance into enemy territory, the use of Running Board LC-47 would often be advantageous.

Training of Signal Construction Linemen in the use of the LC-47 and improvisation of substitute running boards was also favorably considered. The running board developed by the Southern New England Telephone Company, authorized as a substitute for the standard LC-47 was found to have little advantage over those which might easily be improvised by troops in the field.

The approved recommendations in this case are as follows:

1. Operations Division initiate action in the committee for the current study of personnel and equipment for Signal Construction Units, to consider a revision of the Basis of Issue for Running Board LC-47.
2. The procurement of the running board developed by the Southern New England Telephone Company, authorized as a substitute for Running Board LC-47, be discontinued.

3. Methods of running open wire lines, including those using no running board, improvised running boards, and/or running board LC-47, utilizing to the fullest extent practicable standard Signal Corps vehicles and equipment in illustrations and descriptive text, be incorporated in Technical Manual 11-368, Field Construction for Open Wire Lines.

Signal Corps Board Case No. 523 - Service Test of Loop Assembly AS-4/GR. Approved 25 August 1943.

Loop Assembly AS-4/GR is a direction finding unit originally developed as a homing device for use with Cavalry and Armored Force organizations.

It consists of combined indicating and power unit, a set of four interchangeable loops, and associated cables by which it may be attached to an ordinary radio receiver. A 12-volt D.C. source of power is required.

It was considered possible that the AS-4/GR might be used as a substitute for the Radio Set SCR-206 (a much heavier equipment using the aural null system of direction finding, and the present standard equipment for use as a portable direction finder for front line work), and for Radio Set SCR-558, a mobile vehicular instrument for use immediately in the rear.

Loop Assembly AS-4/GR was service tested as a possible vehicular intercept and direction finder, and as a potential replacement for two or more units of the SCR-503.

The tests were made using Receiver BC-312 with Radio Sets SCR-193 and SCR-245 as target transmitters. With but two exceptions the Loop Assembly AS-4/GR was mounted in an O-Truck ¼-Ton, 4x4, equipped with a 12-volt electrical system. The transmission included continuous wave, voice, and tone modulated signals.

The Signal Corps Board found that the device as submitted for service test did not possess sufficient accuracy to merit adoption as standard equipment. However, it was considered worthy of further development and study.

The Signal Corps Board recommended that:

1. No action toward the standardization or procurement of AS-4/GR (XO-1) be taken at the present time.
2. Engineering and Technical Service be directed to continue development of AS-4/GR (XO-1) with a view toward incorporating the modifications enumerated in paragraph 3c of the report; and upon the completion of such development, to refer the adapter to this Board for a further test.

Signal Corps Board Case No. 535 - Telephone Central Office Set TC-2, Mounting in Shelter HO-17. Approved 27 August 1943.

Telephone TC-2 is a switching central for use at Army Corps or other

headquarters requiring a telephone switchboard of the capacity of one or two Switchboard BD-89. It is a complete portable equipment, the principal components of which are: switchboards, main distributing frame, storage batteries, power control equipment, engine generator set, maintenance and tool equipments.

The Signal Corps Board was directed to make a study and submit plans for mounting the TC-2 in Shelter HO-17, a lightweight body made for installation in a standard 2½-ton truck, and originally designed to house Radio Set SCR-299.

It was found feasible to install the operating equipment of a TC-2, employing one Switchboard BD-89 in Shelter HO-17, and allow the transportation of the non-operating component parts, provided they were removed from the shelter during periods of operation of the set.

Using two Switchboards BD-89, it is necessary to use in addition to the Shelter HO-17, a Trailer, 2W, Cargo, for transportation of the complete equipment.

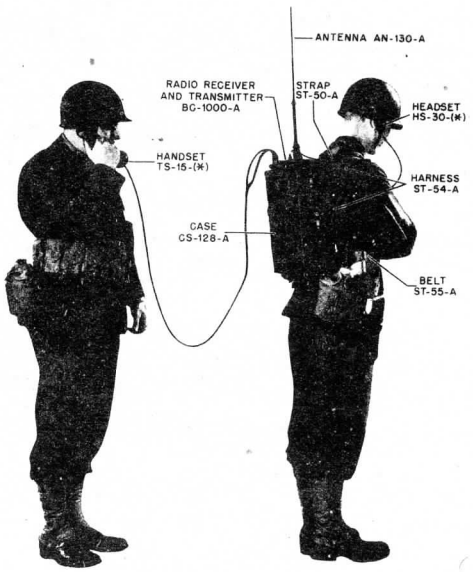
Plans for both types of installation have been submitted by the Signal Corps Board in the report. The approved recommendations provided for the adoption of the plans and for dissemination of the information in the next revision of Technical Manual 11-340. Provisions were also made to substitute Shelter HO-27 (a housing identical with Shelter HO-17 except that it has no electrostatic shielding) when the HO-27 becomes available.

GROUND SIGNAL

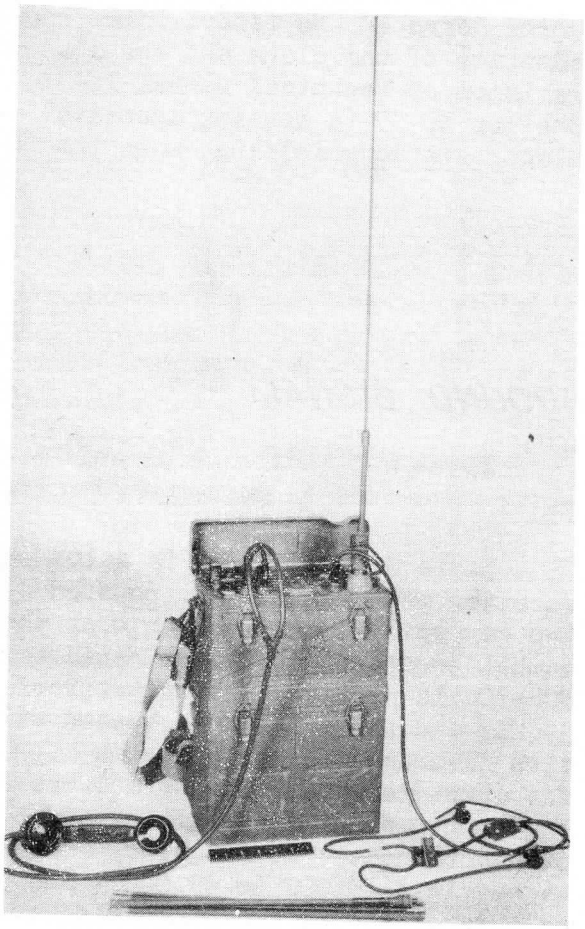
NEW WALKIE-TALKIE, RADIO SET SCR-300-A

Radio Set SCR-300-A is a low power, portable, frequency modulated radio receiver and transmitter, powered by dry batteries. The set is designed for two-way voice communication over short ranges. It is primarily for use by combat troops on foot, and replaces in part Radio Set SCR-194 and SCR-195. SCR-300 is provided with waterproof seals, such as rubber grommets at the jacks, and the chassis is coated with waterproof varnish, so that its operation is unimpaired by rain and high humidity or even by immersion in water for short periods. The normal operating range is three miles or more, depending upon operating conditions and terrain, but greater ranges than these have been obtained. The frequency range is continuously variable from 40.0-48.0 megacycles (40,000 to 48,000 kilocycles). The dial is calibrated in 40 channels separated by 200 kilocycles each with "0" channel located at 40.0 megacycles and with channel "40" at 48.0 megacycles. Each set is individually hand calibrated at the time of manufacture, thus assuring a high degree of accuracy.

This radio set comprises two main packages: (1) Radio Receiver and Transmitter BC-1000-A with Battery Case CS-128-A and Dry Cell Battery BA-70; weight, 35-1/2 lbs.; dimensions - 17-1/2" high, 12" wide and 7-1/2" deep; (2) Equipment Bag BG-150-A containing one Antenna AN-130-A, one Antenna AN-131-A, one handset TS-15 and one Headset HS-30-A. Up to 40 hours of intermittent operation may be expected when Battery BA-70 is used. A lighter battery, BA-80, is available with a life of approximately 24 hours. Weights are as follows: BA-70, 15 lbs; BA-80, 9-1/2 lbs.



Transmissions at the frequencies used by this set act somewhat like light rays. Obstacles such as hills, tall buildings, trees, etc., between the points of transmission and reception tend to reduce the signal strength and thereby the effective range. It is, therefore, desirable to operate between points which are as high as possible in order to increase the effective line of sight range.



The range of the equipment is also dependent on the antenna used. In flat level country the short Antenna AN-120-A will have slightly less range than the long Antenna AN-131-A. When operating in a depression or valley, the long Antenna AN-131-A will provide much greater range than the short one.

Radio Set SCR-300 is now in production and the following issue is contemplated:

		Total
BN. Hq. Co. - 6 x 3		18
Cm. Co.	5	5
AT Co.	5	5
Reg't Hq. Co.	12	12
Inf. Reg't		40
Inf. Div.		120

NEW TELETYPEWRITER MAINTENANCE EQUIPMENTS

Twelve new maintenance equipments, each servicing a particular type of teletypewriter equipment, have been developed in order to secure greater portability, economy and efficiency. Now available for issue, the equipments and their purposes are briefly described below.

Until recently, the only available spare parts and tools for repairs to Teletype Equipment were contained in Maintenance Equipments ME-7 and ME-18 and Tool Equipment TE-50. These were designed to maintain only one type of equipment; i.e., page printers, including:

Printer TG-7-A (part of Telegraph Printer Sets EE-97 and EE-98).
Teletypewriter TG-7-B (part of Teletypewriter Sets EE-97-A, EE-98-A and Telegraph Central Office Set TC-3).
Teletypewriter TG-37 (part of Teletypewriter Sets EE-102 and EE-103).
The page printer section of Commercial Model 15 Printer.

In due time, other Teletype machines, including Perforator Set TG-11, Perforator Transmitter Set TG-23, Reperforator Transmitter Set TG-25 (non-typing) and Reperforator Transmitter TG-26 (typing) were developed. This necessitated revision of the maintenance equipment on hand and development of new ones (to enable the servicing of all teletype units).

The large number of spare parts contained in Maintenance Equipment ME-7 made it uneconomical for issue to organizations having only a few teletypewriters. The problem of superseding the ME-7 by a universal kit for issue to higher echelons where a large number of teletypewriters of all types may be serviced, and by smaller kits, each containing a small number of parts suitable for one type of machine, to be issued to organizations having only a few machines, was handled by the Test and Maintenance Equipment Branch, Camp Coles Signal Laboratory.

Detailed investigations resulted in the development of six maintenance kits to replace the ME-7. While Maintenance Equipment ME-7 can be used with Printer TG-7 and similar type page printers only, the new, smaller kits contain the FREQUENTLY used parts of all teletypewriter equipments, and contain approximately 1/25 the quantity of parts. These individual kits, consisting of Maintenance Kit ME-69, ME-80, ME-81, ME-82, ME-83, and ME-84, are to be issued to lower echelon units and are suitable for maintenance of various types of teletypewriter equipment as follows:

ME-69 - For: Keyboard Typing Reperforators
ME-80 - For: Page Teletypewriters
ME-81 - For: Non-typing Reperforators
ME-82 - For: Transmitter Distributors
ME-83 - For: Perforators
ME-84 - For: Perforator Section of Model 19 only.

The duplication of items presented with the use of the ME-7 has been

eliminated by the new kits. This is due to the fact that the six small kits are issued for specific purposes and equipments and therefore contain only those parts which are essential for these specific equipments. Formerly, one kit containing many excess parts would lie idle at one depot or field unit instead of being advantageously used at another. When Maintenance Kit ME-69, ME-80, ME-81, ME-82, ME-83 and ME-84 are issued as a group to a Theater Pool, they are issued as Maintenance Kit ME-86.

Maintenance Equipment ME-18-( ), nomenclature assigned to the Maintenance Parts Annex, and issued as such only to the depots, constituted the only equipment for the replacement of INFREQUENTLY used parts of teletypewriters in higher echelons. Although a duplication of items was present in the ME-18, the kit covered only the servicing of Printer TG-7 and similar type page printers. Six new, small kits, consisting of Maintenance Kit ME-89, 90, 91, 92, 93 and 94 were developed to replace the old ME-18. As with the kits developed for lower echelon repair, these higher echelon repair kits are to be used for specific purposes and equipments, thereby eliminating the duplication of items. Following are their applications.

ME-89 - For: Keyboard Typing Reperforators
ME-90 - For: Page Teletypewriters
ME-91 - For: Non-typing Reperforators
ME-92 - For: Transmitter Distributors
ME-93 - For: Perforators
ME-94 - For: Perforator Section of Model 19 Only.

Tool Equipment TE-50 was then revised to be used by the Teletypewriter Repairman (239) to maintain all teletypewriter equipment. The revised equipment is issued as Tool Equipment TE-50-A, supplemented by Maintenance Equipment ME-37 (containing expendable items).

LOUDSPEAKER FOR RADIO SET SCR-284-( )

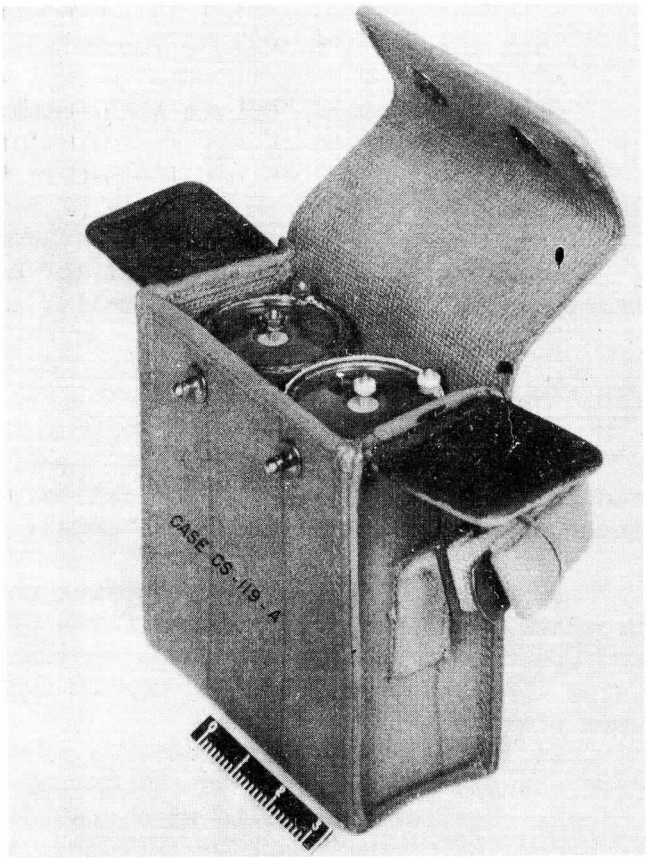
In order to eliminate the necessity for operators of Radio Set SCR-284-( ) wearing headsets for long periods of time while awaiting orders, particularly in case of bad static conditions, and to permit persons other than the

operator to hear the signals when so desired, Loudspeaker LS-7 has been made available for use with this radio set. Present procurement of Radio Set SCR-284-( ) includes Loudspeaker LS-7, which has been added to its parts list.

A supply of Loudspeakers LS-7 is now on hand for use with Radio Set SCR-284-( ), which were originally issued without loudspeakers, and they may be secured for such sets upon requisition.

NEW BATTERY CASES

The standard telephones, EE-8-( ) and EE-91, which have supplanted Telephone EE-5, require a 3-volt battery supply rather than the $4\frac{1}{2}$-volt supply which the obsolete equipment used. Therefore, there would be an almost 33-1/3 percent waste of steel were the older battery case, CS-39, which held three batteries (BA-23) still used.



To conserve this critical material, two new battery cases have been developed and standardized. Each holds two batteries, BA-23, and is intended for use with field telephones when an external 3-volt battery supply is required. The two models, Case CS-119 and Case CS-119-A, are interchangeable, and the model procured will depend upon the availability of materials and the cost of production.

Case CS-119 is made of pressed steel, with a fiber insulating lining. It is rectangular in shape, with outside dimensions of 3-1/4 x 7-1/2 x 7 inches and inside dimensions of 2-7/8 x 7 x 6 inches. It is provided with a lid and 78-inch web shoulder strap.

Case CS-119-A is similar to Case CS-119 in size and shape, but is made of cotton belting, and has a hinged cover. It is also provided with a 78-inch shoulder strap, but the interior insulation is omitted.

EVOLUTION OF RADIO SET SCR-299

A HISTORY AND SUMMARY OF CHANGES

Since Radio Set SCR-299, one of the most widely used of the larger Signal Corps equipments, has been issued in a number of models (SCR-299-A, SCR-299-B, SCR-299-C, SCR-299-D, SCR-399 and SCR-499), it is considered desirable that some brief explanation be given of the major differences between the various issues. It is believed that the following description will serve that purpose.

Radio Set SCR-299-A

Original design. Only a small number built.

Radio Set SCR-299-B

Identical to SCR-299-A except for addition of Box BX-34-B with 72 crystals. A couple of hundred were built.

Radio Set SCR-299-C

Several hundred were built. Identical to SCR-299-B as to operating procedure and general layout. The following improvements over SCR-299-B were incorporated in all sets of this model:

1. In the cable system carrying power from trailer to truck, complete breakaway was provided. Former Cords CD-556, CD-557, CD-558, CD-559, CD-560 and CD-561, together with the extension cable terminal box, were eliminated. Cords CO-313, CO-314, CO-315, CO-316 and CD-652, having heavy duty connectors were provided.
2. Duffel cabinets on outside of truck were strengthened, and hinges were changed so doors opened at the rear for safety.
3. Heavier wing bolts were provided holding Chest CH-89 (seat bench) to floor.
4. An improved and much stronger mounting for holding Chest CH-88 to wall of truck was incorporated.
5. Chest CH-88 was provided with locking pins to prevent doors from sliding open.
6. Metal clamping type holders for the fire extinguishers were provided instead of the former wood holders.
7. The Arvin electric heater used on SCR-299-B was replaced by an Electromode model providing heating or ventilating.

8. Improvements in operating position:
   a. Keys J-37 used instead of J-44.
   b. Microphone Model 600B, replaced by Microphone T-50, having improved switch.
   c. Spare electric sockets on wiring channel changed to "Twist-Tite" so as to accommodate and lock standard parallel blade plugs.
9. Changes in accessories:
   a. Anti-corona balls provided for transmitting antenna.
   b. 45 ft. auxiliary transmitting antenna provided.
   c. 100 ft. roll antenna wire included.
   d. 12-volt trouble lamp included in addition to 115 volt type.
   e. Quantity of fire extinguishers and typewriters reduced from 2 each to 1 each.
   f. Lift straps for handling storage batteries included.
10. Improvements in BC-610 and BC-614:
   a. Tank coils greatly strengthened.
   b. Transmitter cover doors provided with ring latches and arranged to open outwards.
   c. VT-218 modulator tubes turned so grid terminals not easily damaged.
   d. Better material provided for tuning charts and circuit labels.
   e. Several minor improvements in wiring and construction. Small parts in BC-614 mounted on resistor boards.

Radio Set SCR-299-D

A total of well over 1000 were built including several hundred airborne type. This set is identical in external appearance and quite similar in internal appearance to SCR-299-C. The following several major improvements (except for 5 and 6 below) were incorporated in all models.

1. Table MC-269 changed to Table MC-269-A:
   a. Layout rearranged so BC-614 moved to top of table. (Formerly occupied shelf below table top.)
   b. Mountings FT-388 and FT-389 provided for loudspeakers and receivers. Mounting FT-289 includes lamp fixtures, Mountings FT-162 and Mountings FT-178 as an integral part.
   c. Control Box BC-731 deleted (including AC voltmeter). Start-Stop switch moved under table top as Switch SW-199. Fuses formerly in control box removed to Junction Box JB-69.
   d. Deleted shelf under table formerly used to hold BC-614, and reshaped table legs to avoid interference with operator's knees.
2. Break-in c.w. operation provided.
3. The transmitter fuses on BC-610 were moved to the front panel.
4. On Trailer K-52-D:
   a. Gas cans moved from original position to new positions, 3 on each side of PE-95. Quartermaster gas can brackets provided.
   b. Chest CH-112 supplied at front of trailer for storage of miscellaneous parts.

5. Approximately two-thirds of SCR-299-D were supplied less volume level meter on Speech Amplifier BC-614-D. This resulted in elimination of an extremely critical part with no effect on operation (Mod. Plate meter gives proper indication).

6. Approximately one-third of the sets towards end of contract were equipped with improved RY_1 relay as result of field reports of trouble. This improved relay was similar to original type but had heavier springs.

7. Note: The "Airborne Type" of SCR-299-D consisted of identical components to Radio Set SCR-299-D except not installed in truck and trailer.

Radio Sets SCR-399-A and SCR-499-A

Several thousand originally built. Since this set constituted a complete major redesign from SCR-299, only major differences in construction will be noted, together with those points covered because of field requests.

1. Radio Set SCR-399-A is mounted in Shelter HO-17 for transport by 2-1/2-ton cargo truck (truck not a part of the radio set). Trailer K-52-E is practically identical to Trailer K-52-D, except that PE-95 uses a Willys engine. Radio Set SCR-499-A includes the components of Radio Set SCR-399-A, except Shelter HO-17 and Trailer K-52. It is delivered packed for Air Transport.

2. General construction:

a. Table MC-269 replaced by removable Chests CH-120 and CH-121, as mounting for receivers and other operating position components.

b. Chest CH-119 added under Chest CH-88 for wall storage of bulky items.

c. Removable Chest CH-109 provided for spare storage battery. Rectifier RA-63 provided for charging battery.

d. Frame FM-59 provided for wire reels.

e. Junction Box JB-70 (in Chest CH-120) provided for station control.

f. Chest CH-89 provided with back rests.

3. Radio Transmitter BC-610-E.

a. Frequency range extended to be 2 - 18 mc. instead of 2 - 8 mc.

b. Phone-c.w. relay circuit modified to eliminate danger of burning contacts if operated with plate power on.

c. Additional improvement in Relay RY_1 by use of type made by Leach.

d. Shock mount revised to provide a bottom plate cover for transmitter. Transmitter mounting bolts increased in size.

e. Tube clamps provided on most tubes.

f. Number of meters further reduced by combining functions. Number of mica capacitors reduced to 50 percent.

g. Mechanical construction simplified.

4. Antenna Tuning Unit BC-939-A.

a. Range extended to 18 mc. with provision for long wire antenna.

b. Metal cover added.

5. Mast Base MP-47-A used instead of Mast Base MP-47 to eliminate trouble with rain leakage through center of spring assembly. (After about 1000

sets, gasket material was changed to "vellumoid" to reduce possibility of water leakage outside of spring assembly).

Radio Set SCR-299-F

A few hundred to be built. Similar to SCR-299-D except:

1. Radio Transmitter BC-610-E used instead of BC-610-D. Speech Amplifier BC-614-F is identical to BC-614-D except for addition of Mod.-Plate meter necessary when BC-610-E is used.
2. Frequency range of transmitter and Antenna Tuning Unit BC-729-C extended to be 2 - 12 mc. by the addition of plug-in components.

Proposed further changes

Continuous work is being done to improve the set as a result of field reports and suggestions originating in the Signal Corps laboratories and the manufacturer's laboratory. Among proposed changes:

1. Filament transformer T2 to be replaced by hermetically sealed unit of more generous design.
2. Screening against insects to be added to BC-610. (Early in 1944).
3. Additional protection against high humidity to be provided. (Continuous project; components improved as individually studied).
4. Large industrial type relay to be provided for RY_1. (Early in 1944).
5. Many minor constructional details of chests and woodwork being improved (continuous project).

METHODS AND NEW EQUIPMENT FOR

TESTING WIRE SYSTEMS

Test Set TS-26/TSM is a proposed instrument for wire line testing. It will not be available for several months but information given herein may be used in constructing an equivalent test set, pending issuance of Test Set TS-26/TSM. These simple, light-weight sets may be used in accordance with instructions given later in this article to detect grounds, crosses, shorts, and opens, and to measure insulation and conductor resistance as well as line and battery voltages. They may also be used for short range location of opens by means of the capacitance-kick method.

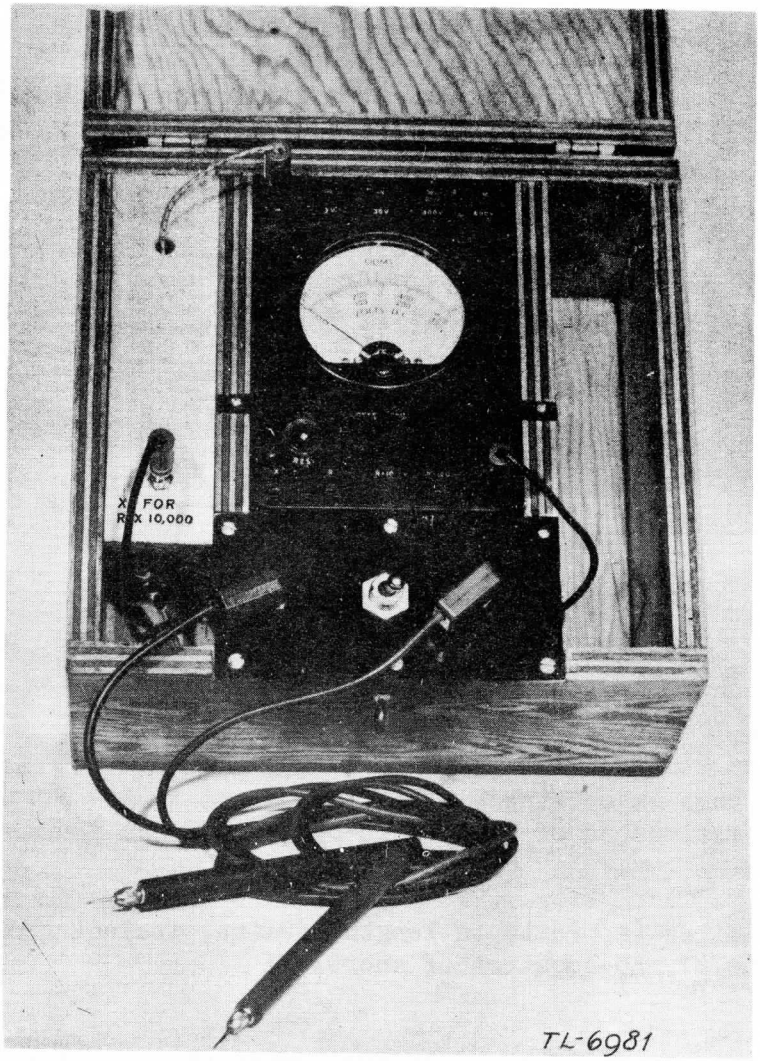
DESCRIPTION

Test Set TS-26/TSM, when issued, will consist of a volt-ohmmeter, 2 test leads with pins on one end and alligator clips or test prods on the other, a reversing switch, a 315,000-ohm resistor, a 45-volt battery, 3 pins, and 3 pin jacks. The set will be mounted in a wooden case measuring 7-3/4 x 7 x 5-1/2 inches, and its total weight will be approximately 5-1/2 pounds. The test set will also include a table, similar to tables I and II herein, showing loop resistance per mile of line facilities at representative temperatures and open location capacitance-kick test values. Pending the issuance of this set, an equivalent of Test Set TS-26/TSM can be improvised in the field by using Weston Volt-ohmmeter Model 564, Type 3C, and the above-mentioned equipment. The improvised set should be wired as shown in the circuit diagram in Figure 1, and preferably mounted in a case. Such an assembled set is illustrated herewith.

The Weston Volt-ohmmeter, Model 564, Type 3C, is a multi-range meter capable of measuring resistance (directly in ohms) and d-c voltages. It employs a 4-1/2-volt Battery BA-31, contained within the case but not considered a part of the instrument. The voltage ranges are: 0-3, 0-30, 0-300, and 0-600 volts. The ohmmeter ranges obtained by the use of the various pin jacks on the meter are: 0-1,000, 0-10,000, 0-100,000, and 0-1,000,000 ohms. An additional ohmmeter scale of 0-10 megohms may be obtained with the TS-26/TSM or its equivalent by the use of the external pin jack X FOR R X 10,000 (Figure 1).

TESTING FOR SHORTS

Throw the VM-RES switch to RES. Insert one pin, attached to the flexible leads, in the meter pin jack X and the other pin in meter pin jack R. Insert the test lead pins in the two jacks located near the reversing switch. Short



the clips together and adjust the meter to read zero on the ohmmeter scale by means of the BATTERY ADJUSTMENT knob. Connect the clips to the line under test. The far end of this line must be open. A reading on the meter indicates the presence of a short. To determine the distance to the short, select an ohmmeter scale (by mvoing the pin in pin jack R to R x 10, R x 100, or R x 1,000) to obtain the most accurate reading of the resistance value. (The meter must be adjusted to zero each time the scale is changed.) Refer to Table I to determine the loop resistance per mile of the type of line being tested for the existing outside temperature in degrees Fahrenheit. Divide the resistance reading obtained from the meter by the loop resistance of the circuit as taken from the table. The result will be the length of line, in miles, to the short if the short itself has zero resistance (that is, if it is a "dead short").

Example: A measurement is made on a Wire W-110-B circuit and an ohmmeter

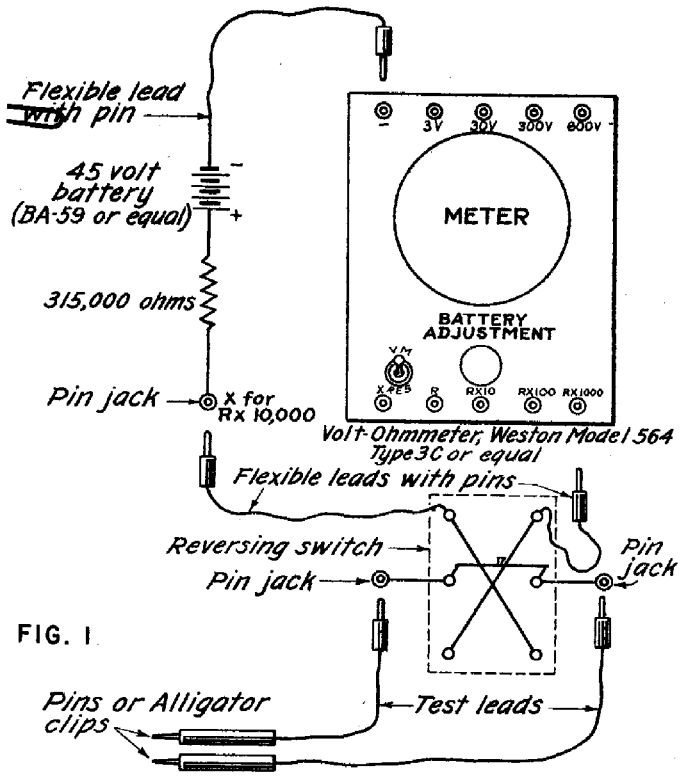


FIG. 1

reading of 1,005 ohms is obtained. The temperature is 50° F. Referring to Table I the loop resistance of Wire W-110-B at 50° F. is found to be 182.7 ohms per mile.

$\frac{1,005}{182.7}$ = 5.5 miles (approximate length of line, including slack ties, etc., to location of short).

NOTE: If the short has definite resistance value, the fault will be located at some distance less than 5.5 miles. If possible, take a similar measurement from the far end of the line and obtain a location of the fault as above. The true location will then be halfway between the two calculated locations.

TESTING FOR CROSSES

Set up the instrument for testing as outlined above for shorts. Connect one clip to the wire under test and connect the other clip in turn to each wire suspected of being crossed with the wire under test. A reading of the same meter will indicate a cross, and the distance may be determined in the same manner as described for shorts.

TESTING FOR OPENS

Opens are detected by the same procedure as shorts, except that the circuit is open if no ohmmeter reading is obtained after the clips have been connected to the line and the far end shorted. The distance to an open may be approximated by determining the amount of needle deflection caused by the

TABLE I

LOOP RESISTANCE AT VARIOUS TEMPERATURES

(Ohms per Loop Mile)

	Type of Conductor		
Temp., F°	W-110-B	W-143	CC-358 (Spiral-four)
-20	154.3	26.1	62.2
-10	158.4	26.7	63.8
0	162.4	27.4	65.4
10	166.4	28.1	67.0
20	170.5	28.7	68.6
30	174.5	29.4	70.3
40	178.6	30.1	71.9
50	182.7	30.8	73.6
60	186.7	31.5	75.2
68	190.0	32.0	76.5
70	190.8	32.1	76.8
80	194.9	32.8	78.5
90	198.9	33.5	80.1
100	203.0	34.2	81.7
110	207.0	34.9	83.3
120	211.1	35.5	84.9

capacity in the circuit, from the test point to the location of the open. While the clips are connected to the line, throw the reversing switch to each position alternately. Each time the switch is thrown a momentary deflection will be obtained on the meter. Record the average of the peaks of several of these momentary deflections.

One method of approximating the distance to an open is to compare the average deflections obtained from tests on the circuit in trouble with similar measurements on a good circuit which takes the same route and terminates

at the same place. The circuits must be disconnected from all terminating equipment before testing. The readings obtained from the above tests are substituted in the following formula:

$$X = \frac{D^1 L}{D}$$

where D = Voltmeter deflections on good line; D^1 = Voltmeter deflection on line in trouble; L = Distance between stations; X = Distance to location of open.

TABLE II

VOLT-OHMMETER CAPACITANCE-KICK TEST

(Lower Scale Reading)

Miles	Type of Conductor				
	W-110-B		W-143		CC-358 (Spiral-four)
	Dry	Wet	Dry	Wet	Dry
1/4	4.0	9.5	8.5	8.5	10.0
1/2	8.0	18.5	16.7	16.7	17.8
3/4	11.5	25.5	23.5	23.5	24.0
1	15.0	32.0	29.0	29.7	29.0
1-1/4	18.5	37.5	34.0	34.9	34.0
1-1/2	21.5	42.5	38.8	39.4	38.0
1-3/4	24.5	47.0	43.0	43.6	41.6
2	27.5	50.5	46.7	47.5	45.0
2-1/4	30.0	54.0	50.0	51.0	48.0
2-1/2	32.5	56.5	53.0	54.0	51.0
2-3/4	34.5	58.5	56.0	57.0	53.5
3	36.5	60.2	58.5	59.0	56.0
3-1/4	38.3	——	60.0	——	57.8
3-1/2	40.0	——	——	——	59.5
3-3/4	41.5	——	——	——	——
4	42.5	——	——	——	——

Another method of obtaining the distance to the location of an open is to calibrate the meter beforehand by determining the amount of condenser kick which various lengths of different circuits will give, and comparing these values with readings obtained when testing on faulty lines. These values may be tabulated as shown in Table II for convenience. The table shown is a typical table and will not be accurate for every meter. A similar table must be

made up for each meter from actual readings taken on known lengths of each type of wire system. Read the deflections on the voltage scale and count each division as 1 unit (full scale = 60). Both methods of locating an open are approximations and accurate results must not be anticipated.

TESTING FOR GROUNDS

Throw the VM-RES switch to RES, insert one pin of the test leads in pin jack X and the other pin in pin jack R. Adjust the meter to read zero. Connect one clip to the wire under test and the other clip to a known ground (water pipe, driven ground rod, etc.). A reading on the meter will then indicate the presence of a ground on the line. In some instances the location of the grounded point may be approximately determined by doubling the value of resistance measured and dividing that figure by the loop resistance (obtained from Table I) for the circuit under test. In most instances the resistance of the ground itself will prevent accurate location of the ground.

MEASUREMENTS

Insulation Resistance

Insulation resistance is measured in the same way that the distance to shorts is measured, except that one pin attached to the flexible leads is inserted in the X for R x 10,000 jack and the other pin is inserted in the R x 1,000 jack. To measure insulation resistance between conductors, connect the clips to the conductors under test and multiply the reading obtained on the meter by 10,000. To measure the insulation between a conductor and ground, connect one clip to the conductor under test, ground the other clip, and proceed as outlined above.

Conductor Resistance

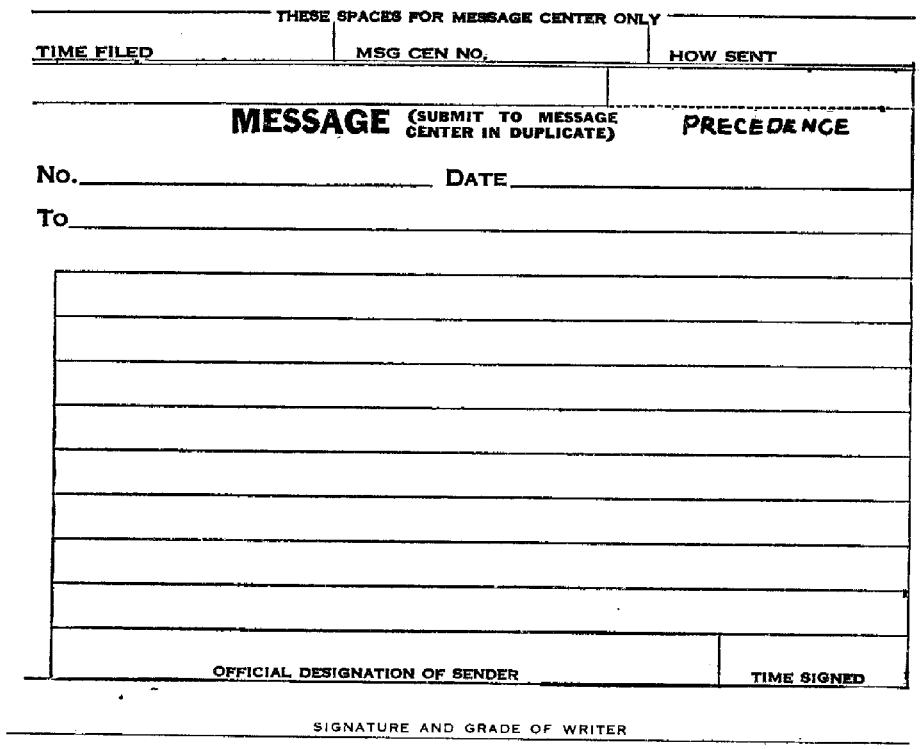
The conductors are shorted together at the distant end, and the measurement of the resistance is made in the manner outlined for measuring the resistance of a shorted line.

Line and Battery Voltage

Throw the VM-RES switch to VM. Insert one pin of the test leads in the minus (-) jack and the other pin in the 3V, 30V, 300V, or 600V jack depending on the value of voltage to be measured. If the approximate value of voltage to be measured is not known, start with the largest scale and progress downward to the lowest scale which can be used.

MESSAGE BOOK M-210-A

Concurrence of the Commanding Generals, Army Air Forces and Army Ground Forces, has been obtained to changing the message blank and the instructions inside the front cover of Message Book M-210. On the message blank (shown below) the word "Precedence" is being substituted for the word "classification" and the block printed "AUTHORIZED TO BE SENT IN THE CLEAR -- signature of officer" is being entirely eliminated. Since Message Book M-210 will continue to be used until present supplies are exhausted, the latter change may suggest to individual signal officers that local instructions be issued to discontinue use of that block. One of the basic reasons for making the change


THESE SPACES FOR MESSAGE CENTER ONLY

TIME FILED | MSG CEN NO. | HOW SENT

MESSAGE (SUBMIT TO MESSAGE CENTER IN DUPLICATE) PRECEDENCE

No. DATE

To

OFFICIAL DESIGNATION OF SENDER | TIME SIGNED

SIGNATURE AND GRADE OF WRITER

was due to the fact that an officer might sign that block in error, therefore the practice of having the commander or his authorized representative write "Send in clear" over his signature was readopted.

Instructions 5, 10, 11, and 12 were revised and an instruction 14 added. These changes are as follows:

"5. If a precedence other than ROUTINE is desired, print the desired precedence (URGENT, OPERATIONAL PRIORITY, PRIORITY, OR DEFERRED) in the space provided.

"10. 'Time Signed' - Must always be stated in terms of the 24-hour clock system.

"11. All messages are cryptographed for transmission by radio unless the words 'send in clear' are written on the face of the blank over the signature of the commanding officer or his authorized representative.

"12. 'Signature and Grade of Writer' - Must always be filled in.

"14. DESTROY CARBON SHEETS BY BURNING."

HINTS ON USE OF CONVERTER M-209

From time to time reports of observers from maneuvers contain interesting information which is of value to organizations in the field. A report of a recent maneuver contained the following concerning the use of the Converter M-209 which is presented for the benefit of other units which may encounter similar experiences.

"In an instance involving parachute and glider-borne operations, a code clerk had set up the pin and lug setting in the M-209 prior to taking off. However, when the converter was carried down on the parachute jump, 'the shock of landing threw the pins off. In the ensuing scramble to send messages many garbles occurred.'

"Although this situation may not be expected to occur frequently, it may suggest to many Signal Corps officers the preparation of a message center SOP to repeat the 26-letter check (par. 8d, TM 11-380 and par. 265 of FM 24-5, 1942) to insure against garbles from accidental offsets. Thus each time the converter is used in a location different from that in which it was originally set up this reassurance might be obtained.

"Security considerations may suggest that the M-209 be carried into exposed forward areas with all keying elements in neutral position rather than having a man who could become a casualty carry the device all set up according to key tables. However, when this threat to cryptographic security is analyzed, it may be observed that there is an equal risk since it would be necessary to have the cipher keys to insure proper functioning of the M-209. Provision in SOI of special cipher keys for use with an established SOP to set up and check the M-209 in advance but to recheck it prior to use would appear to be practicable. This would have the advantage of permitting immediate use of the M-209 at the new location, provided the 26-letter check proved correct. If not, corrective action could be taken before garbled encipherments result in confusion or delay."

IMPROVISED POLE LIFTER FOR WINCH TRUCK

(From: 13th Army Air Force, 29th Air Service Group, 1003rd Signal Company)

One of our radio operators, Technician 5th Grade Wilson W. Hayles of Beaumont, Texas, on his own initiative and during his spare time set himself to make life a little easier for our line crew. This organization is not equipped with a pole lifting truck although on occasion it has been found necessary to do some pole work. Using only such salvaged and scrap materials as he could find, T/5 Hayles has effectively and efficiently harnessed the winch on the front of a 2½-ton truck to do the desired job. Note the supporting jacks which prevent excessive weight being placed on the truck springs.

MILITARY TRAINING

WAR LESSONS APPLIED IN OCS

The Signal Corps Officer Candidate School has revised completely its curriculum in compliance with recent War Department directives extending the course to four months.

One of the important changes is the addition of two periods per week of Physical Conditioning. This addition includes calisthenics, marches, obstacle-course running, guerrilla exercises, combative tests, and physical-fitness tests.

Several minor subjects, formerly components of major academic subjects, have been expanded to meet the stringent requirements based on experience on the battlefield. They are: camouflage, defense against air attack, defense against mechanized attack, defense against paratroops and airborne attack, leadership, destruction of materiel, and motor transport practice.

The Academic Course, extending over a period of 78 days, is followed by a Field Training Course of 19 days' duration. During this period the theories learned in the classroom are put to practical use.

Eighteen days of the Field Training Course are devoted to command post exercises, during which the following subjects are covered:

Subject	Hours
Orientation	3
Physical Conditioning	11
Current Events	4
Critiques and Inspections	4
Individual Protection and Booby Traps	2
Camouflage	1
Field Sanitation	2
Destruction of Materiel	2
Preventive Maintenance	2
Defense Against Chemicals	1
Camps, Marches, and Bivouacs	5
Signal Security	3
Scouting and Patrolling	2
Defense Against Air Attack	2
CPX Radio Communication	25
CPX Wire Construction	25
CPX Message Center	25
CPX Telephone and Telegraph	25

MESSENGER TRAINING

Messenger trainees in the Message Center School of the Eastern Signal Corps Unit Training Center at Camp Charles Wood will soon be up against the Bushmaster Trail again, in a new location. Temporarily suspended on moving from Camp Edison to Camp Wood, the four trails to test messengers will be re-established as soon as arrangements are completed for suitable terrain.

The Bushmaster is a deadly snake that lives in the jungles of Panama and Central America. Only the expert scout can successfully complete the Bushmaster Trail, which includes hidden directions, a Japanese observation post, Japanese snipers and simulated machine gun fire.

The Bushmaster Trail was one of four compass courses included in the training area three miles from Camp Edison, near Allaire, where trainees in the Messenger Service course gained practical experience after their classroom instruction. Here the trainee suddenly realized that reading a compass in a classroom and finding directions in the woods are two very different matters.

The first day in the new area, the trainees will encounter the Pupakiki Trail. Pupakiki is Hawaiian for "hurry-fast." This trail traverses heavily wooded terrain and swamp land. The trainees are lined up at the first post and sent off individually or in pairs to follow the directions they find at each of the nine succeeding posts. Tags on trees mark the posts, and each contains directions for using the compass to find the next post. Also included on the tags are Japanese words for army units and symbols that must be copied on a message blank. At the fifth post, men must don gas masks for a simulated gas attack and proceed from there wearing masks. Non-coms posted at various points in the course constantly check the progress of the trainees.

When the embryonic messengers successfully master the Pupakiki, their next battle of wits is with the Koolau Pau, or Windward Trail. Here the procedure is much the same, except that the course is more difficult. The instructions at each "post" are blended into the bark of the tree of stump to which they are attached. Accuracy with the compass is all-essential. The directions at each post do not tell the distance to the next, but only the direction which must be figured out by converting bearings to azimuths and back azimuths. Unless the trainee is accurate, he will never find the proper tree with the blended markings. Again the Japanese words, symbols and English equivalents must be copied at each post.

By this time the messenger trainee has begun to look upon the compass as a vital thing, an instrument upon which life itself may depend. And the next course he must traverse will test him even further. It is the Hale-al-Kala, or Trail-to-the-Sun. He sets out on this without benefit of compass, and to complete it he must rely only upon his sense of direction, his pocket watch and the sun. Directions, as before, tell him at each post where to go, but the method of getting there is left to his ingenuity — and his learning.

Finally, upon successful completion of these three trails, the messenger trainee has earned the right to pit his skill against the Bushmaster Trail.

The markings here are even more carefully camouflaged. They are in the shape and color of a leaf blended into the leaves of the trees that mark the posts. Only the trained, sharp eyes of the experienced scout can keep him from getting off his course. Add to that the obstacles of the Japanese observation post, the snipers, the machine-gun fire under which he must crawl, and the encounter with a wounded companion for whom he must care, and the trainee really has a problem on his hands. The penalty for walking into any trap is starting the trail over.

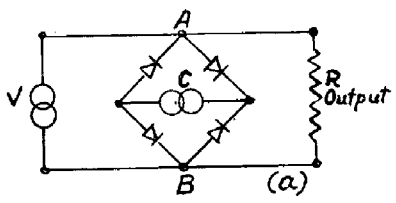
There is another item of interest that operates in conjunction with the compass trails — a perfectly concealed and camouflaged underground message center. All trainees who go to the area are told they will be taken to the message center, then they are led over it, and not one in 100 can spot it until it is pointed out. The only give-away, if known, is a tree stump through which messages are handed in and out.

Credit for the success of the original trails, which will be duplicated in the new training area, goes mainly to Lt. Arthur W. Mason, an instructor in Message Center School, who was message center chief for General Patton before receiving his commission, and to Sgt. T. H. Landwehr, an experienced woodsman and artist whose previous Army experience includes three years in Hawaii.

The area will be supervised by the Message Center School of the Specialists School Section, part of the Troop School Branch, ESCUTC, under Major William M. Brown.

CORRECTION: "FUNDAMENTALS OF CARRIER COMMUNICATIONS"

In Part II of the article of the above title, there appeared an error in the drawing, Figure 6(a), page 34 of the September SCTIL. While the error was probably obvious to many, the corrected diagram is nevertheless shown herewith.

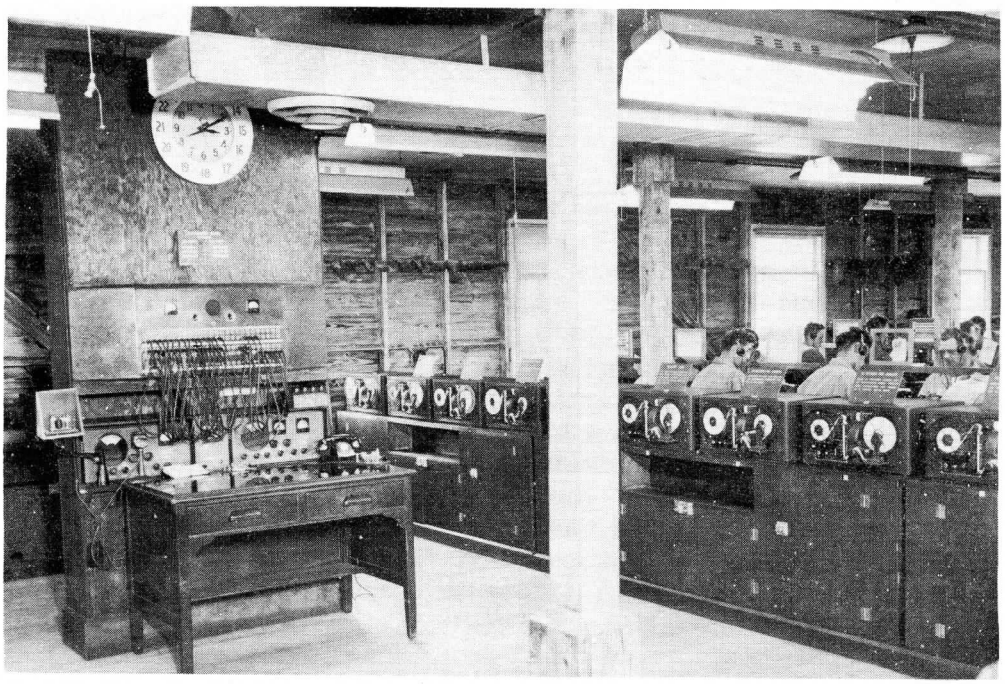


MAKING CODE PRACTICE REALISTIC

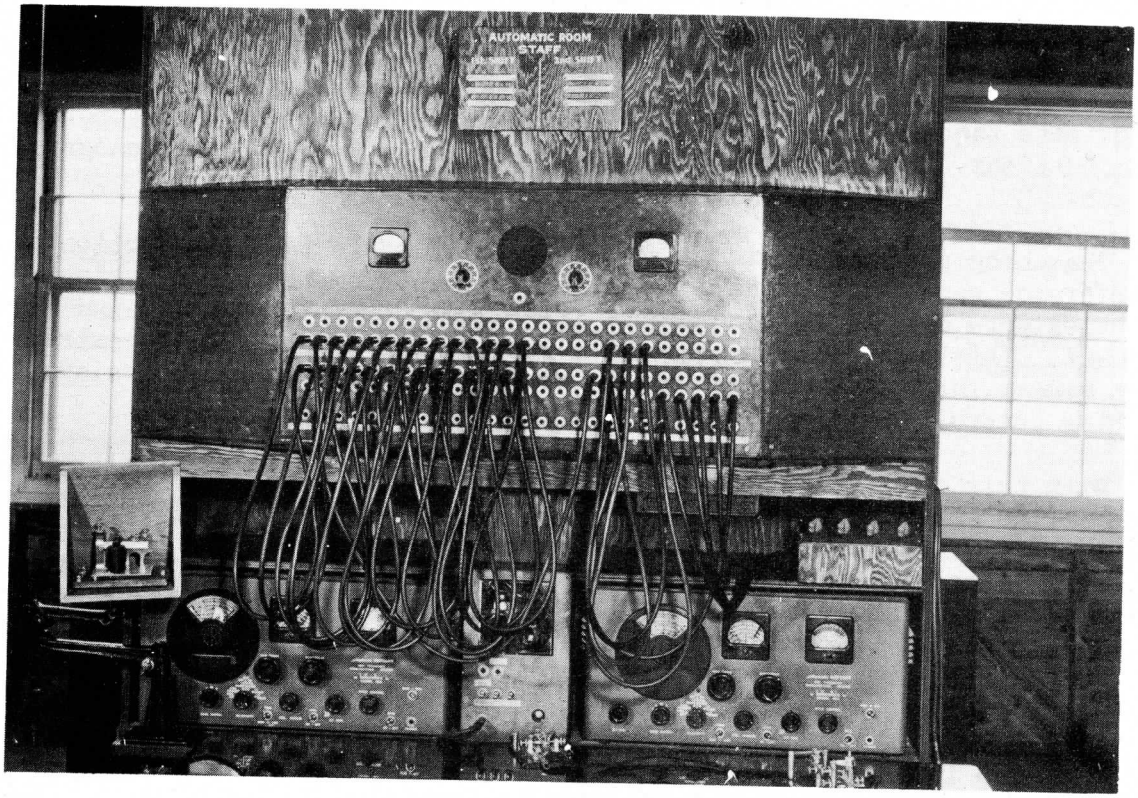
Reports from the various theaters of operations have shown that radio operators trained in U.S. Army Signal Corps schools would be better qualified when graduated if the training were received under simulated operating conditions. Men trained without artificial noises were not qualified to operate in the field at the code speed they had acquired in school under quiet and otherwise ideal conditions. It was, therefore, felt necessary to train students under conditions more nearly approximating those found in the field.

When artificial interference was imposed in training, students required a little longer to attain the necessary qualifying speed. This, however, was not a serious objection because the qualified operator could then go into the field and operate under the most adverse receiving conditions with a minimum of additional field experience.

A procedure of trial and error was necessary before a system was decided upon which provided the most effective simulation of actual field operating conditions. It was necessary, for instance, to determine how much interference of one kind and another the signal could stand before it became altogether unreadable. Since the pitch of an interfering signal in the field



A PART OF THE "AUTOMATIC ROOM" AT CSCS. THE OUTPUTS OF KEYERS AT RIGHT ARE DISTRIBUTED THROUGH THE MASTER SWITCHBOARD, CENTER.



CLOSE-UP OF MASTER SWITCHBOARD. BELOW ARE THE RADIO RECEIVERS USED TO SUPERIMPOSE STATIC AND SIGNAL INTERFERENCE ON THE CODE-PRACTICE LINE

could always be made dissimilar to that of the desired signal by regulating the tuned or b.f.o. frequencies, should the pitch of the interfering signal be different from that of the signal the student would be called upon to copy?

Through experiment and experience, it was decided that the answer to the first of these two questions was to feed the student a signal, the readability of which would be rated as "3" (readable but with considerable difficulty). At first the students were inclined to complain, but, upon realization that these represented the conditions to be faced in the theater of operations, they made the best of the interference and shortly the progress was almost equal to the pace established under former, ideal conditions.

In the case of the second question, the answer was more or less obvious. Since the pitch can always be controlled in the field by moving slightly off frequency, it was decided that the pitch of the artificial interfering signal should differ appreciably from that of the intended or main signal.

The static was, likewise, brought up to a point where the main signal would be considered of "3" readability. Both an interfering signal and noise at the above described level were introduced at the same time.

In view of these findings, an instructor in the Code and Traffic Maintenance Section in Central Signal Corps School put into operation a circuit whereby static and interfering secondary radio stations could be introduced into the practice code from an automatic Keyer TG-10-D and amplified to approximate the interference which might be encountered under poor operating conditions. These were introduced from a radio receiver, a phonograph, or both.

The changes necessary in the keyer to accommodate the introduction of interference were minor. The chassis was removed from the keyer cabinet, and two holes were drilled to accommodate the volume control and the input Jack JK-34-A. This jack was mounted on the rear of the chassis on the extreme right side. The volume control was mounted on the face of the chassis near the bias control, as shown in Figure 2.

With this control mounted in that position, two isolating resistors were wired in, as shown in Figure 1. This mixing network was introduced into the first amplifier tube in the keyer, which is a VT-96. This tube is a dual triode and acts as a phase inverter for driving the push-pull VT-115 output tubes. (Figure 1 shows the electrical change. The parts that are labeled are the ones added to the circuit.) In wiring the circuit the usual shielding in the grid circuit was used to prevent hum pick up.

By use of this type of circuit it is possible to separately control the volume of the interference and the tone signal. That is, the volume of the noise (or of the interfering signal) can be increased or decreased without changing the volume of the practice tone signal, or vice versa.

This added input circuit makes it possible to electrically superimpose any desired type of interference on the practice lines. Recordings of static and code practice lessons are employed, the latter serving as the interfering signal. Or these same types of interference are actually picked from the air by the two radio receivers shown beneath the switchboard in one of the accom-

FIG. 1

IMPOSING NOISE AND CODE SIGNALS ON CODE PRACTISE CHANNELS

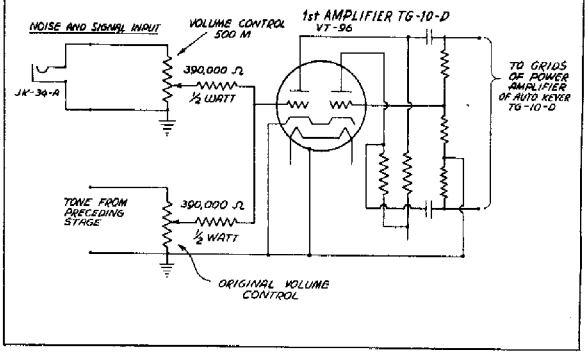


FIG. 2

LAYOUT OF TG-10-D KEYER

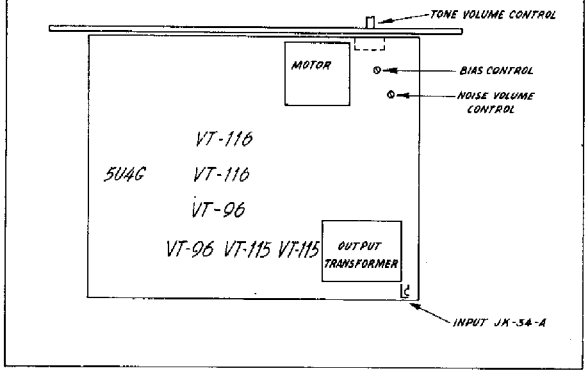
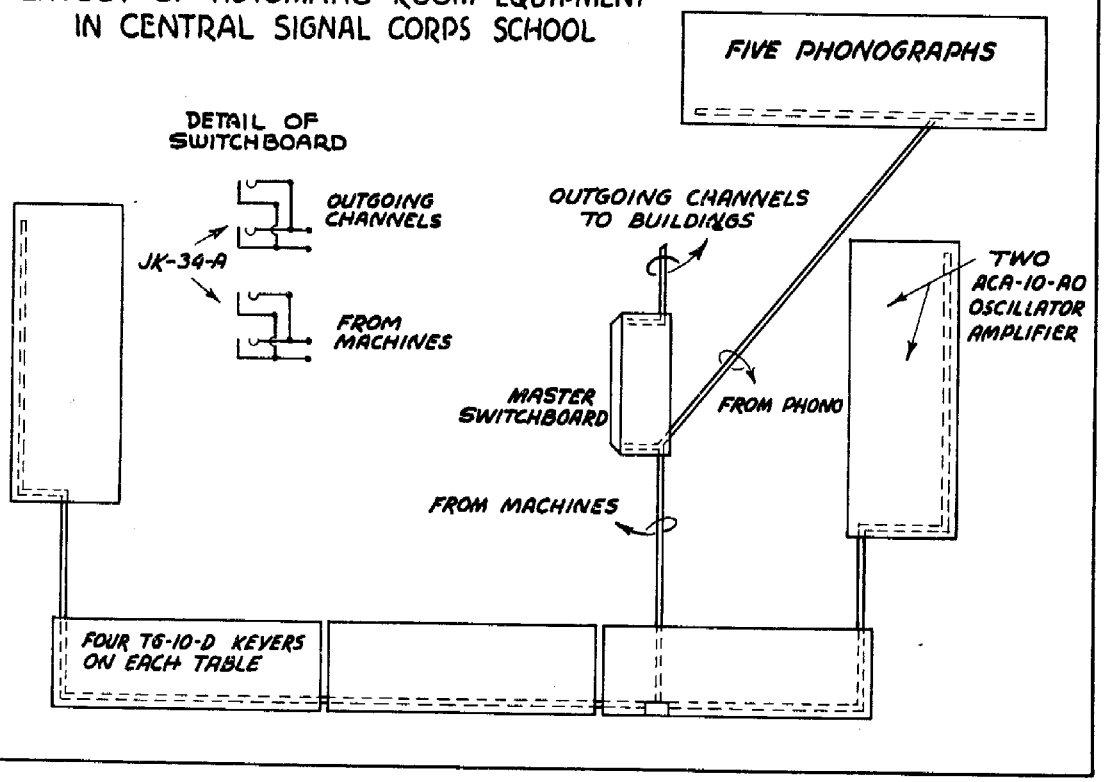


FIG. 3

LAYOUT OF AUTOMATIC ROOM EQUIPMENT IN CENTRAL SIGNAL CORPS SCHOOL



panying illustrations. It was found that interference pick-up with the radio receivers is the most effective. It is only necessary to connect the output winding of the radio receiver to the added noise inputs of any desired number of keyers, the latter being connected in parallel.

VISUAL TRAINING AIDS

"SLOW MOTION" OSCILLATOR DEMONSTRATOR

The subject of "oscillators" has always been a bugaboo for beginning students in radio. The main reason for this is undoubtedly the natural complexity of oscillator operation and particularly the difficulty of demonstrating to the student the many things which take place simultaneously in an oscillator circuit.

Here at the Southern Signal Corps School a genuine effort has been made to visually demonstrate, through the use of meters and oscilloscope patterns, the actual operation of a low frequency oscillator of the multivibrator type.

This dynamic demonstrator shown in Figure 1 is built bread-board fashion in the interest of simplicity and accessibility of the various parts. The construction of this oscillator is rather novel in several ways and deserves

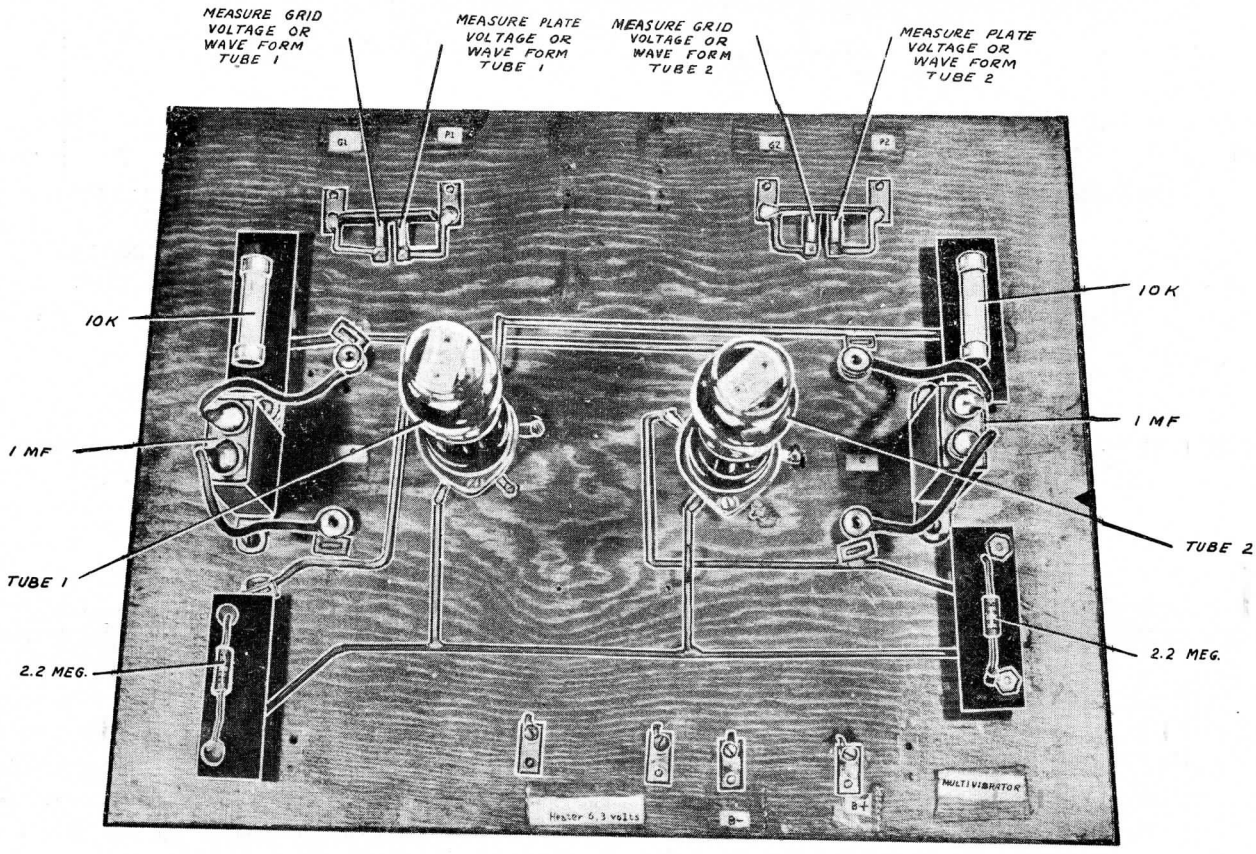


FIG. 1 - TOP VIEW OF MULTIVIBRATOR BREADBOARD SET-UP. CONDENSERS AND RESISTORS SHOWN PROVIDE A 2-SECOND TIME CONSTANT

special consideration.

First of all, the circuit contains a number of "Nu-Way" lugs which allow the various condensers and resistors to be removed and different valued circuit elements to be inserted in their place. Such a substitution method makes it possible to change the time constant of the frequency-determining elements of the oscillator easily and in this way to change its frequency of oscillations. In order to measure voltages and to observe the wave-forms appearing in the grid and plate circuits of the two tubes, pin jacks are provided at the rear of the bread board. These can be seen by again referring to Figure 1. The schematic diagram of this oscillator is illustrated in Figure 2.

The power supply (not shown in any of the illustrations) for this multivibrator is a conventional type made up of a full-wave rectifier and a con-

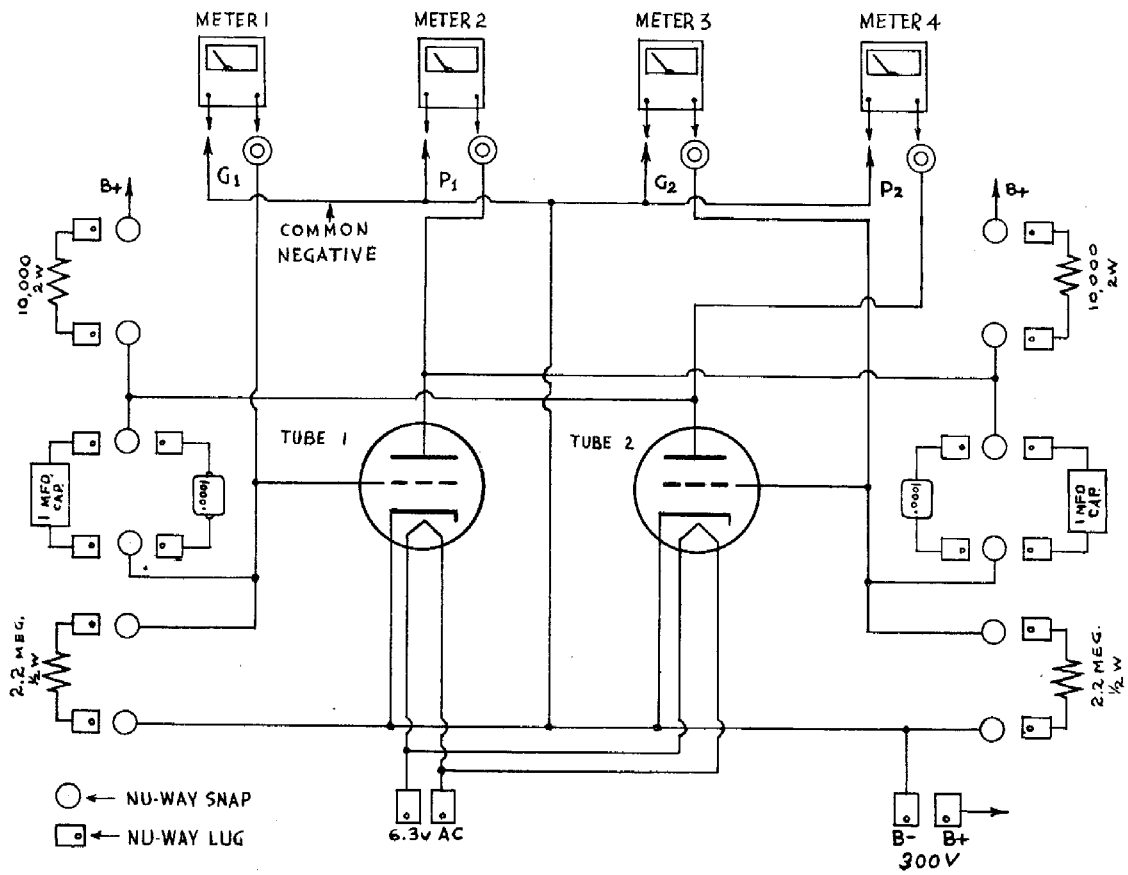
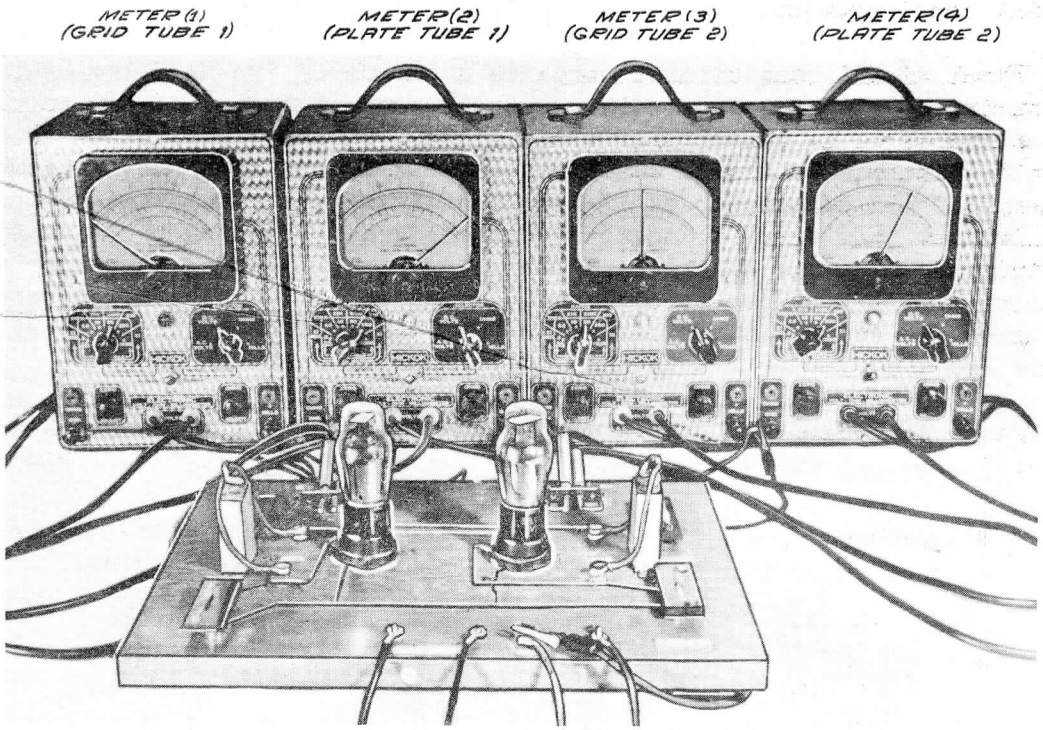
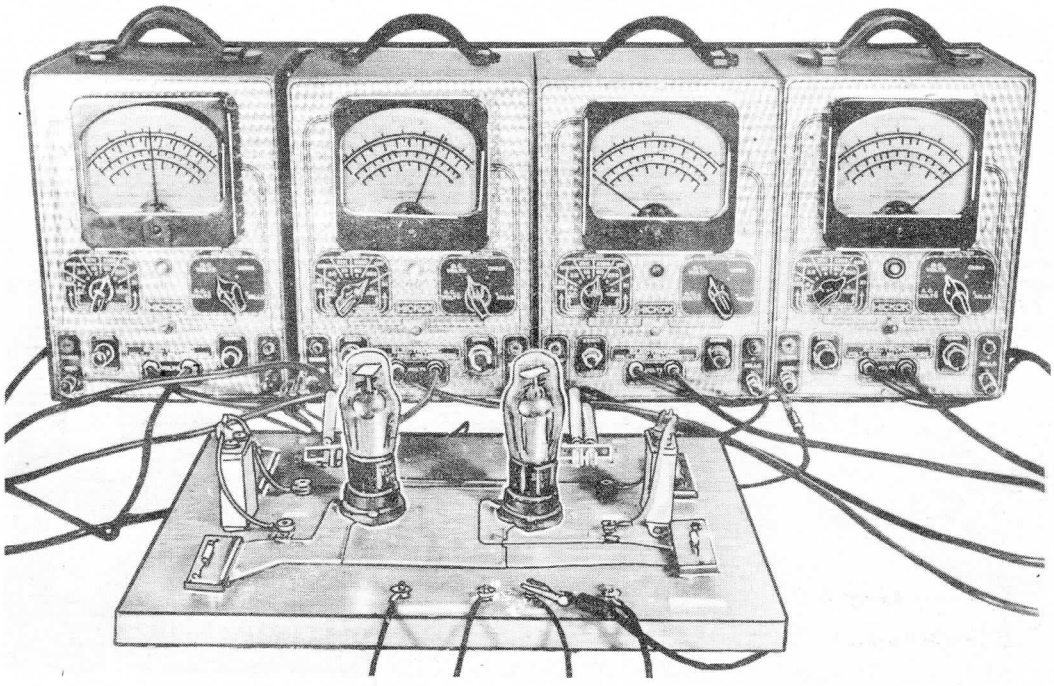


FIG. 2 - SCHEMATIC DIAGRAM OF MULTIVIBRATOR DYNAMIC DEMONSTRATOR.





FIGS. 3 (TOP) AND 4 SHOW VOLTAGES EXISTING DURING SUCCESSIVE HALF-CYCLES, DEMONSTRATING SEE-SAW ACTION IN MULTIVIBRATOR OSCILLATOR.

denser input single-section pi filter. It supplies approximately 300 volts of pure D.C. as well as the 6.3 volts A.C. for the tube heaters. The power supply leads connect to the filament and plate voltage terminals along the front edge of the bread board.

Shown in Figure 3 is the complete set-up for this dynamic demonstrator. Notice that four identical vacuum-tube voltmeters are used to show the voltage variations which take place in the individual grid and plate circuits of each tube when the oscillator is functioning. Since the oscillator action must be slowed down sufficiently to permit observation, the various resistors and condensers are so chosen that a time constant of approximately 2 seconds is obtained in the grid circuits of both tubes. The four meters indicate the following voltages (from left to right): (1) grid voltage of tube #1, (2) plate voltage of tube #1, (3) grid voltage of tube #2, and (4) plate voltage of tube #2.

The two meters used for measuring the grid voltages are adjusted so that zero is at center scale; a negative voltage is indicated to the left, and a positive voltage is indicated to the right of center. The plate voltage meters are set for zero center also but since all voltages are positive, the needle swings only to the right.

The test setup shown in Figure 3 represents a condition during the operat-

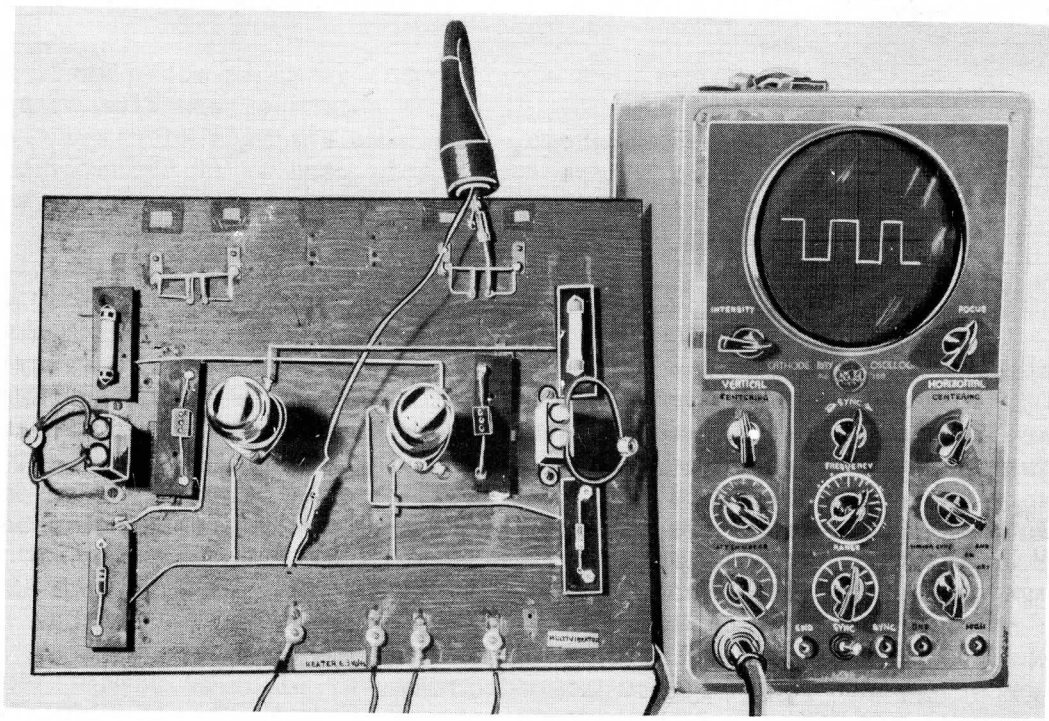


FIG. 5 - OBSERVING THE OSCILLATOR WAVE FORM WITH A STANDARD SCOPE. THE IMAGE SHOWN HERE IS THAT OBTAINED AT THE PLATE OF TUBE 2.

ing cycle in which tube #1 is at cutoff and tube #2 is conducting heavily. This condition can be understood by observing the movement of the meter pointers, and in this instance can be explained as follows. As meter (1) is connected across the grid resistor of tube #1, its reading indicates that a maximum negative grid voltage (cutoff) exists at tube #1. Meter (2) is connected between the common negative supply terminal and the plate of tube 1; consequently its reading indicates that maximum (positive) plate voltage exists at tube #1. Since the tube current is practically zero, the drop across the plate load resistor is practically zero. On the other hand, meter (3) is connected across the grid resistor of tube #2; and its reading indicates zero grid voltage. The grid-to-cathode resistance is extremely low (grid drawing current), consequently the coupling condenser between the plate of tube #1 and the grid of tube #2 is changed almost instantly to the full plate voltage of tube 1. There is then no difference of potential across the gridleak resistor of tube 2. Meter (4) is connected between the common negative supply terminal and the plate of tube #2; consequently its reading indicates that a minimum positive plate voltage exists at tube #2. Since the tube current is very high, the voltage drop across the plate load resistor is very high; hence the plate potential as measured by meter (4) is low.

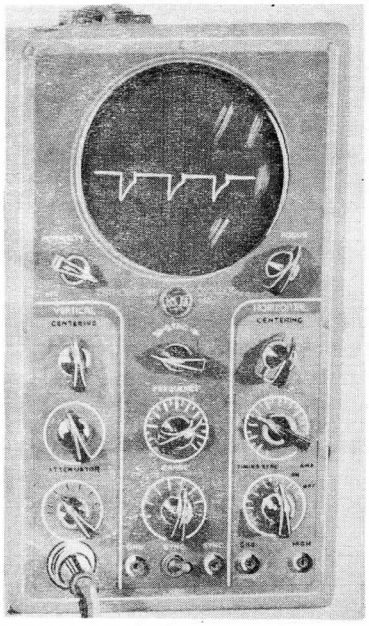


FIG. 6 - WAVE FORM AS OBSERVED AT THE GRID OF TUBE 2 OF THE MULTIVIBRATOR OSCILLATOR.

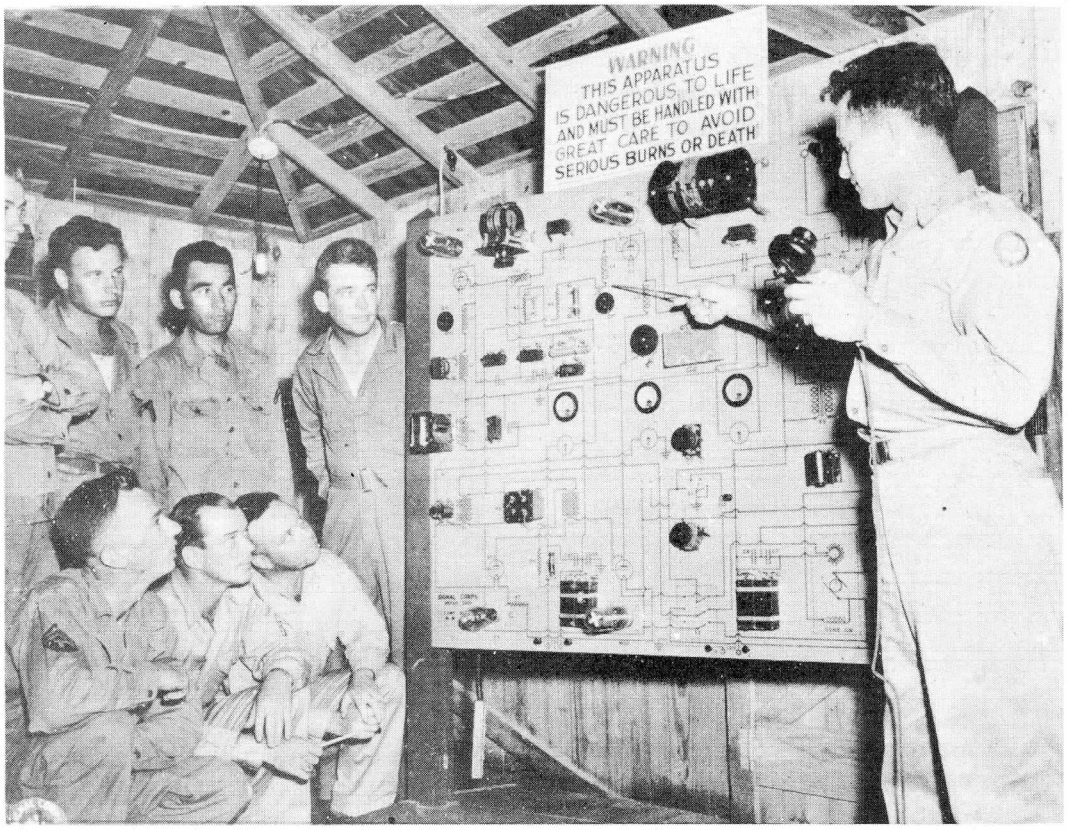
The same experimental setup is shown again in Figure 4 except that the second alternation of operation is shown. The same analysis of circuit operation holds true in this case as in the previous alternation just explained except that the operating conditions of tubes 1 and 2 are now reversed — tube #1 is conducting heavily while tube #2 is cut off.

When it is desired to show the student the various wave-forms appearing in the oscillator circuit, it becomes necessary to increase the operating frequency of the multivibrator since the sweep circuit of ordinary oscilloscopes will not function at frequencies as low as those obtained with the 2 second time constants employed in this multivibrator. The oscilloscope patterns obtainable from this oscillator are shown in Figures 5 and 6. Note that wave-forms are obtained at the same points as those used to measure the grid and plate voltages of both tubes.

DYNAMIC DEMONSTRATORS

In the instruction of officers and enlisted men for jobs as Communication Officers, Radio Operators, and Radio Repairmen, it has been found bene-

ficial to provide as many training aids as possible to promote the interest of students. In addition, students are able to use their facilities of sight and touch to learn the subject matter. In the present courses of instruction at this Antiaircraft Artillery Training Center, Camp Hulen, Texas, the amount of time students are allowed for school instruction has necessarily been reduced to a minimum. To take fullest advantage of the available time and to



teach the difficult subject of radio repair in a very few weeks, instructional methods have been revised entirely to incorporate the practical aspects of the job. Many training aids have been developed to accomplish this end. Two of the most useful of these aids will be considered here, the radio transmitter and the radio receiver.

More than a year ago it was realized that students found difficulty correlating circuit diagrams of radio equipment with the actual equipment itself. They would spend hours studying circuit diagrams, learning the function of each component part. Then they would look inside the transmitter chassis only to find a maze of coils, condensers, resistors, chokes, transformers, connecting leads, etc. They would proceed to check the set trying to relate each component part to the corresponding part in the circuit diagram, but usually would find that the actual parts of the set were not in line as shown on the circuit diagram but instead were dispersed at what seemed like random around

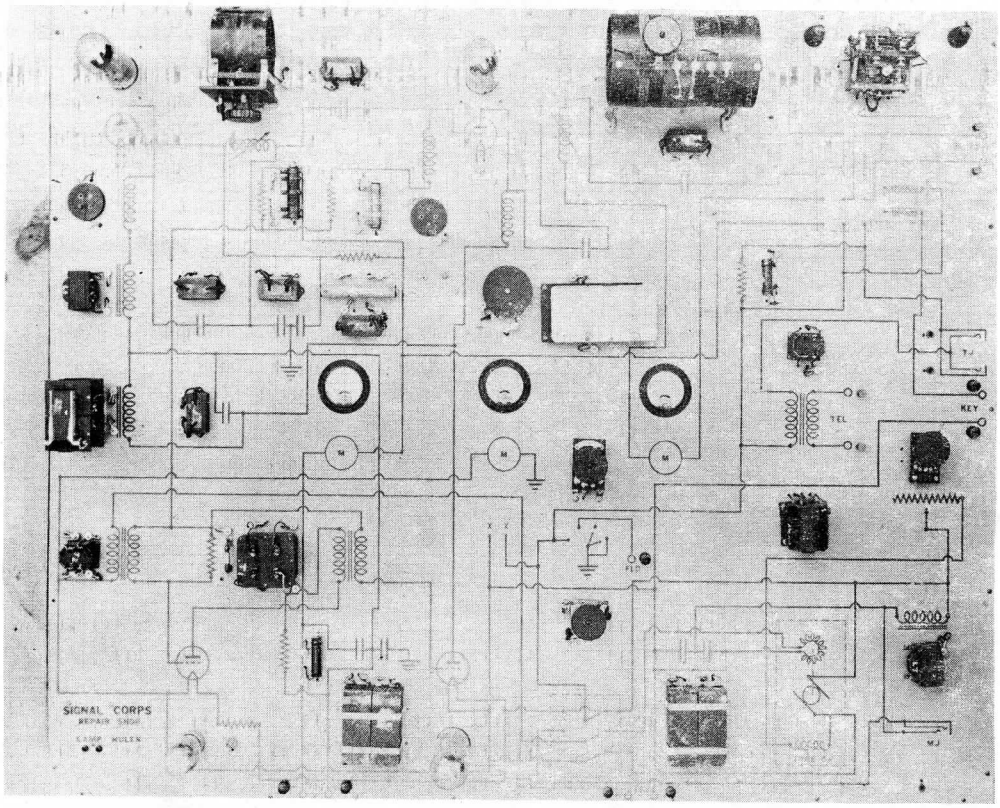


FIG. 1 - CLOSE-UP OF TRANSMITTER DEMONSTRATION BOARD.

the set. If some method could be developed to reduce the time students required to correlate circuits diagrams with the actual wired circuits, more time would be available for actual repair work. The resultant method took shape as the dynamic demonstrator, illustrated here.

Transmitter Circuit Demonstrator

This Radio Transmitter Dynamic Demonstrator was constructed on a piece of board 4' high and 5' wide. As shown in Figure 1, the component parts of an old ship transmitter were laid out on the board and the circuit diagram was drawn so that each component part was adjacent to its schematic symbol in the circuit diagram. The parts were mounted and wired together with snap connectors. This type of fastener was used to facilitate the breaking and making of connections in order to insert trouble in the transmitter for student diagnosis. For this purpose connections are broken and the student is required by resistance and voltage measurements and the use of an oscilloscope to locate the trouble.

Accompanying the demonstrator is a 750-volt direct current generator,

with necessary high and low voltage cables. The meters employed are a plate current ammeter, filament voltmeter, and thermo-coupled ammeter showing antenna R.F. current.

All of the various parts and circuits and their functions are more clearly explained with the use of this demonstrator. A test oscilloscope is employed to record wave patterns of the various stages when voice, ICW, or CW is employed. Test instruments are employed readily at all points of the set.

This dynamic transmitter demonstrator was constructed by the Camp Hulen Signal Corps Repair Shop for use in training of radio repairmen. Its utility in the training program was so great that it was decided a receiver demonstrator would be similarly useful.

Radio Receiver Circuit Demonstrator

Advanced students in the Radio Repair School of the AAATC, Camp Hulen, undertook the job of constructing a dynamic receiver demonstrator similar to

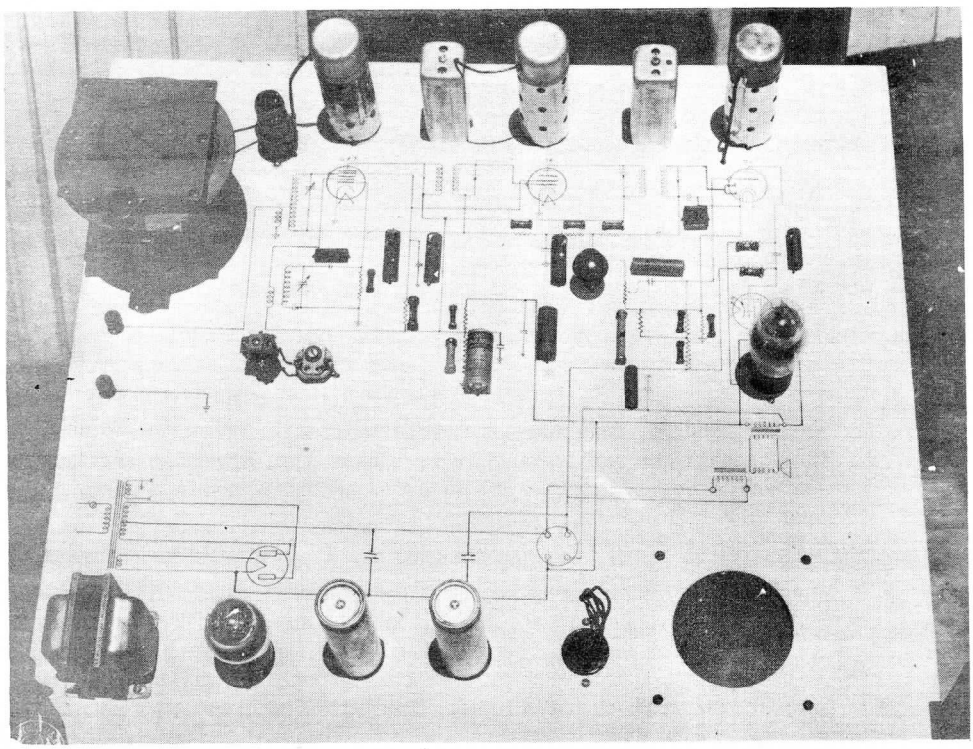


FIG. 2 - RECEIVER DEMONSTRATOR BOARD MADE BY STUDENTS.

the above described transmitter demonstrator. The receiver so constructed is a standard 5 tube superheterodyne receiver working on the broadcast band and is shown in Figure 2. The board employed is approximately 24" by 26". Parts were all scrap obtained from old worn out radios.

This receiver demonstrator clearly correlates a circuit diagram with the actual component parts of a radio receiver. It points out the radio frequency stage, 1st detector, intermediate frequency, 2nd detector, and audio frequency stages with the coils, resistors, condensers, speaker, transformer, tubes, etc., associated with each stage. Embryo trouble shooters find very little difficulty locating standard trouble put into this demonstrator. Once the student has associated the circuit diagram with the parts and circuits in a radio set, he finds less trouble in tracing down circuits in other transmitters or receivers. This demonstrator can be utilized in the explanation of terms sometimes hazy to the prospective radio repairman such as resonance, gain of stage, and many other common terms.

It is felt that by introducing such demonstrators as these two, the practical side of instruction in radio repair is being importantly emphasized.

NEWS BROADCASTS AT PHILA. DEPOT

When American troops in Tunisia tasted the first fruits of victory in the North African campaign, it was with a sense of chagrin that the employees at the Philadelphia Signal Depot received the news at the end of their workday from the customary newspaper and radio sources. It was felt that as war workers with the Army they had a greater stake than the average man in the war news, good or bad, and accordingly were anxious to be among the first to hear this news. The War Production Drive Publicity Sub-Committee endeavored to fill this need through the medium of the public address system at their disposal.

Patient experimentation disclosed the desirability of using a brief news summary for this purpose from a reliable source and coupling this summary with news of local interest, such as sports, bond drive news, blood donor petitions, swing shift amusement announcements and similar items.

The time selected as most appropriate for the announcement was the luncheon period, thus avoiding the criticism of interrupting the employees' work, and the news broadcast was restricted to the cafeteria loudspeaker system. Because the luncheon period is but a half hour, it was decided that every effort should be made to keep the announcements to a minimum to eliminate a sense of haranguing the workers. To lend an air of professionalism to the announcements, appropriate introductory bars of music were dubbed in from recordings, such as the "Stars and Stripes Forever," and closing music was dubbed from the recording "Song of Production." An introductory and closing phrase was developed for use by the announcer to impress upon the listeners their affiliation with the war effort.

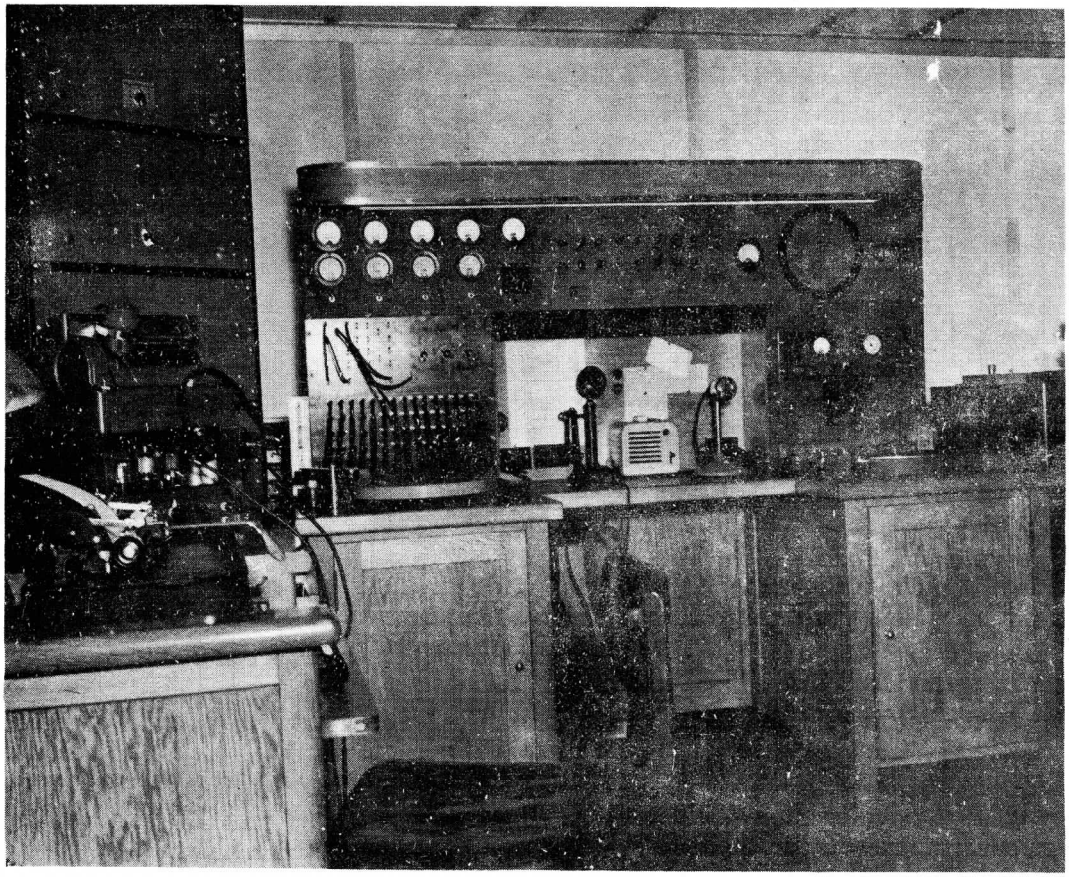
Because of the many thousands of workers at the Philadelphia Signal Depot, five different luncheon shifts are scheduled. To relieve the announcer from the necessity of making five identical broadcasts, a recording of the news is made at 11 a.m. each day with the dubbed musical introduction and close being re-dubbed daily. The same news recording is ordinarily used for the five supper shifts since experience disclosed that little change occurred in the news during the afternoon. However, a check is made of this fact about 3:00 p.m. daily, and should the news vary sufficiently, a modified recording is made.

The assistance of the local representatives of a national broadcasting chain was secured for the provision of the news by telephone each morning and afternoon, directly from their press wires. This service is entirely voluntary, and no advertising media of any nature whatsoever is involved.

The Control Room is equipped with a telephone line from which the news as given by the broadcasting company representative is recorded on a dictaphone installed in the Control Room. This recording is subsequently typed and edited, and remains to corroborate the news as finally broadcast. The

edited news is then recorded, local news of the depot added, and the musical passages dubbed in.

The Public Address equipment is installed in a sound-proof room approximately 16 feet square. Four final amplifiers contained in a rack and panel mounting have an average output of 150-watts (peak output 170-watts) or a



PUBLIC ADDRESS CONTROL ROOM THROUGH WHICH NEWS BROADCASTS TO EMPLOYEES ARE HANDLED AT THE PHILADELPHIA SIGNAL DEPOT.

total of 600 watts. This drives the ninety-five speakers located throughout the Depot. A separate amplifier of 60-watts output supplies seven speakers in the main cafeteria and two in the Officers' Mess.

The main control console contains four pre-amplifiers, two turn-tables and one cutting head, a speaker terminal board, five decibel meters, four milliameters, radio and monitor speakers. Two turntables equipped with cutters and pick-ups as well as amplifiers are part of the Control Room equipment. These can be operated separately or in conjunction with the main sys-

tem. Pre-amplifier channels #2 and #4 are so set up that either turn-table can be connected to either pre-amplifier by means of a switch. The radio output can also be switched to either pre-amplifier #2 or #4 so that it is possible to transmit any special radio programs over the entire system. Should the occasion arise, it is possible to supply four different programs at the same time to different parts of the Depot.

A musical program of selections appropriate for the relaxation desirable at this time is furnished to the cafeteria system between news announcements from a library of 350 records.

Reception of the news on the part of the personnel has been generally gratifying. Enthusiastically received on its first presentation, it is now for the most part taken for granted, but its reception is looked forward to, and the news subjects become lively topics of discussion.

When news of extraordinary interest develops on any front, the organization and facilities of this "broadcast" system are at the disposal of the Commanding General for his decision concerning its broadcast. Assurance has been given by the broadcasting company which provides the news that these developments of unusual interest will be telephoned at once to the Depot.

Henceforth, as each victory is achieved by the fighting forces in the field, the workers behind the lines at the Philadelphia Signal Depot will know of it promptly and will have an opportunity to join in joyful acclamation.

O.C. SIG. O. LIBRARY

Following are a few of the books added to the collection in the Signal Corps Reference Library, 5B135, The Pentagon, during the last month:

Cables and Wires by "Proton" (pseud.) Chemical Pub. Co., 1941. 184 p. TK3351.P73.

Electrical Engineering by E.E. Kimberly. International Textbook, 1939. 342p. TK145.K5.

Electrical and Radio Dictionary by C.H. Dunlap and E.R. Hahn. Rev. and enl. ed. American Tech. Soc., 1943. 110p. TK9.D78.

Magnetic Circuits and Transformers - Massachusetts Institute of Technology. Wiley, 1943. 718p. TK2551.M37.

Elementary Electricity by E.P. Slack. Prepared at the request of the War Department and the U.S. Office of Education in conformance with official pre-induction training course Outline No. PIT 101. Rev. ed. McGraw, 1943. 305p. TK146.S6.

Principles of Magnaflux Inspection by F.B. Doane. 2d ed. Photopress, 1942. 288p. TA460.D5.

Radio Interference Suppression by G.W. Ingram. London, Electrical Review, 1939. 154p. TK6553.I55.

Television Receiving Equipment by W.T. Cocking. London, Wireless World, 1940. 298p. TK6630.C58.

Thermionic Valve Circuits by Emrys Williams. London, Pitman, 1942. 174p. QC544.V3W5.

Traffic Handbook for Radio Operators by J.E. Kitchin. Ottawa, Ont., Compass Book Co., 1943. 163p. TK6554.K5.

Applied Mathematics for Technical Students by M.S. Corrington. Harper, 1943. 226p. QA39.C8.

Vector and Tensor Analysis by H.V. Craig. McGraw, 1943. 434p. QA261.C77.

Technical Drafting; A Text and Reference Book on Graphics by C.H. Schumann. Harper, 1940. 793p. T353.S35.

Kodachrome and How to Use It by Levon West. Simon, 1940. 143p. TR510.W46.

Lighting for Photography by Walter Nurnberg. 2d ed. London, Focal Press, 1942. 172p. TR590.N8.

Mortensen on the Negative by William Mortensen. Simon, 1941. 283p. TR290.M6.

The Audio-Visual Handbook by E.C. Dent. Society for Visual Education, 1942. 227p. LB1044.D43.

Clouds, Air and Wind by Eric Sloane. Devin-Adair, 1941. 74p. QC863.S6.

REQUIREMENTS PLANNING

TABLES PLANNING

NEW POLICY IN REVISING T/E's

A new policy has been established by the Chief Signal Officer in the review of signal sections of tables of equipment.

As new tables of equipment are made or as revisions in published tables of equipment are requested, the increases of each item over the amount covered in current Army Supply Program is compiled. When the accumulated increase on any item reaches 10 percent or more, the Commanding General, Army Service Forces, is notified and action is initiated to revise the Army Supply Program accordingly.

If the item is considered as critical from a procurement standpoint and requested increases reach 10 percent or more, the proponent of the table of equipment is advised of this fact. The proponent of the table of equipment is also informed of the time which must elapse before issue of the additional equipment for this requirement can be made without diverting it from units for whom the equipment was originally procured.

Due to the fact that frequent changes in tables materially affect the procurement program and that production does not immediately reflect the needs not foreseen when the program was set up, this procedure of altering the procurement program has been adopted.

NEW T/O AND E — INCLUDES FUNCTIONAL TEAMS AND TEAM EQUIPMENT

Tables of Organization and Equipment 11-500, Signal Service Organizations, has been approved and was published 1 July 1943. This table includes teams designed for specific functions together with standard equipment for teams. A combination of teams can be made to form signal service organizations of any desired type. The teams are designed for use in zone of communications, but may be used to compose tactical units when required.

It is the policy of the Chief Signal Officer to form future signal service organizations in accordance with this table. Where possible, the table will be amended as required to include such teams as the necessity arises. Reorganization of existing signal service organizations in accordance with this table is contemplated as soon as practicable.

It is recommended that signal officers and staff officers study Table of Organization and Equipment 11-500 and make recommendations supported by facts, for revision or addition to Table of Organization and Equipment 11-500. Address the Chief Signal Officer, attention: Plans and Operations Division.

SPECIAL EQUIPMENT PLANNING

CODE PRACTICE EQUIPMENTS

The following extract is quoted from War Department Memorandum No. W700-28-43, dated 14 June 1943, "Allowances for Training Purposes."

"4. The allowances of code practice equipment shown in T/A 20 are not complete and basis of issue is not correct. All remarks as to basis of issue should read per signal company. (See Cir. 118, WD, 1943) Pending revision of T/A 20, code practice equipment is authorized and will be issued to post, camp, or station property officers upon requisition on the basis of appropriate T/BA.

"5. Post, camp or station commanders will requisition training equipment including controlled items required by units at the station. Requisitions for controlled items will indicate the specific organizations which are to use the equipment. Requisitions will be filled in priority A-5b-0.1 in order of activation, unless the units which will use the equipment are in higher priority, in which case the equipment will be issued in the higher priority. Excess equipment will be reported promptly in order that redistribution may be effected. In the case of items which are issued as bulk credits to the Army Air Forces, reports of shortages or excesses will be made to the headquarters of the air force or command having jurisdiction over the station."

Change No. 1 to T/A 20, dated 26 June 1943, covers the revision in the above quoted paragraph 4.

The supply of Code Practice Equipment has become less critical. It is suggested that Post, Camp, or Station Commanders requisition their unfilled demands or report their excess equipment as instructed above.

PERSONNEL PLANNING

The Eastern Signal Corps Unit Training Center was established and organized 10 August 1943 at Fort Monmouth, N. J., with an authorized capacity

of 2780 men. Its mission, under control of the Commanding General, Eastern Signal Corps Training Center, is to coordinate and supervise the training of such units as may be designated by the Chief Signal Officer.

The 167th Signal Photographic Company, affiliated with the Research Council of the Academy of Motion Picture Arts and Sciences, was ordered into active military service of the United States on 15 August 1943 by the Commanding General, Ninth Service Command. The unit was transferred without personnel and equipment to Camp Crowder, Mo., where it was organized by the Commanding General, Second Army, with an authorized strength of 17 officers, one warrant officer, and 170 enlisted men.

The 999th Signal Service Company was constituted on 16 August 1943 and was activated at Camp Crowder, Mo., with an authorized strength of 20 officers and 265 enlisted men.

The 766th Signal Aircraft Warning Company was reorganized with an authorized strength of 12 officers, four warrant officers and 236 enlisted men, including two officers and 19 enlisted men attached medical.

The 608th Signal Aircraft Warning Company, Regional, on 10 September 1943 was augmented by two officers, one warrant officer and 50 enlisted men, and was reorganized with an authorized strength of 49 officers, nine warrant officers and 518 enlisted men, including 12 enlisted men attached medical.

The 704th, 759th and 763rd Signal Aircraft Warning Companies were reorganized in accordance with T/O and E 11-400, each to have an authorized strength of 12 officers, two warrant officers and 196 enlisted men. The complement of each includes four enlisted men, attached medical, and an AAF Fighter Control detachment of three officers and 17 enlisted men.

PERMANENT CHANGES OF STATION

Organization	From	To
187th Signal Repair Co.	A.P.Hill Reservation, Va.	Desert Training Center
188th Signal Repair Co.	Camp Ellis, Ill.	Lexington,Ky.,Signal Depot
26th Signal Company	Camp Gordon, Ga.	Camp Campbell, Ky.
4th Armored Signal Bn.	Desert Training Center	Camp Polk, La.
3rd Armored Signal Bn.	Camp Polk, La.	Desert Training Center
83rd Signal Company	Camp Atterbury, Ind.	Camp Breckinridge, Ky.
150th Armored Signal Co.	Fort Benning, Ga.	Camp Gordon, Ga.
563rd Signal Company	Camp Blanding, Fla.	Camp Van Dorn, Miss.
31st Signal Company	Louisiana Manuever Area	Camp Pickett, Va.
304th Signal Operation Bn.	Camp Swift, Texas	Ft. Sam Houston, Texas
4th Signal Company	Fort Dix, N. J.	Camp Gordon Johnston, Fla.
80th Signal Company	Tennessee Manuever Area	Camp Phillips, Kansas

ACTIVATIONS

Organization	Place	Date
1367th Signal Company, Wing	Pinedale, Calif.	1 October
1368th Signal Company, Wing	Pinedale, Calif.	1 October
1369th Signal Company, Wing	Pinedale, Calif.	1 October
1370th Signal Company, Wing	Pinedale, Calif.	1 October
221st Signal Depot Company	Ft. Monmouth, N. J.	14 August
222nd Signal Depot Company	Ft. Monmouth, N. J.	14 August
22nd Signal VHF Installation and Maintenance Team	Ft. Monmouth, N. J.	

TEMPORARY CHANGES OF STATION

Organization	From	To
94th Signal Company	Camp Phillips, Kan.	Tennessee Maneuver Area
152nd Armored Signal Company	Camp Campbell, Ky.	Tennessee Maneuver Area
98th Signal Company	Camp Breckinridge, Ky.	Tennessee Maneuver Area
84th Signal Company	Camp Howze, Texas	Camp Polk, La.
99th Signal Company	Camp Van Dorn, Miss.	Camp Polk, La.
102nd Signal Company	Camp Maxey, Texas	Camp Polk, La.

REASSIGNMENTS

The 1088th Signal Company, Service Group, on 20 August 1943 was relieved from control of the Army Ground Forces and reassigned to the Army Air Forces, remaining at the present station in the Desert Training Center.

The 933rd Signal Battalion (Air Support Command) was relieved from its former assignment and reassigned to the II Air Support Command without change of station.

The 929th Signal Battalion, Separate, Air Support Command, was relieved from the control of the Army Ground Forces and reassigned without change of station (Desert Training Center) to the Western Defense Command, for further assignment to the Fourth Air Force.

REDESIGNATIONS

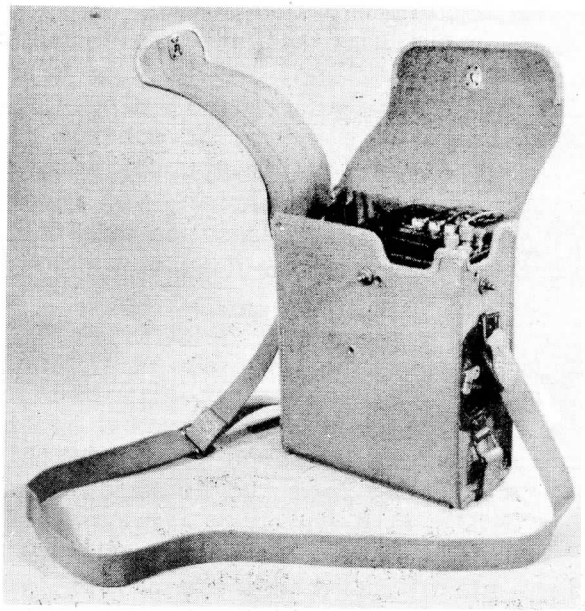
The following units are redesignated as indicated, without change of strength, station or assignment:

Present Designation	New Designation
Hq & Hq Sq, I Air Support Command	Hq & Hq Sq, I Tactical Air Division
Hq & Hq Sq, II Air Support Command	Hq & Hq Sq, II Tactical Air Division
Hq & Hq Sq, IV Air Support Command	Hq & Hq Sq, III Tactical Division

PROCUREMENT

COTTON SUBSTITUTE CONSERVES LEATHER

Of all items of Signal Corps procurement, perhaps none is better known or of greater importance to military communication than is the Telephone EE-8-A and its case. Carried across the shoulders of the soldiers of the combat services it goes into the very heat of battle with the men themselves. Like the soldier, the case must be sturdy, resiliant, tough — able to withstand equally both arctic cold and torrid heat. These cases, originally made of



oak with a metal flanged metal bottom, were quickly supplanted by the well known leather case.

Several months ago came the order to "conserve leather." Studies were made of all possible substitutes. Through the collaboration of Engineering and Technical Service, the Fort Monmouth Laboratory and the Conservation Unit of Resources Section, Production Branch, an impregnated cotton fabric case was brought out. Twenty-one thousand three hundred heavy cattle hides which would have been necessary to fulfill current Signal Corps requirements for field telephone cases are now going into sole leather for the armed forces. Moreover, the new telephone case is lighter, more water-proof, more fungi-proof.

This is only one item of procurement where conservation of critical leather has been effected by substituting less critical material in communication equipment.

MILITARY PERSONNEL

SIGNAL SECTION, ENLISTED RESERVE CORPS

Those who remember the period shortly after 7 December 1941, during which the Signal Corps was bending every effort to secure technically qualified men to meet the needs of the rapidly expanding army, have recently been asking, "What became of the Enlisted Reserve Corps?" To answer this question means delving into the history of one of the Signal Corps' most ambitious and successful procurement and training programs.

The Enlisted Reserve Program was inaugurated as of 15 March 1942. Men between the ages of eighteen to thirty-eight were encouraged to enroll in the Enlisted Reservists, Signal Section, in order to attend vocational schools preparing them for military service as communication specialists with the Signal Corps. Civilian schools were set up to conduct classes for these enlisted reservists and gave instructions in courses such as radio repairman, radio operator, draftsman, telephone repairman, and radar technician. At the completion of their training, the reservists were called to active duty and were to be assigned to communications duty for which their training fitted them.

As of 15 December 1942, the Enlisted Reserve Program was discontinued, a total of approximately fifty thousand men having been enrolled and trained between 15 March 1942 and 15 December 1942. Around ten thousand of these men had been called to active duty by March 1943. Of this number approximately two thousand were graduated from the Southern Signal Corps School and assigned to Signal Corps units with the Army Air Forces. From March 1943 to July 1943 about eighteen thousand were ordered to Signal Corps replacement training centers; sixteen hundred of these are currently enrolled in the Southern Signal Corps School to be made available to the Commanding General, Army Air Forces, for assignment. From July 1943 to 30 September 1943, ten thousand enlisted reservists have been scheduled for assignment to Signal Corps replacement training centers, twelve hundred now being located at the Central Replacement Training Center, upon completion of their basic training to be sent to the Southern Signal Corps School for ultimate assignment by the Commanding General, Army Air Forces.

Twenty-two hundred enlisted reservists who were trained at the Philco Radio School, Philadelphia, Pennsylvania, have been assigned to Signal Corps units with the Air Service Command, Army Air Forces, five thousand more having been assigned to Army Air Forces Basic Training Center at Miami Beach, Florida, with the understanding that pre-radar and radar students will be sent by the Army Air Forces to the Southern Signal Corps School for radar training upon completion of basic training.

Thus a total of approximately twelve thousand of these carefully se-

lected and trained men who volunteered for communications work as their chosen field of endeavor, have been supplied to the Army Air Forces for signal duties, thirty-two hundred have been assigned to Signal Corps units in the Army Ground Forces, thirty-two thousand eight hundred going to replacement training centers from which they were assigned according to the needs of the army for signal personnel, and two thousand were transferred to other branches of the service or discharged.

As can be seen by the foregoing, a sizeable number of specialists were procured and made available to the U. S. Army in a comparatively short time, and at a time when the armed forces and our allies needed them. These men either have, or are about to have, the opportunity they studied and worked for, the chance to do their part in getting the message through. That's what's become of the Signal Section, Enlisted Reserve Corps.

CAPACITY OF OFFICER CANDIDATE SCHOOL

On 21 August 1943 a formal directive was received from The Adjutant General establishing the capacity of the Officer Candidate School, Fort Monmouth, New Jersey, at one hundred fifty candidates each seventeen weeks beginning 1 October 1943. This capacity is sufficient for the training of approximately seventy-five Electronics Training Group and R.C.T.C. students every two months and about ten or twelve overseas candidates per class. This limitation on overseas candidates will result in relatively few approved overseas applicants being accepted for Officer Candidate School and practically precludes the possibility of accepting enlisted men from continental units for OCS training. War Department Memorandum W625-7-43, dated 1 September 1943, subject: "Acceptance and Selection of Applicants for Officer Candidate Schools," should be studied by all Signal Corps officers in order that they may be in a position to explain the reasons for curtailment of opportunities for OCS training, and thus minimize the number of complaints which naturally will arise from such a condition.

PERSONNEL AUTHORIZATIONS FOR INSTALLATIONS UNDER THE CSigO

The recently established Strength Authorization Subsection of Military Personnel Branch, OCSigO, is now handling the AP-1 Reports, or Personnel Authorization Report Forms, for installations under the jurisdiction of the Chief Signal Officer. The procedure to be followed in allocating such allotments has changed considerably, due to the transition from the former allotment procedure to the present method of distributing bulk allotments to service commanders and chiefs of services. Personnel authorizations are now granted to the Chief Signal Officer for Signal Corps organizations in Washington, for the field in the Military District of Washington, for the continental field outside of the Military District of Washington, and for overseas installations under the Chief Signal Officer. Within his total allot-

ment the Chief Signal Officer must perform the functions for which he is responsible.

Bulk allotments to chiefs of services must be changed as major functions are added to or subtracted from the services. The Chief Signal Officer has been directed by Army Service Forces to report available to ASF any positions which become surplus because an installation is deactivated. The Strength Authorization Subsection, upon receipt of communications from the services and information compiled from AP-1 Forms, prepares studies for the Chief, Personnel and Training Service, to forward to the Chief Signal Officer for approval, recommending changes in bulk allotments to the services. To meet changing operating requirements, each chief of service is allowed to have the personnel authorizations changed for installations under his control, providing the bulk allotment to the service is not increased. Requests for such revisions may be submitted to Military Personnel Branch, whereupon AP-1 Forms will be revised. However, such revisions should not be made more often than at monthly intervals.

In the event new functions, such as the activation of a new depot, impose personnel requirements on the Chief Signal Officer which he cannot meet by shifts within existing allotments, a request must be submitted through the Chief, Personnel and Training Service to Military Personnel Branch. This type of request should contain an analysis of the functions of the new activity and its anticipated work loads. Increases and decreases in personnel authorizations must be made as functions change within the agencies under the Chief Signal Officer. This means that, each time an installation needs additional personnel in order to secure the authorizations, the Chief Signal Officer must take away corresponding personnel authorizations from other agencies which have reported decreases. The chief of each service is authorized to make reductions within the field agencies under his control by notifying the Military Personnel Branch. Any increases over and above this must be routed through the Personnel and Training Service for study.

Military Personnel Branch has to maintain a check on the strength of services in order to be able to make reductions when necessary, readjust personnel authorizations to make increases, make monthly reports to the chiefs of services covering the authorized and actual assigned strength of each installation under their control, and make certain that the Chief Signal Officer is within his authorized strength in civilians, and authorized strength and grades in officer, enlisted and WAC personnel.

Reduction of Personnel

The AP-1 Forms of 31 August 1943 were first reports received under the ordered reduction in the field of installations under the Chief Signal Officer of 11,000 civilian and military positions. The Chief Signal Officer met this ordered reduction although it meant the transfer, loss and discharge of a considerable number of people. An ordered reduction of one hundred sixteen officers within the Office of the Chief Signal Officer will be accomplished by 30 September 1943.

WACS AT THE QUEBEC CONFERENCE

The Signal Corps was well represented at the Quebec Conference by twenty-nine WACs carefully selected from among the best telephone operators available in the Women's Army Corps. Nine were chosen from Fort Oglethorpe, six from Fort Devens, five from Fort Monmouth, five from the Signal Center in Washington, and four officers were from Fort Des Moines. When the group arrived in Quebec, they were surprised and impressed by the fact that they had been given the opportunity of serving the joint Chiefs of Staff at this historic conference. Upon arrival at their station, it was found that the telephone job was not as heavy as expected but there was a dearth of secretaries and stenographers. It developed that a number of the WACs on this mission were experienced secretaries, whereupon they were immediately assigned where they were needed and proved to be as competent as secretaries as they had been as telephone operators. The entire conference was held at the Hotel Frontenac, the business at hand being carried on with very close contact between the participants. As the communication system functioned perfectly, no hitches occuring during the entire period, this arrangement worked to the advantage of all concerned, and many favorable comments were received regarding the versatility and efficiency of the WAC contingent.

All of the girls were treated royally by the Canadian government. A special cruise on the St. Lawrence River was arranged for the Chiefs of Staff as an extra bit of hospitality by the Canadians, to which six of the WACs were invited. At the hotel, WACs were assigned adjoining rooms with complete room service. During their off-duty hours the WACs spent their time sightseeing and visiting the officials and nobility present at the conference. They met Mary Churchill and received autographs from such notables as General Marshall, Lord Louis Mountbatten and Anthony Eden. The Canadian "Mounties," the RAF fliers, the Canadian Women's Auxiliary Corps and the Signal Corps WACs enjoyed touring the ancient city of Quebec.

The fact that at any moment the girls might (and did) meet President Roosevelt, Winston Churchill, or any of the other distinguished members of the conference made the entire occasion an exciting one, aside from the fact that in their capacity as switchboard operators, security mail clerks, and secretaries they were performing extremely important duties, and were in touch with events and decisions of world-wide importance.

It was not all glamour and excitement, however. The girls worked three shifts, and during the first few days some of them remained on duty for eighteen hours at a stretch. When the girls returned to the United States, at the end of their tour of special duty, five were returned to the WAC Detachment at Fort Monmouth, five went back to the Signal Center and the rest were sent to Fort Oglethorpe, with the firm purpose of trying to be transferred to the Signal Corps. Needless to say, all of the girls who worked at the conference are convinced that the Signal Corps is tops, and they are extremely grateful for what they termed, "the thrill of a lifetime."