No. 24

RESTRICTED

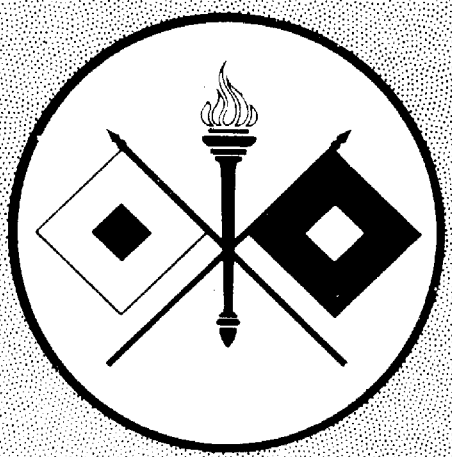
SIGNAL CORPS

TECHNICAL

INFORMATION LETTER

NOVEMBER 1943

ARMY SERVICE FORCES · OFFICE OF THE CHIEF SIGNAL OFFICER



"In the hands of junior officers lies the fate of an Army. You are in direct, immediate command of the troops. You are their inspiration and leaders. All of you are fighting for the right to live as you please as long as you don't get unjustly in other people's hair. You are fighting against dictation and dictators. Only discipline will win a war. Victories come from discipline. And discipline comes from the everlasting efforts of the junior officers."

—— Gen. Dwight D. Eisenhower

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ARMY SERVICE FORCES

OFFICE OF THE CHIEF SIGNAL OFFICER

OFFICE SERVICE DIVISION · SPECIAL ACTIVITIES BRANCH

SCTIL

PURPOSE The Signal Corps Technical Information Letter is a monthly publication designed to keep personnel informed on Signal Corps matters. It provides means for the general dissemination of information of widely varied nature to Signal Corps officers as a whole and for the interchange of information among the different Signal Corps organizations and installations.

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 Signal Corps organizations, Signal sections of organizations and headquarters not Signal, and Signal headquarters and installations here and overseas. It is also available for distribution to communications officers of other arms and to others who, though not Signal Corps officers, nevertheless have direct technical interest in Signal Corps equipment or for other reasons are aided by this publication in performing the functions of their assignments.

Distribution is to organizational units rather than individuals and it is expected that a single copy will serve each smaller unit, while in larger units copies will in general be required on the basis of one to each five interested officers (or other key personnel).

Any organization, installation or other unit mentioned above which does not now receive the SCTIL, or receives too few or too many copies, can rectify the condition by addressing the Chief Signal Officer, SPSAY, Washington.

* * * * *

The material presented in the SCTIL is informative and suggestive. Nothing herein should be construed as directive nor should requisitions for new types of equipment be submitted on the basis of data contained herein.

24-51925ABCO

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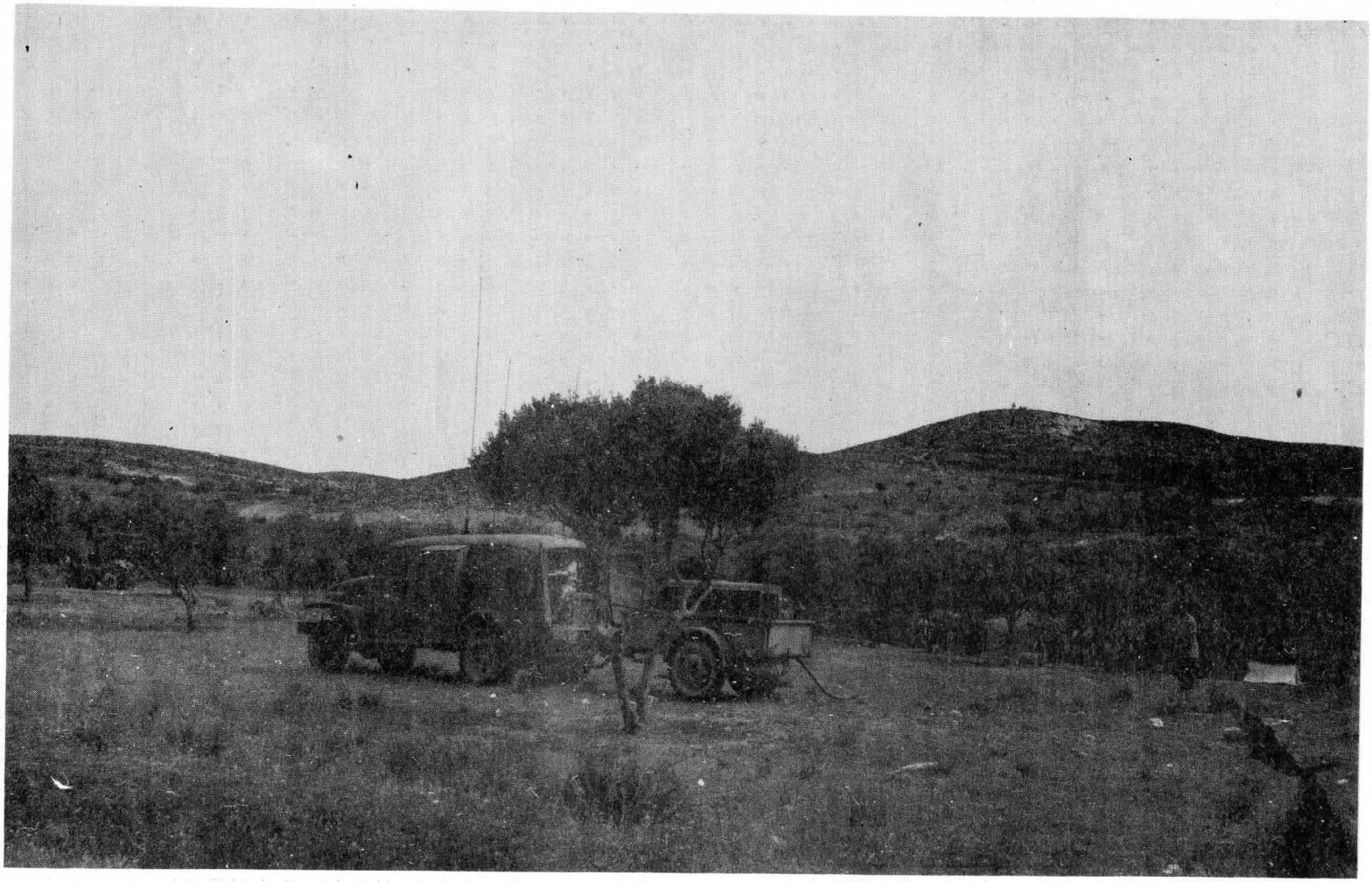


ONE OF THE NUMEROUS U.S. SCR-299 SETS USED BY THE BRITISH. THE TREES BEYOND PROVIDE CONCEALMENT FOR A BRIGADE HEADQUARTERS.

LESSONS FROM NORTH AFRICAN OPERATIONS

Considerable newspaper and magazine publicity has been given to a few of the more spectacular exploits of signal communication organizations in North African campaigns, but many of the more important functions of these organizations have been passed over as too commonplace to have news value. However, this situation does not minimize, in the least, the fact that signal communications have exerted a major influence on Allied tactical operations in the several North African campaigns from the time that Italians crossed the Libian-Egyptian border in September 1940 until the last Axis forces surrendered on Cape Bon.

The most unique problem encountered during the North African operations was that of planning and coordinating signal communications during the combined phase of the operations.

The naval, ground and air force communication systems of the British, French and U.S. components under the Allied Force Headquarters had been built up independently and naturally involved different methods, procedures and equipment. Consequently, the coordination of the systems, so that the various components could operate together efficiently, was a tremendous task, ably handled by the Signal staff of Allied Force Headquarters.

During these operations all agencies of signal communication have been put to the acid test and have proved highly efficient when properly employed. In general, failures in communications were due to misuse of equipment and procedures or to inadequately trained personnel rather than to any inherent weaknesses in communication equipment and doctrine.

It is proposed to present in this article a consolidation of the information obtained from reports furnished by tactical and signal unit commanders, signal and communication officers of subordinate units, and observers sent into the combat theatre on general or specific missions. It is hoped that the information contained herein will provide signal and communication unit officers with a better picture of the situations and problems which were solved in the final communications testing laboratory — the battlefield.

GENERAL SITUATION

Landing Operations in North Africa

It is interesting and pertinent to note that the most frequent comments on signal communications in the campaign were aimed at this phase of the operations. It was generally felt that the principal shortcomings were due to the short period allowed for planning and training of communications teams in joint and combined operations, to the secrecy necessary to insure the suc-

cess of the operation, and to the fact that the U.S. army troops involved were engaged in actual combat for the first time.

Another factor which delayed some assault teams in setting up shore communications with task force commanders still at sea was the policy of splitting communications units between assault and follow-up convoys. This was essential because of the need for including a maximum of combat troops in the assault, but it unfortunately resulted in a wide separation of communication detachments and equipment on beaches. This situation made it difficult for the task force commanders to control their troops and coordinate the attack during the initial stages.

However, as soon as communication units were able to collect their beachhead teams and equipment and establish axes of communication, the radio, wire and messenger nets were quickly established and were continuously successful to the end of the short campaign which terminated with the surrender of the French.

Terrain

In North Africa the terrain varies from the shifting sand dunes in Tripolitania and southern Tunisia to rocky ridges and mountains, 1000 to 6000 feet high, in central and northern Tunisia, Morocco, and Algeria. Between these extremes lay barren, rock strewn plains and rolling hills, similar to the "bad lands" of the American Dakotas.

In the desert areas patches of cacti, much the same as those found on American deserts, were sparsely spread. Date palms grew at desert oases and along a few of the river valleys. Cork forests and large groves of cedar-like evergreen trees are spread along the Mediterranean coast but none of these is as extensive or dense as forests of the American Rockies and northern Europe.

The rainfall of the Mediterranean and Atlantic coastal areas approximates that of the Dakota-Arizona section of the U.S. with the rainy season extending, generally, from October to April.

Successful camouflage was particularly difficult on the deserts and open plains and the greatest care had to be taken to conceal anything larger than a man. When time allowed, CP, radio and like installations were "dug in" so that nets or other blending covers threw the minimum shadow. In some locations time and the extent of the installation would not permit camouflage construction and in these cases vehicles, personnel and equipment were widely dispersed so as to present the least concentrated target for enemy shells and bombs. Several reports emphasized the importance of camouflage discipline to prevent personnel from compromising good camouflage installations.

As is usually the case in offensive operations, the Allies were frequently forced to maneuver over the most difficult terrain in order to surprise and

outflank Axis forces in North Africa. The fact that such maneuvers were successful from El Agheila through the Mareth and El Guettar offensives to Bizerte and Tunis proved the value of such tactics.

Allied operations over bad terrain were often made more hazardous by the clever and extensive use of land mines by the Axis forces. Mine fields were usually placed so that they blocked natural routes of approach to Axis defense positions and were employed with or without added obstacles and fire coverage. One observer classed land mines as "the greatest single physical and mental hazard of this war." Other officers felt that mines were merely another weapon for which countermeasures were necessary and proceeded to develop expedients for their rapid and effective detection and removal.

In summary it can be said that the Axis had the initial advantage of

MINE DETECTION AND REMOVAL ARE IMPORTANTLY EMPHASIZED IN TRAINING ACTIVITIES IN NORTH AFRICA.

experience gained from an extended occupation of the land. During this period they had been able to choose the best supply bases, routes of communication and defense positions afforded by the terrain. However, once the Allies had taken the initiative, they were not slow to utilize these facilities for their own purpose and advantage.

Personnel and Training

The diversity of conditions encountered in the North African campaign afforded an excellent test of communications personnel training methods. Here officers and men encountered practically all the operations and maintenance problems that they had experienced in unit training problems and in maneuvers, plus some new ones peculiar to the particular operation. It was agreed that the training doctrine being given in the U. S. is basically sound. In fact, one officer remarked in his report that "the only difference between maneuvers and actual combat was that, when you made a mistake in combat, you got killed." Those who had not taken their combat course, basic military and technical operation lessons seriously were a detriment to their units and forced an added load on officers and men who could perform their assigned missions.

All reports indicated that, regardless of the extent and thoroughness of individual training, there is no substitute for individual initiative, resourcefulness and the will and energy to get the job done, whatever the situation.

As a result of the lessons in methods of training learned in these North African campaigns, Allied signal and communications troops will be better prepared to perform their individual and unit missions in future campaigns.

Transportation

Men and material poured into North Africa through Atlantic and Mediterranean ports had to be transported more than 1200 miles, in some cases, before reaching the combat areas. In spite of the fact that rail lines leading from ports in French Morocco and Algeria were seldom bombed, they could not be used to transport troop units to any great extent — principally, because of the shortage of rolling stock. Ammunition and food supplies were shipped by rail as troop units moving forward were able to guard the lines and set up depots and dumps. Once occupied, the ports of Bougie, Philippeville, Bone and Tripoli were utilized for landing Allied troops and materiel and saved long hauls from ports farther west.

Truck losses which occurred prior to or during the landing operations resulted in some units being short on transportation essential for subsequent operations. Some reallocation of military vehicles and the use of commercial trucks and cars obtained locally provided enough motor transportation to move troops, equipment and supplies into combat areas.

The roads over which these motor columns moved toward Tunisia were poor when compared with the wide paved highways and reasonably solid dirt roads over which these same units had operated during maneuvers in U.S. training areas. Initially the convoy control was not as good as expected and caused some back tracking and rerouting of columns.

Several reports stated that very few U.S. Army vehicles had to be abandoned along the march route because of mechanical failures. This indicates good maintenance and good driving. Two reports stated that drivers needed considerable additional training in night driving, but this deficiency did not appear to be general. Another report pointed out that truck drivers were specialists and had to be trained continuously in combat driving if they were expected to perform their job well under combat conditions.

Equipment and Supplies

Most of the reports noted contained numerous comments and suggestions on the subject of supplies and equipment.

Particular emphasis was placed on the necessity for packing signal equipment in packages which could be handled by one man so as to minimize mishandling by native stevedores and porters, and for stenciling the list or type of contents and the name of the organization to which assigned on the package in clear text in order to speed delivery. One advocate of smaller packages pointed out that great care would have to be taken to prevent components of a large unit from being separated during shipment and thereby rendering the unit useless until all components could be assembled. A new packing system now under development should solve this problem.

It was generally agreed that unit equipment and supplies needed for the initial phases of an amphibious operation should be loaded and kept with the using team. This principle would seem to be SOP but was violated in some instances when loading schedules were prepared.

Organizations engaged in amphibious operations that did not provide waterproof coverings for their vulnerable electrical equipment had difficulty in placing such equipment in operation immediately and were faced with the problem of cleaning and repairing this equipment while under enemy fire.

Once equipment had been safely landed and placed in operation the main problem lay in obtaining spare parts to keep it operating.

Signal equipment maintenance teams, of all echelons, were commended in many reports on the resourceful methods adopted to speed repairs and on their tireless devotion to their mission.

Immediately after the landing operations were completed, a pre-planned system of signal supply was set up on the general principles set down in FM 100-10 and expanded as needed to meet campaign requirements. Reports cover-

NOT INFREQUENTLY THE INTERCHANGE OF EQUIPMENT AMONG THE ALLIES DURING THE NORTH AFRICAN CAMPAIGNS AIDED COMMUNICATIONS COORDINATION. HERE IS SHOWN THE TAIL OF AN SCR-299 AND ONE OF ITS BRITISH CREW.

ing this system indicate that it is basically sound and that only minor changes are necessary to fit varying situations.

TACTICAL OPERATIONS

Type of Operation

Military tacticians repeatedly state that there is nothing new in military tactics; that it is only the application of ancient principles of tactics that are brought up to date in each war.

On this premise the principles employed in the amphibious and armored operations of the North African campaign were not new but the equipment and weapons used did present new signal communications problems, some of which could be solved only by trial and error.

Operation Phases

For the purposes of this article the several North African operations can be divided into three campaign phases, as follows:

Phase 1 - Beginning with the initial Italian attack across the Libian-Egyptian border on 13 September 1940, through the subsequent British eastward offensives in Libia, first against the Italians and later against the combined German and Italian forces and ending with the British stand at El Alamein on 1 July 1942.

Phase 2 - Began with the British drive through Libia, starting 23 October 1942 and ended with the U.S. and British landings on 8-10 November 1942 at strategic points in French Morocco and Algeria against token resistance by Vichy French forces.

Phase 3 - This was the final phase and began with coordinated attacks by the British 8th Army on the Mareth Line in Southeastern Tunisia and the American, British, Free French and French colonial forces along the western boundary of Tunisia. All of these units operated under the North African Force Headquarters.

In the second phase American units were landed as task forces. Following the consolidation of Allied Forces in French Morocco and Algeria, these task forces were assigned to the American Second Corps, the British First Army and a few units, as a nucleus, to the American Fifth Army.

In making their landing operations the Allies had a great advantage in the elements of surprise and force. Landing parties were supported by highly mobile naval fire power from ships which by this time held practically undisputed control of the western Mediterranean. As soon as landing fields were established, the Allied Air Forces soon gained air superiority which they were able to maintain for the duration of the operation.

In the third phase, after the British 8th Army had flanked and broken the Mareth Line and driven Axis forces north along the coast and the American El Guettar action had forced through Axis defenses in that sector, parrying patrol action kept the Axis puzzled until Allied forces could be reformed for the final knockout blow at Bizerte and Tunis.

The Axis conceded at least superiority of numbers of Allied ground forces after the U.S.-British landing in Algeria and French Morocco and was forced, in several quarters, to admit superiority of equipment and strategy before the battle of Tunisia had ended.

Axis Forces

During the three Allied campaign phases the components of Axis troops varied considerably but were generally composed of German panzer and Italian regular and colonial infantry units combined under control of the Afrika Korps. Some Italian units were experienced desert fighters, having operated in Ethiopia and Eritrea prior to the first phase of the North African campaign, but it is doubtful if the German troops had any extensive training, as units, prior to the formation of the Afrika Korps.

Axis tactics followed the pattern set by panzer units in European conquests, but by this time the Allied commanders had devised effective counter-tactics and the Axis seemed unable to formulate a new pattern. Again, as in 1918, the Allies displayed greater adaptability and resourcefulness.

RADIO

Planning of Operation

Reports covering the planning phase of the campaign indicate that the complete planning and coordination between signal officers of the combined command paved the way for successful radio operation throughout.

The following outline of radio-frequency allotment procedure is given as an example of the complete and comprehensive staff work done by the combined signal staff:

1. Frequency allotment was made by the Chief Signal Officer, AFHQ, who utilized as a part of his signal section a signal staff coordinating agency composed of one U.S. Signal Corps officer and one British Signals officer. These officers under the CSigO, AFHQ, had final jurisdiction on frequency allotment.

2. In making frequency allotments the following were considered: -

a. Requirements (number of nets and sets for each arm and service).
b. Data as to power, antennas and frequency range of each set to be employed by Allied troops.
c. Enemy station data on frequency, power and location of all fixed stations known.
d. Ionospheric predictions for the latitude, on the planned operation dates.
e. Probably Allied Force Headquarters fixed station locations.
f. Separation between HF frequencies.
g. Classification of transmitters as to relative antenna power.
h. Geographical frequency allotment to permit duplication of channels whenever possible.

3. The frequency allotment agency was authorized to deal directly with using arms or services in allocating or revoking frequencies so as to eliminate delay. Formal verification was sent through channels later.

Beachhead Operation

As a basic principle of joint amphibious operations, naval communication agencies were charged with the function of maintaining communications between ground and air force headquarters of the Task Forces until these

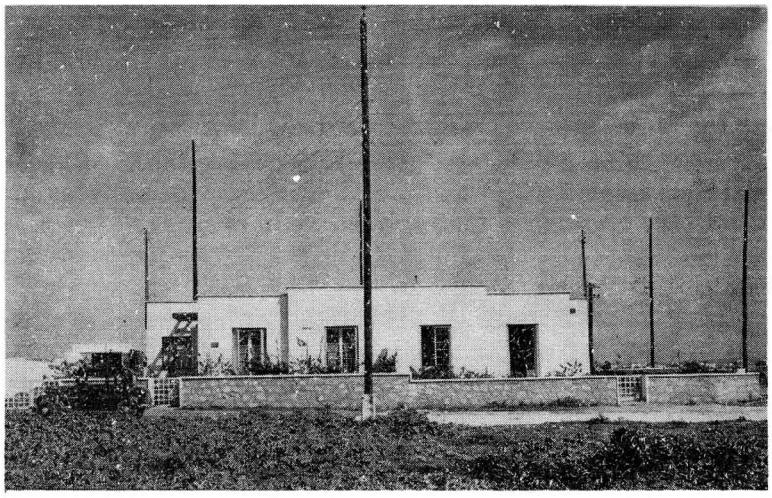
headquarters could set up beachhead CPs. This function was considered as distinct and separate from the normal and special naval communication functions. Considering the novelty of the operation and the limited joint and combined training possible prior to this operation, naval units performed this function in a very commendable manner.

Signal and communication elements of the initial assault and follow-up forces carried low-power, light-weight radio sets ashore and opened temporary beach radio stations. As subsequent support and CP teams could be landed with vehicular sets, CP radio stations were set up and began normal combat operation.

As noted earlier, under Equipment and Supplies, General Situation, some assault combat teams had considerable difficulty in landing radio equipment without getting it watersoaked. Other units improvised various types of waterproof fabric covers which provided excellent protection. (Note: Several standard sizes of rubberized equipment covers have now been developed and furnished to amphibious forces located in the U. S. and abroad.)

Radio Operation

Despite the careful planning done by the combined signal staff prior to the beginning of the third phase of the North African operations, situations developed in radio operation and maintenance which prevented universally successful radio communication. As an example, it was well known to the combined signal staff that mutual interference would result when the numerous radio nets of Allied forces were put on the air. To combat this difficulty, sets were placed in transmitting power classes and strict limitations were enforced on transmitting power. Regulations on close calibration



FIXED RADIO STATION AT CASABLANCA, ONE OF SEVERAL HIGH-POWERED STATIONS ESTABLISHED BY THE SIGNAL CORPS IN THIS THEATER.

of sets also helped greatly in limiting interference. Excessive interference from this cause had not been experienced in other theatres because fewer sets had been operating in sectors of a comparative area. In spite of all the above precautions, good operation still depends mainly on the ability of radio operators to work through static and other interference.

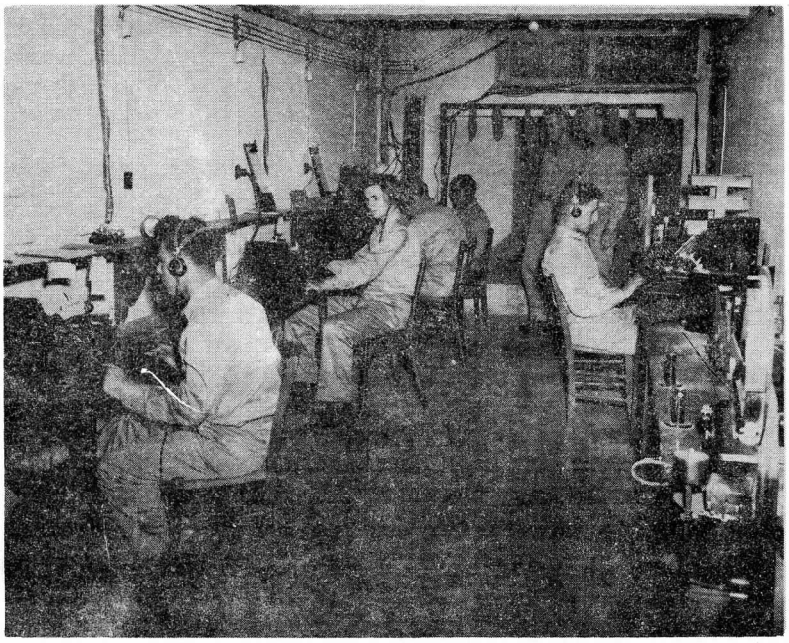
The radio equipment furnished was generally praised - the SCR-193, the SCR-299 and the SCR-500 and -600 series particularly. However, constructive criticism was voiced on practically all sets and technical improvements have been made in many cases. (See article "Evolution of Radio Set SCR-199" in this publication last month, for example. — ED.)

Regimental and battalion communication officers suggested that the SCR-511 would be better suited to Infantry Battalion Command nets than the SCR-536 and that the latter would make an excellent Infantry Company command and patrol set. These suggestions arose from the fact that reinforced battalions sometimes served as separate task forces and operated over a 5 to 10 mile front. Another suggestion, along this line, considered the establishment of an Army signal equipment pool from which extra equipment could be drawn by units assigned to special missions when the unit T/BA or T/E did not provide such equipment. Some signal officers considered the latter plan as more feasible since they felt that it permitted more flexible distribution of equipment but recently published T/Os have allotted additional equipment to provide for special operations.

Remote control of radio transmitters was extensively employed, particularly for the larger vehicular sets. Operators usually set up their remote control unit and a receiver in a fox hole at the CP and located the transmitter as far away as the remote control cable would allow. When possible, the transmitter and vehicle were camouflaged to prevent attack from hostile light bombers and pursuit planes.

Other radio operation problems included enemy jamming, the frequent necessity for operating over abnormal distances, activation of special nets and the "masking" effect experienced when operating in or among mountains. Jamming was combated by shifting to alternate frequencies allotted. Relay systems solved some of the abnormal distance transmission difficulty and permitted lower power transmissions, thereby reducing interference and the possibility of enemy interception. Extra equipment was provided to set up most of the special nets. Relocation of sets generally helped to alleviate the "masking" effect. (Note: The "masking" effect can be defined, generally, as a phenomenon that prevents normal distance transmissions from FM and other sets which depend on line of sight wave propagation.)

In a few cases where Air Force and Ground Force sets were to be netted a temporary exchange of equipment was necessary to provide satisfactory nets. Such expedients were normally authorized and controlled by coordination between Air Force and Ground Force signal officers of the echelons directly affected and this solved the problem of both forces neatly.



THE RADIO ROOM, FIFTH ARMY HEADQUARTERS.

Due to a prearranged plan for the employment of theatre aircraft primarily for strategical missions, only a limited need was found for air-ground radio communication.

The difficulty resulting from the employment of a number of different radio procedures within a theater became acute upon the original U.S. landing in North Africa and, as a result, considerable importance was attached to the development of standard radio procedures which was being carried on by the Combined Communications Board. It can now be reported that standard radiotelephone, radiotelegraph, teletypewriter, visual (blinker and semaphore), and panel procedures and radio operating signals have been developed and approved for all U.S.-British, Joint Army-Navy, and intra-Army communication.

Fixed Station Operation

Following the consolidation of Allied positions after their landings in French Morocco and Algeria, several high-power, fixed radio stations were set up in these countries.

Some of the stations were added to existing U.S., British and Free French naval, army and air force command nets. One particularly important facility was the U.S. 40-kw. station which provided direct, multi-channel radio teletype service to WAR in Washington.

Other stations included several employed by military and civilian agencies to broadcast time signals, news, general instructions and special pro-

grams to Allied troops; propaganda and special announcements to pro-Ally and enemy countries in Africa and Europe. Facilities were also made available for military and commercial press dispatch and photo facsimile service to the U.S. and England.

Radio Maintenance and Supply

On this subject the consensus of opinion of all reports seemed to be that:

1. Additional equipment should be furnished when special missions require the operation of added nets or operation over an extended area. This has been done in at least one theatre since the close of the Tunisian Campaign.
2. The shortage of spare parts for available equipment prevented higher operating efficiency. Automatic issue of certain of these spare parts, plus a good depot stock, was suggested as an answer to this problem. Effective steps are now being taken to remedy this shortage.
3. Radio maintenance crews of all echelons were "doing wonders" in keeping sets operating despite shortages of spare parts and, in a few cases, of necessary tools.
4. American radio batteries had a reasonably good operating life if they were "fresh" when placed in operation. In this connection a suggestion was made that radio dry cell batteries be standardized in fewer sizes or that a compact, multi use, non-spillable storage battery be developed. Consideration has been given to these suggestions by development laboratories and will result in improvements along these lines. New specifications have also been put into effect on waterproof packing of dry batteries.
5. Consideration should be given to standardizing a 6-12 volt ignition system for all vehicles assigned to Signal Corps and other communication units and 12-24 volt ignition systems for all armored vehicles to provide an adequate power supply for radio sets which are mounted in these vehicles.

Enemy Radio

There is no doubt that enemy intercept stations were active during the North African Campaign. Accurate fire on Allied radio stations was too frequent to be by chance. Reduced transmitting power, better camouflage and improved security measures at Allied radio stations served to reduce their detection but did not eliminate occasional bombing and shelling of their positions.

Of the Axis radio equipment captured the German equipment was generally found to be superior to the Italian — although both were comparable in quality to Allied equipment and much superior to Japanese equipment captured to date in other theatres.

(Wire Communication: It is anticipated that a discussion covering Wire Communication in the North African campaigns will be presented in a later issue of this publication. — ED.)

CAPTURED EQUIPMENT VS. SOUVENIRS

22 September 1943

Commanding Officer
Military Intelligence Branch
Office of the Chief Signal Officer
Washington, D. C.

Dear Sir:

I have just been notified of the disposition of one each Japanese Field Telephone which I personally seized from the Japanese Goverrment and which the Collector of Customs impersonally seized from me. I had originally intended that the set be used for study by my father's command, as I realized how many similar sets were captured by our Signal Officer and assumed that he had sent several sets to you. Since the set is in your hands, I.am pleased that your office may derive some benefit from it. In fact, had I known, I would have sent it to you in the first place. It just occurred to me, however, that you may be interested in knowing what branch of Japanese troops used this set, where it was located, what parts go with it that are missing and other pertinent information.

The set has many noteworthy features you may have observed from the conventional diagram without translating the characters, and contrary to popular opinion, you do not have to speak Japanese for satisfactory transmission. The set is versatile in all languages, a very commendable feature.

In addition to furnishing any information you may desire, I would be glad to have the Commanding Officer accept the set as a gift from the men of Company "H", 35th Inf, and myself, should the Government decide to release the set. We do, however, extend our apologies for presenting such an inferior product — undoubtedly "Made in Japan."

Sincerely,

/S/ GERALD H. SHEA

Co "H", 35th Infantry
Commanding

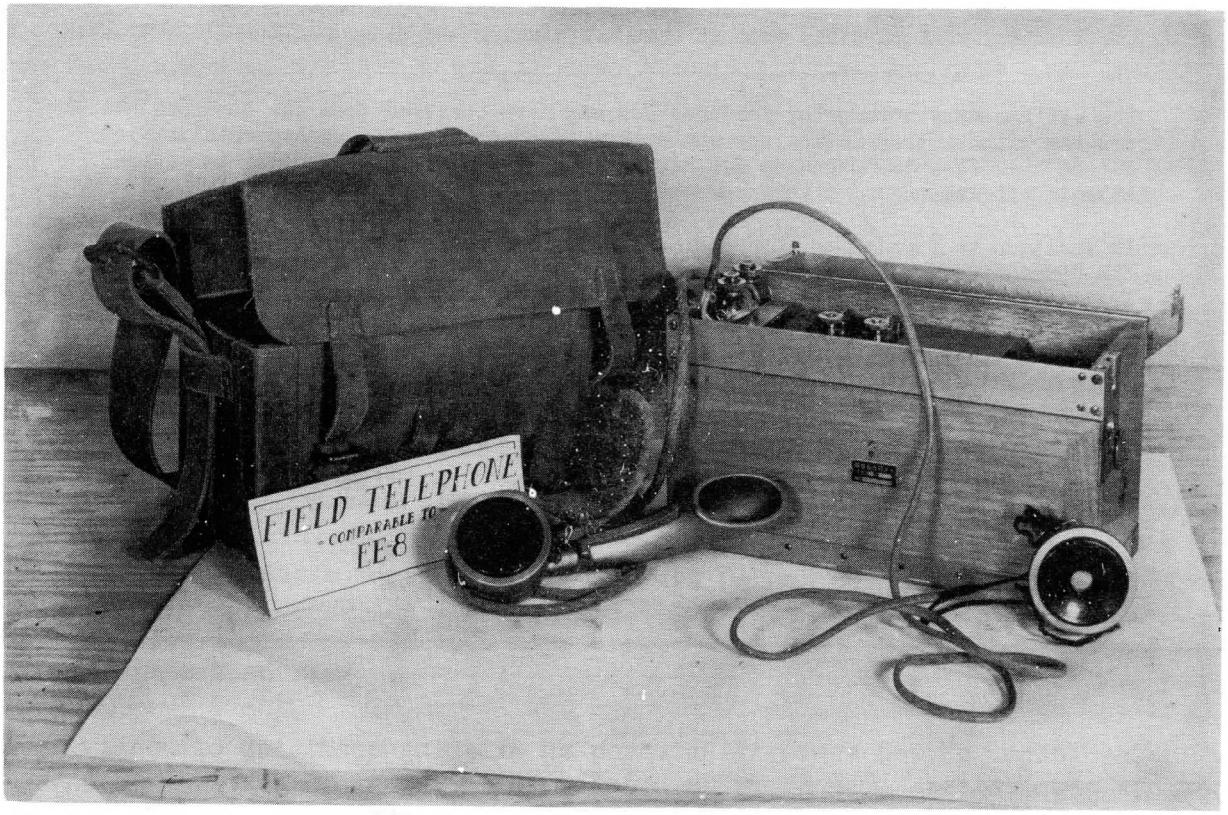
The letter quoted above illustrates an existing condition of really serious proportions. The story is briefly this:

Captain Shea forwarded the Japanese field telephone to which his letter refers to his father (Lt. Col. Shea, 9th Service Command). It was in-

tercepted by Customs officials at a U.S. port and turned over to the Intelligence Branch, OCSigO. This branch in turn wrote to Captain Shea, informing him that it had received the equipment and calling to his attention the procedure that should have been followed in the disposition of this enemy equipment.

It is of the utmost importance that all captured signal equipment be cleared through the properly authorized intelligence units which now exist in every theatre. These are known as "Enemy Equipment Identification Teams." Lacking information as to how to reach such units, captured equipment should be forwarded direct to the Office of the Chief Signal Officer, attention of Intelligence Branch.

This should be done, even in the case of items which, to the finder's knowledge, have been captured in sizable numbers. The reason for this is that different items of the same type may differ in some important details. It might be, for example, that ten units of the same type had been examined and found to be all alike but the eleventh might incorporate some significant difference. It might be, for instance, that a different material is employed in one of its components. This seemingly minor point, when combined with



A JAPANESE FIELD TELEPHONE OF THE TYPE CAPTURED BY CAPTAIN SHEA.

other information on hand in the Intelligence Branch, may point to a growing shortage of some strategic material. Such a bit of information may be highly important to our war effort. Hardly likely? It is more than likely — it has actually happened!

Or take a radio set. Suppose a number of a given type had been captured and examined. Another one might come along which utilized an entirely different frequency range, pointing perhaps to new tactical applications of this type of set.

Effective intelligence is not so much a matter of making individual discoveries of first magnitude, but of piecing together bits of information from here and there until finally a complete pattern is obtained. Every single piece of signal equipment captured is a potential source of information and should be treated accordingly.

This means not only that attention should be paid to turning in such equipment, but striving to turn it in complete with all accessories. Many pieces of captured equipment are made next to useless for the purposes of intelligence because of the removal of small accessories or component parts by souvenir hunters.

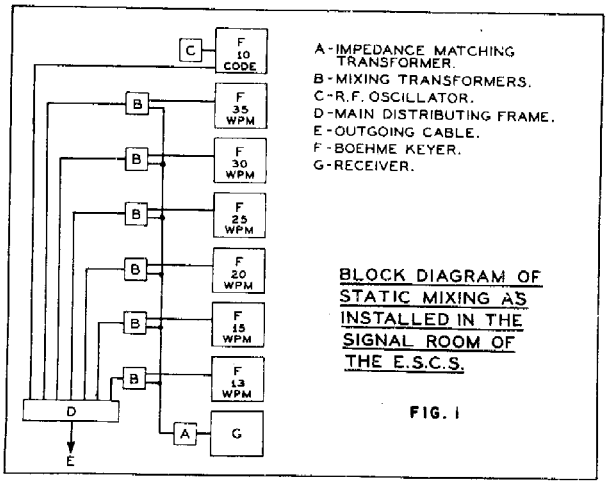
If the existence of a piece of discarded or captured enemy signal equipment is discovered, it isn't always practical to turn it in. It will be helpful in such cases to notify the proper authorities, particularly if the equipment is in any way unusual.

If one must collect souvenirs, it is far better to stick to knives, pistols, bayonets, helmets, etc. Better still to skip them entirely. More than one soldier has found a potential souvenir suddenly blossom into a full-grown booby trap.

TRAINING TO COPY THROUGH INTERFERENCE

The wide-spread enemy practice of jamming and otherwise interfering with radio communications, the interfering effect of tropical static and the normal interference which occurs when a number of transmitters are operated on closely neighboring frequencies, have made it essential that the radio operator be able to copy messages correctly through any type of interference, man-made as well as natural.

Training in this phase begins early at Fort Monmouth's Eastern Signal Corps Schools. After the operator has fully grasped the essentials of the alphabet and has passed ten words per minute, he is first subjected to interfer-



BLOCK DIAGRAM OF STATIC MIXING AS INSTALLED IN THE SIGNAL ROOM OF THE E.S.C.S.

FIG. 1

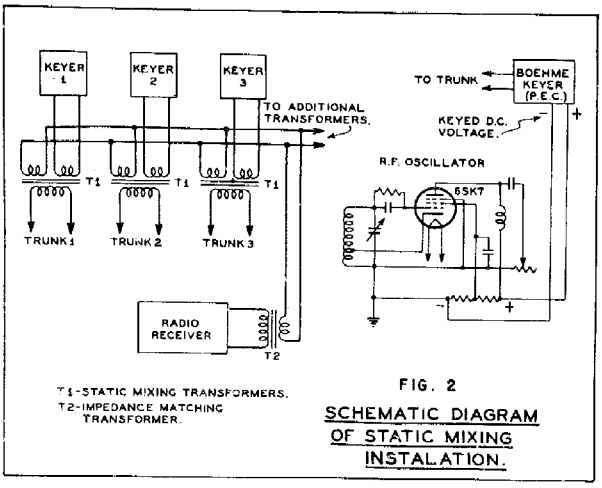


FIG. 2

SCHEMATIC DIAGRAM OF STATIC MIXING INSTALATION.

ence at the thirteen words per minute speed. The method whereby static and other types of interference are introduced is described in the diagrams and accompanying text in the following pages.

Thereafter, as the student progresses through the higher speeds up to thirty-five words per minute, he never copies any message without some type of interference. The faster the code speed, the more interference. This is accomplished by regulating the volume of the tone signal, as explained below.

The employment of a standard radio receiver in conjunction with an oscillator and keyer as the instrument of interference presents many interesting possibilities. The interference may be varied so that the student becomes accustomed to copying not only through static, code interference and noise, but through interference of standard broadcasts of music or speech.

In a further effort to provide realistic conditions for students copying code, actual recorded battle noises are fed over loudspeakers installed in the main code rooms. Records made by the Signal Corps are used, and include

artillery barrages, machine gun fire, aerial bombardments, dog fights, etc.

It has been found that students trained in the manner described above readily adapt themselves to conditions encountered in the field, and actually develop a certain immunity to extraneous sounds that sharpens their perception of the radio signal.

Method of Mixing Static and Signal Interference with Practice Code

Figure 1 is a block diagram showing the complete installation for a number of keyers, the code being taken from the keyer and mixed with static and an interfering signal picked up by a radio receiver.

Figure 2 is a schematic diagram of the installation. The code from each keyer is fed into one primary of a transformer T1 which is a low impedance transformer having two primary windings and one secondary winding. The other primary winding is matched to the output of the radio receiver supplying the static and interfering signal. The common secondary winding containing both static and code is then fed through trunks to the switchboards and students positions. These T1 transformers should be of low impedance so that the windings will properly match the keyers and trunks. The radio receiver employed is the Hallicrafters Model SX-28. This is a standard communications-type receiver which provides both short-wave and standard broadcast reception and sufficient audio output to satisfy the requirements of a large installation of this type. The output transformer incorporated in the SX-28 has two output windings, one of 500 ohms and the other 5,000 ohms. In the ESCS installation the transformer T2 (Figure 2) is one which matches the 500-ohm output into the 2-ohm static line.

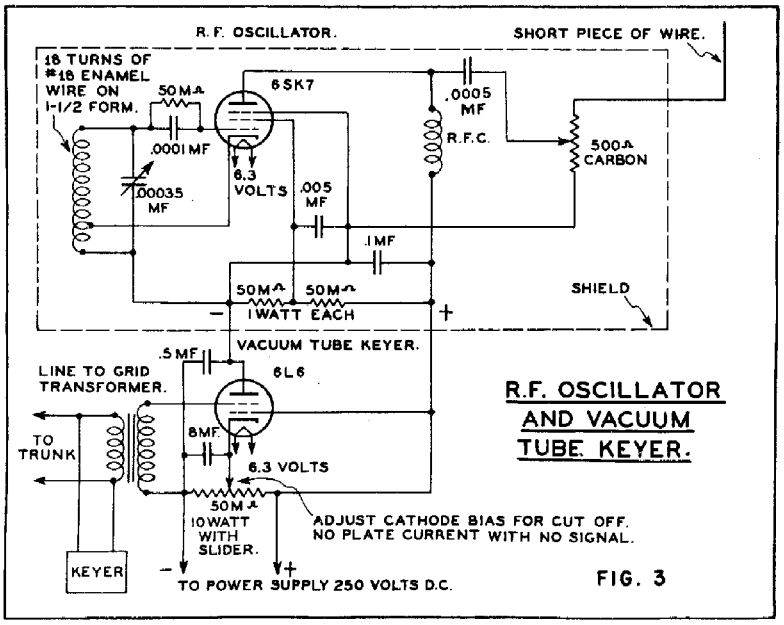
Any number of keyed signals may be mixed with static by this method, with a separate mixing transformer for each speed. The windings supplying the static are all tied in parallel and matched to the receiver through T2. If proper mixing transformers are not available, two separate transformers may be used for each speed by connecting their secondaries in series.

In order to provide an interfering signal along with the static, the receiver may be tuned to a code station, but this method is not entirely satisfactory as the stations are not on consistently and usually vary in signal strength. In order to overcome this, a separate R.F. oscillator is keyed and picked up by the receiver, thus assuring a constant signal at all times. This r.f. oscillator is keyed by another keyer as it is supplying code over its own trunk.

Figure 3 is the diagram of the r.f. oscillator and is vacuum tube keyer used to key the oscillator when keyed d.c. voltage is not available. When using the Boehme photo-electric cell Type 9 D Keyer, however, the vacuum tube keyer is not necessary, as the keyed d.c. voltage may be taken right from the keyer. When using the TG1Ø type or similar keyers supplying only a tone output, a vacuum tube keyer is necessary to supply a d.c. keyed voltage

to key the oscillator. The vacuum tube keyer is tapped off any of the keyers and rectifies the tone signal to a d.c. keyed voltage. This voltage across the plate loading resistor of the keyer tube is used as the plate voltage of the oscillator, thus keying the oscillator. When using an oscillator for an interfering signal, it is advisable to key the oscillator from a keyer that does not have static mixed with it; otherwise, the interfering signal on that speed will sound like an echo.

If more or less static is desired, the volume control on the radio receiver may be varied, and the volume of the interfering signal may be varied at the oscillator output control. The oscillator may be placed at a convenient distance from the radio receiver, and picked up along with the static.



R.F. OSCILLATOR AND VACUUM TUBE KEYER.

FIG. 3

R.F. Oscillator Parts

1 6SK7 type tube (VT117)
1 .0001 mfd. condenser fixed
1 .0005 mfd. condenser fixed
1 .005 mfd. condenser fixed
1 .00035 variable condenser
1 .1 mfd. condenser fixed
3 50,000 ohm resistors, 1 watt
1 500 ohm carbon potentiometer
1 r.f. choke, 2.5 mh.

Vacuum Tube Keyer Parts

1 6L6 type tube (VT115)
1 line to grid transformer
1 .5 mfd. 400 volt condenser
1 .8 mfd. 400 volt condenser
1 25,000 ohm, 10 watt resistor with slider
1 power supply for the keyer and oscillator, 250 volts d.c., 6.3 volts a.c.

The volume of each individual keyer may also be varied, thus varying the static-to-signal ratio on any particular speed. If desired, a volume control may be connected in the static line at each transformer to vary the amount of static on each individual speed. The receiver is, of course, tuned to the frequency of the oscillator. The constants shown for the oscillator circuit of Figure 3 will give a range from 4,000 to 6,000 kilocycles.

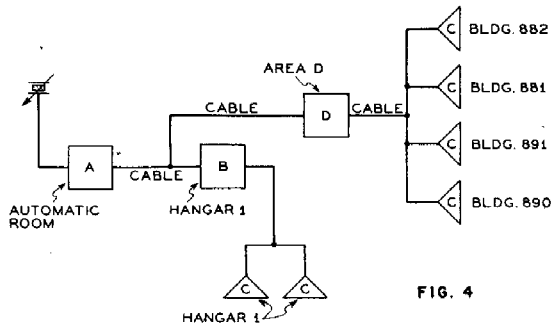


FIG. 4

A - PICKUP & PREAMPLIFIER.
B - 15 WATT AMPLIFIER.
C - SPEAKERS.
D - 10 WATT AMPLIFIER.

BATTLE NOISE INSTALLATION CODE & TRAFFIC SECTION OF E.S.C.S.

Battle Noise Installation

As shown in the diagram, the records are played in the Automatic Signal Room and fed through a small 2.5 watt pre-amplifier and over a trunk in the main cable to Hangar 1. Here the noises are amplified with a 15-watt amplifier to feed two speakers placed in the hangar. The line from the pre-amplifier also continues through another cable to Area D, over a mile away, to feed a 10-watt amplifier there and be reproduced over speakers in four separate buildings.

NEW PROCESS DEVELOPED FOR CLEANING ENDS OF WIRE IN COILS

In setting up its production line for Microphone T-44, an improved method for removing insulation and cleaning the ends of 39-gauge wire used in the fabrication of small magnet coils has been developed by one of the prime Signal Corps contractors.

The new process consists in immersing the wire in sodium hydroxide for ten seconds, then dipping in a solution of boric acid and passing through boiling water, after which a drying agent is applied. The chemical actions involved in this process are the dissolving of the insulation by the sodium hydroxide and its neutralization in the boric acid bath. The wire is then cleaned in boiling water and dried.

The number of wires processed per day by this operation has been increased 600 per cent. The saving in production time as a result of this process is estimated to be approximately 175 man hours per 1000 microphones.

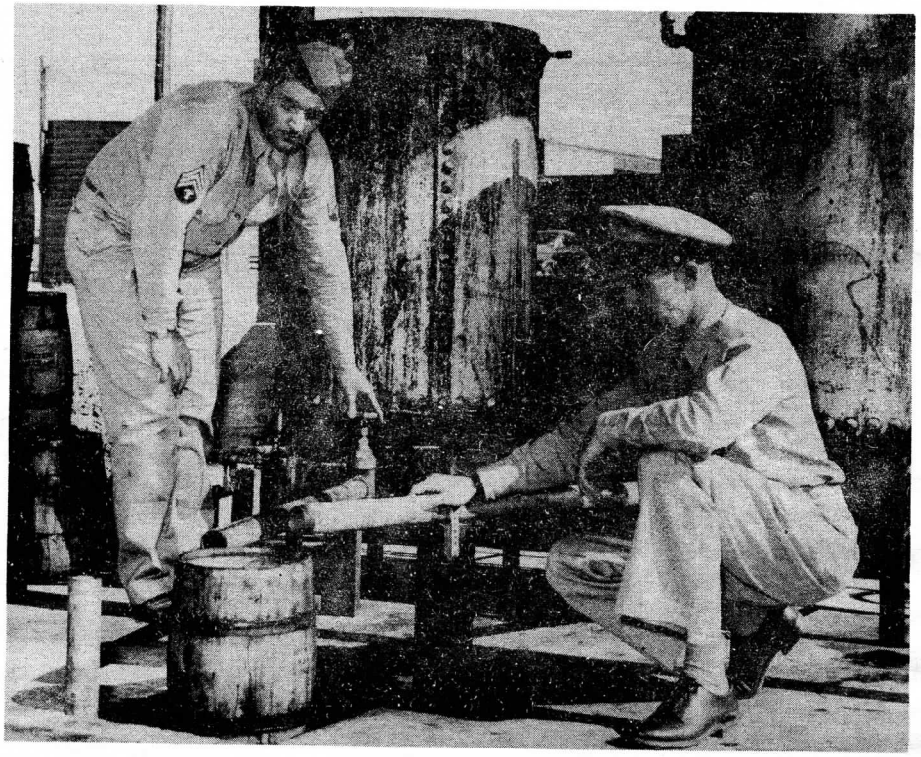
GREASE SALVAGE PLANT AT CAMP KOHLER

A grease reduction plant, constructed chiefly from salvaged materials, and so simple in design that it can be constructed at any camp, has resulted in the salvaging of thousands of pounds of waste grease from the sink drains of Camp Kohler's kitchens.

Anxious to aid the production of explosives by saving every ounce of waste fat and grease, the Salvage Department attempted to market the daily accumulation of waste grease taken from the interceptor grease traps of the sink drains, but the high water content made the substance unmarketable.

Dumping this grease into holes in the ground seemed a needless waste, so Major Hull C. Peppin, Quartermaster and salvage officer, devised a plan to save some of the grease.

As a result of his efforts, 1,500 pounds of grease are now being shipped each month from Camp Kohler to munitions plants -- and it all comes from the unsavory but efficient grease traps.



THE GREASE-REDUCTION PLANT AND ITS ORIGINATOR, MAJOR HULL C. PEPPIN, SALVAGE OFFICER

The ingenious reduction plant which accounts for the saving is a simple steam boiler, into which the drainage waste is dumped for processing. Under intense heat of the live steam, the thick fluid is quickly broken down into grease, water, and foreign matter.

The boiling hot grease is tapped off through a valve into wooden kegs, and, when allowed to cool, it is as clear as lard, completely devoid of adulteration.

Impressed by the effectiveness of the reduction plant, the Ninth Service Command requested photographs and plans of the system, and since then a number of military camps in the coast region have asked for details of construction to install plants of their own.

Widespread use of this simple salvage expedient would mean the saving of countless tons of vitally needed grease which would otherwise be wasted, and the disposition of the substance in this manner is just as simple as the old method of hauling it out to a deep pit in the ground.

CAMP KOHLER REVAMPS P. A. SYSTEM

Recent revision and enlargement of Camp Kohler's huge public address system, the medium used to broadcast all bugle calls, marching music, news, and other features, make it one of the most modern PA systems in any West Coast military installation.

Operation of the network was transferred from the Signal Office to the communications control building of the Signal Communication Branch, with the addition of considerable new equipment.

A standby gasoline motor generator has been installed to operate part of the system in the event power should fail on the post.

Programs are fed out over the camp through some 20 miles of wire to 24 outside horns and 52 inside speakers (in the mess halls) with the aid of two line amplifiers and nine booster amplifiers. This network has been built up from the original system which included only two amplifiers and eight outside speakers.

A modern and complete control desk, slotted so that the operator sits between the amplifiers and built-in turntable and facing the sloping control panel, enables operators to present bugle calls, marching music, newscasts, or pickup radio programs. Outside and inside speakers are separately controlled.

All marches and bugle calls played from transcriptions are recorded by Kohler's military band.

VISUAL TRAINING AIDS

CUTAWAY SWITCHBOARD IS TRAINING AID

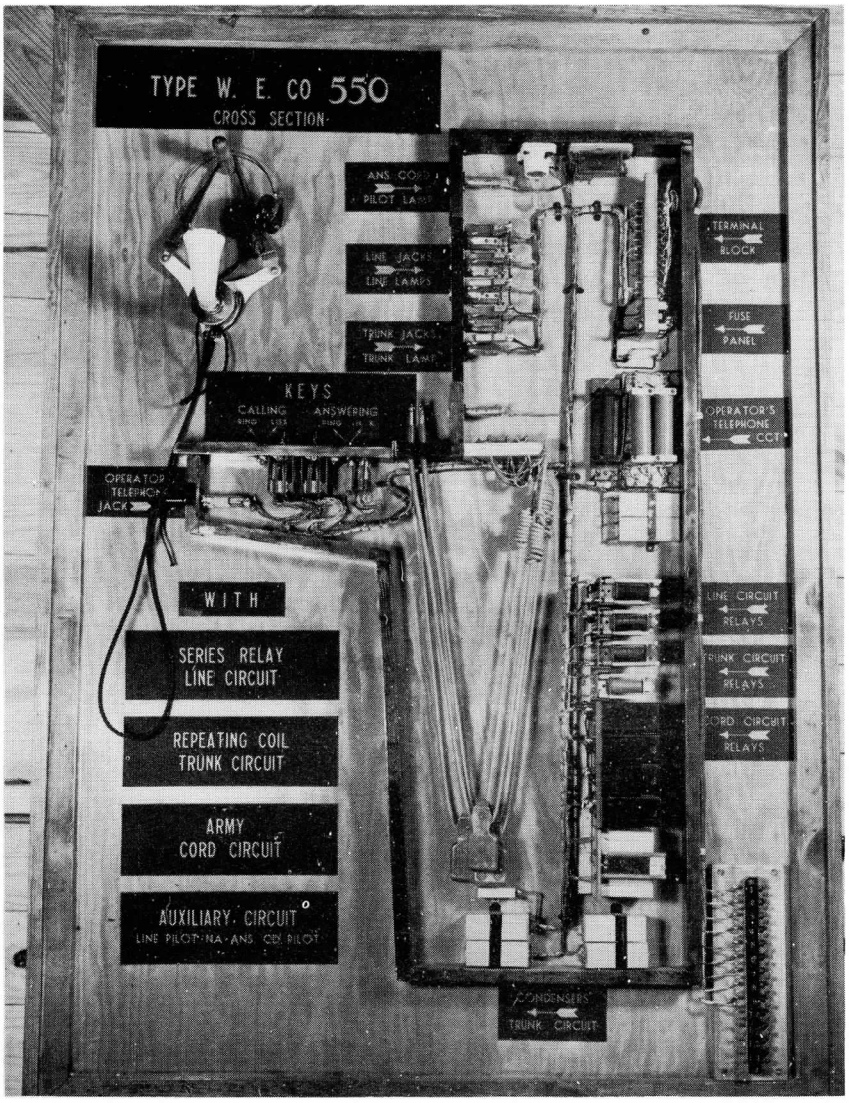


FIG. I - CUTAWAY SWITCHBOARD EMPLOYED AT CSCS

A cutaway switchboard has been developed and constructed at the Central Signal Corps School, Camp Crowder, Missouri, to teach students in the Central Office Maintenance Course of the Wire Division the proper nomenclature and relation of the various circuits in the type WE 550 switchboard. The student

reporting for this course has been taught by the use of various breadboards the different circuits that may be found in a switchboard, but is often not able to clearly coordinate this training with the actual piece of equipment. To overcome this situation and to assist the student in the repair and maintenance of PBX switchboards, the model illustrated in Figure 1 was constructed. The model has met with great success in the training of these students.

Operation

This training aid consists of a demonstration board on which various pieces of telephone equipment are mounted to represent a cutaway end view of the 550 WECo switchboard. The demonstration board is similar to that of a commercial switchboard, the key shelf being hinged and the equipment mounted in its actual operating location. Students that are received in the course with very little or no previous telephone background have difficulty coordinating their training. They are taught with the various colored enlargements of circuit diagrams (Figures 2, 3, 4, and 5) in conjunction with the board (Figure 1) to associate the schematic drawings with the wiring and equipment. The charts have been drawn in various colors on 30" x 40" drawing board to represent the different circuits.

A lecture room is provided in which the instructor with a group of ten to twenty students may work with the board and the charts. The instructor first traces the circuit functions with a pointer on the schematic drawings. The student follows this lecture with black and white copies in his textbook, and is then taught the various troubles and tests to be made. Students are permitted to operate the switchboard model and study the functions of each component. Routine tests and testing procedures are demonstrated and the causes and effects of simulated troubles are analyzed. The instructor demonstrates and points out the effects of trouble as it occurs on the switchboard. This lecture is given prior to the laboratory work on switchboard trouble shooting.

All major items of equipment are labeled for rapid identification. A terminal strip is mounted in the lower right corner, to which is connected battery, generator, and several subscribers' sets (Telephone EE-8-A's are used). The following routine tests may be made on the model:

1. Generator feeder, poling generator
2. Battery feeder, poling battery
3. Battery cutoff and auxiliary signal circuit
4. Tip and ring continuity and supervisory relay test
5. Test for crosses on cords
6. Test for short-circuited cords
7. Test for make contacts of talk key
8. Tests for cutout listening keys
9. Testing of operator's head set
10. Night connection continuity
11. Test for crossed lamp caps on board

12. Test of line lamps and line relay
13. Test of trunk lamps
14. Test of extension line jacks for cutout
15. Test for trunk jack cutouts.

Construction

The switchboard was engineered by an instructor in the Central Office Maintenance Course and constructed by students of the course. The training aid was made as nearly as possible to the exact dimensions of a 550 WECo switchboard with various pieces of equipment — relays, jacks, cords, keys, etc. — located in the same position as regular PBX boards. It is mounted on a backboard of plywood. The apparatus for the model was secured from the stock of replacement parts and from switchboards which were rebuilt in the course. Several circuits had to be varied slightly because of equipment shortages. However, parts were engineered which gave the same working effect.

The circuits employed are as follows:

1. The Line Circuit (Figure 2) — There are six line circuits using the WECo E5 relay, the B2 lamp, and terminating on the WECo #239A jack. Its maximum external loop resistance is 150 ohms, with a minimum internal resistance of 20,000 ohms.

2. The Trunk Circuit (Figure 3) — There are two trunk circuits employed. They are similar to the trunk circuit on the WECo Modified 550B switchboard. That is, they are ring-down trunks employing a repeating coil and a holding bridge to obtain supervision at the connecting office. An Automatic Electric Co. #D53397 repeat coil was substituted for the Kellogg

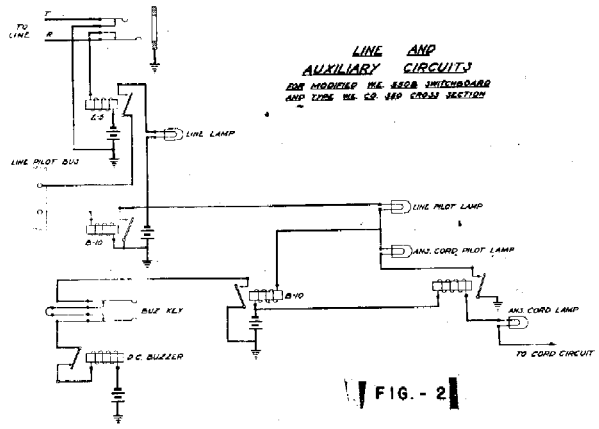


FIG. - 2

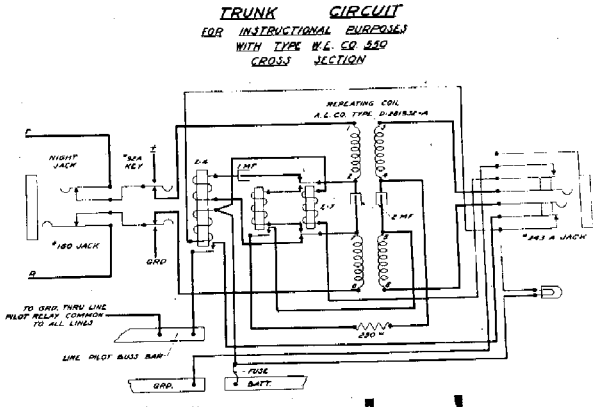
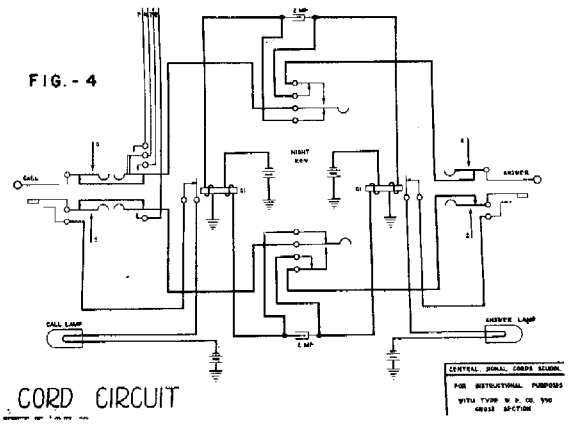


FIG. - 3

CHARTS USED TO TEACH INDIVIDUAL CIRCUITS. ORIGINAL DRAWINGS WERE EACH IN SEVERAL COLORS.

FIG. - 4



CORD CIRCUIT

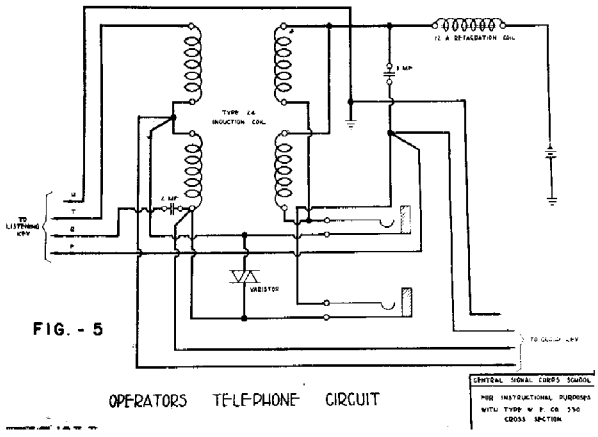


FIG. - 5

OPERATORS TELEPHONE CIRCUIT

16A and a WECo #E7 relay was substituted for the B390. They terminate on the WECo #243A jack and are provided with B2 lamps. No night jacks are provided. It is realized that the maximum working loop of this circuit may be greatly reduced and perhaps transmission not as good as it might be. However, the circuit does demonstrate and set forth the principles of one type of trunk circuit, and so serves its purpose.

3. The Coil Circuit (Figure 4) — There are two cord circuits employing the use of WECo #G1 retardation type relays which provide single supervision. The night or through key is provided, as is normal. Ringing and listening WECo B2 lamps are used.

4. The Operator's Telephone Circuit (Figure 5) — One operator's telephone circuit is provided employing WECo #24 induction coils. Astatic shock is eliminated in the operator's receiver by means of an arrestor. The circuit is the same anti-sidetone operator's telephone circuit studied by the student in the circuit courses and used on the Modified 550 WECo switchboard.

DEMONSTRATOR SHOWS CURRENT-VOLTAGE RELATIONSHIPS

One of the latest developments to be used as a training aid in the Central Signal Corps School, Camp Crowder, Missouri, is the adaptation of an oscilloscope to show two wave forms simultaneously on the screen of the 'scope, as shown in Figure 1. Enlisted instructors of the Common Division of the Central Signal Corps School have developed and constructed a demonstration board to use in conjunction with the 'scope to give the illusion of the voltage and current waves in an AC circuit. Common Division has used this device to demonstrate phase relationships in inductive, capacitive, and series resonant circuits with marked success.

Previous to the use of the demonstration board with the 'scope, the problem of teaching the student the phase relation between voltage and current de-

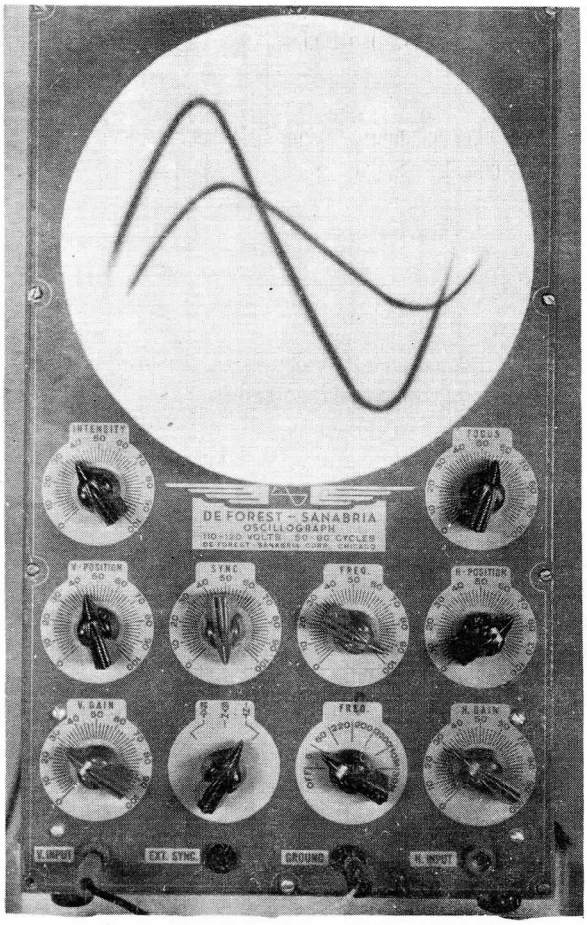


FIG. 1 - VIEW OF WAVE PHASE RELATIONSHIPS AS THEY APPEAR ON THE OSCILLOSCOPE SCREEN

pended upon viewing charts and then referring to the oscilloscope, which only pictured the respective waves separately. The method described overcomes both of these handicaps.

The board with the oscilloscope is first used as a demonstrator with a lecture. The students are given an opportunity to see the 'scope in operation. After the class discussion, if the relationship is not clear, the equipment is adaptable to individual demonstration.

The basic circuit used in this demonstration, as shown in Figure 2, consists of a capacitor variable from 1 to 12 mfd, a permeability coil variable from .5 to 3 henries, a 25-watt lamp, all connected in series, and a transformer to supply of low voltage. The value of the circuit constants available makes resonance possible at the commercial 60-cycle frequency. The circuit components, as shown in Figure 3, are manufactured by Crow, with the exception of the rotary switch, which was designed by the instructors of the Common Division. The switch was constructed from a salvaged telephone generator.

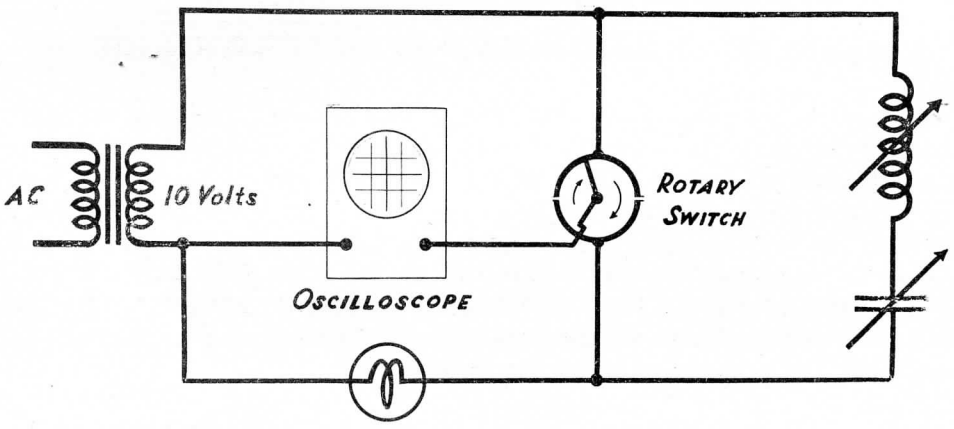


FIG. 2 - BASIC CIRCUIT.

The switch (Figure 4) is a single-pole double-throw type, which is connected so as to alternately place the input terminals of the 'scope across the applied voltage and across the lamp in the circuit. The 'scope, when placed across the applied voltage, will show its wave form, and when placed across the lamp by means of the rotary switch will show the shift of the IR drop throughout the cycle. The voltage drop of the lamp is in phase with the current in the circuit, and shows its wave form and phase relationship with the applied voltage.

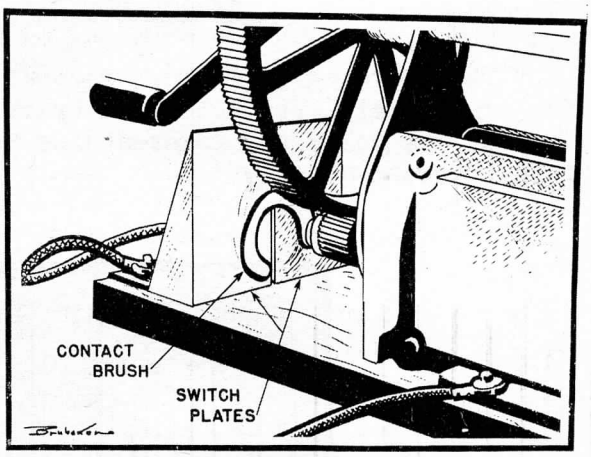


FIG. 4 - DETAIL OF GENERATOR MECHANISM EMPLOYED IN SWITCHING.

The rotating element of the switch is a ringing generator (from a local battery telephone) with the magnets removed. A phosphor-bronze brush, as shown in Figure 4, is attached to the gear on the end of the armature shaft and makes contact with the two plates of the switch. The plates are separated from each other to produce the double-throw effect of the switch. The switch, when rotated at hand speed, produces several thousand RPM, giving the illusion of both waves superimposed as they appear on the oscilloscope screen.

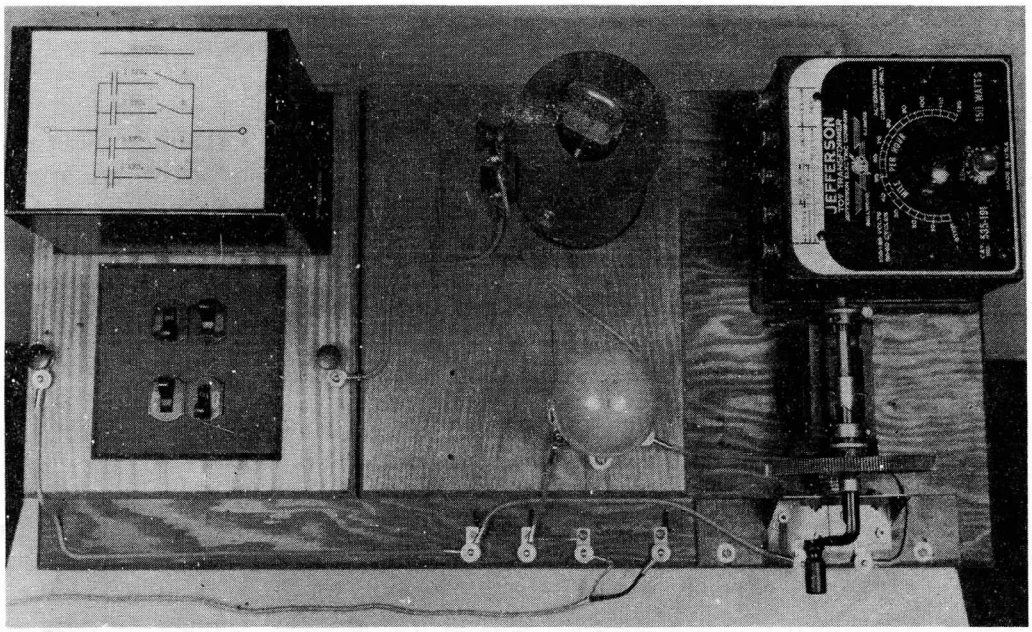
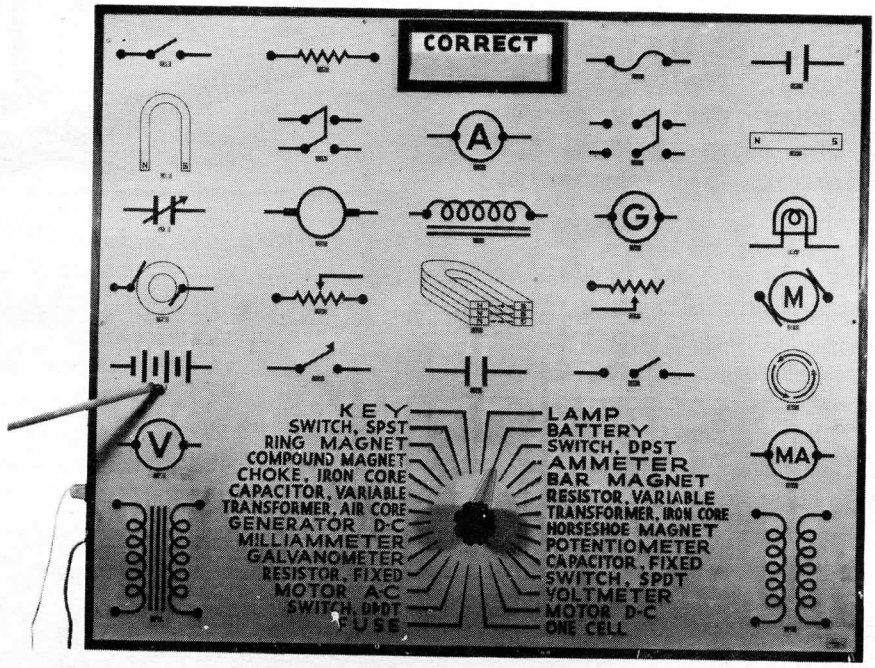


FIG. 3 - EQUIPMENT USED WITH THE OSCILLOSCOPE. SWITCHING MECHANISM OF FIG. 4 IS SHOWN AT LOWER RIGHT.

SYMBOL MATCHING DEMONSTRATION BOARD

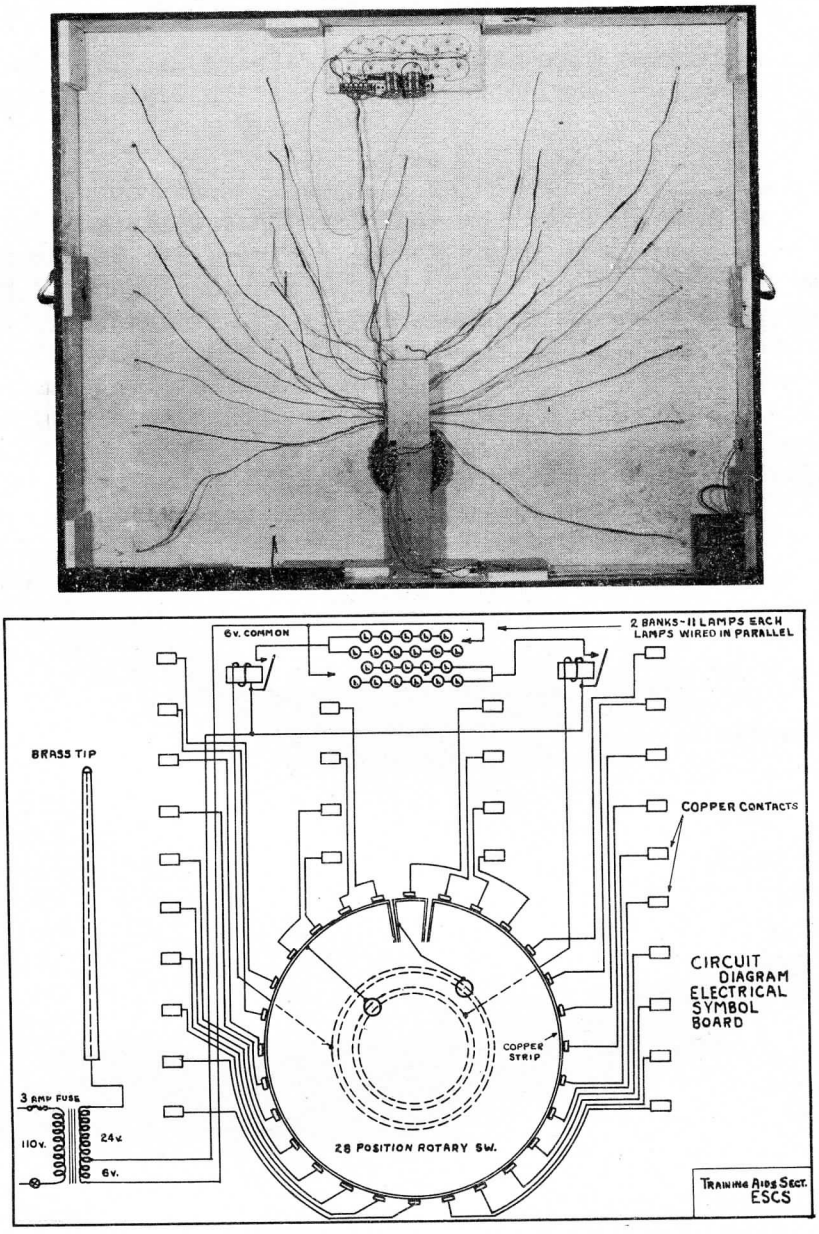
The board shown in the accompanying photographs is one employed at the Eastern Signal Corps School in training students in elementary electricity. It provides color and interest for those students who lack imagination or lose interest quickly.



Twenty-eight symbols are shown and grouped around a selector switch and are the names of these symbols. When the switch is set to point to any one of these names, a circuit is automatically set up such that, if the metallic-tipped pointer (shown at extreme left of the photo) is touched to the metal tab beneath this particular symbol, the upperhalf of the window at the top of the board will glow brightly, silhouetting the word "CORRECT." If, however, the pointer is touched to the tab beneath any of the other twenty-seven symbols, the word "ERROR" will appear in the lower part of the window.

A board of this type can be readily applied to any symbol or parts matching requirement to stimulate the interest of the student.

Electrically this aid is simple to construct and requires relatively few components, as will be indicated by the accompanying front and rear views and the electrical wiring diagram. The 28-point rotary switch sets up the circuits as described above. This consists of a stator six inches in diameter with 28 contacts spaced around its circumference. The rotor is likewise six inches in diameter but has a copper strip extending around all but one small segment of its circumference. This segment is faced with a copper strip that is insulated from the main strip. By means of a roller and pawl, this



REAR VIEW (TOP) AND CIRCUIT OF SYMBOLS BOARD

insulated strip establishes the circuit for the "CORRECT" relay. The other twenty-seven contacts set up the "ERROR" relay circuit. Either circuit is then completed by the pointer and symbol tab to which it is touched.

Like the "Motor Chassis Lubrication Board" described below, the "Symbols Matching Demonstrator Board" is made largely from parts obtained from confiscated pin-ball machines. The parts thus obtained include the lamps and sockets, relays, transformer, copper, contact strips and wire.

MOTOR CHASSIS LUBRICATION BOARD

The unit illustrated here is a visual training aid used in teaching first and second echelon lubrication at the Eastern Signal Corps Schools, Fort Monmouth.

It consists of a reproduction of a chassis, drawn out on a board ten feet long by five feet high, at the end of which are listed the correct nomenclature for the various parts as shown in Figure 1. Beside each part name is a metal tab which serves as an electrical contact. Each of these tabs works in conjunction with the pointer used by the instructor, to complete a relay circuit when touched by the pointer. The relays in turn control small 6-volt lamps, one of which is mounted at each lubrication point on the chassis. There will be four lamps mounted at the spring shackles, for example, corresponding with the four lubricating points for these parts. These will all light when the SPRING SHACKLE tab is touched. When the SPRING BOLT tab is touched with the pointer, 2 lights will come on, and so on. The following list gives the number of points to be lubricated for each specified part, and therefore the number of lamps associated with each name on the board.

Nomenclature	No of Points (Lamps)	Color of Lamp
Spring Shackle	4	Red
Spring Bolt	2	Red
Tie Rod End	2	Red
Drag Link	1	Red
Universal Joint	6	Yellow
Slip Joint	1	Yellow
Winch Shaft	1	Red
Winch Clutch	1	Yellow
Front Axle Universal	2	Yellow
Starter	1	Yellow
Pintle Hook	1	Red
Air Cleaner	1	Red
Winch Worm Housing	1	Yellow
Steering Gear Housing	1	Yellow
Transmission	1	Yellow
Transfer Case	1	Yellow
Power Cylinder	1	Yellow
Power Cylinder Air Cleaner	1	Yellow
Propeller Shaft Center Bearing	1	Yellow
Distributor	1	Yellow
Wheel Bearing	2	Yellow
Axle Housing	1	Yellow
Rear Spring Bearing	2	Yellow

Distinction between first and second echelon lubrication is made by employing red lamps for the former, yellow for the latter. These colors are

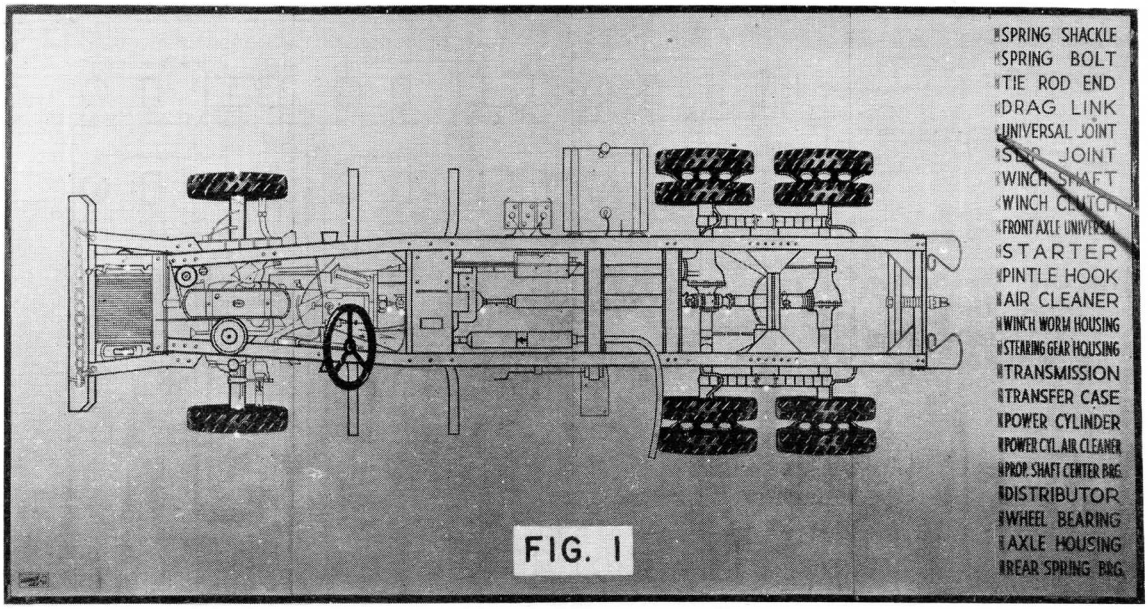


FIG. 1

secured by simply coating the lamps with paint; an arrangement which also reduces the light to a comfortable glow, easy on the eyes of the student.

The white spots of Figure 1 represent a number of lamps glowing as the result of having touched several of the nomenclature tabs with the pointer. The relays are of the holding type so that once a tab has been touched that relay will be held down until purposely released. Thus the lubrication points for a number of different parts can be shown at one time. The board is cleared, that is, all lights are extinguished, by pressure of a release button on the handle of the pointer.

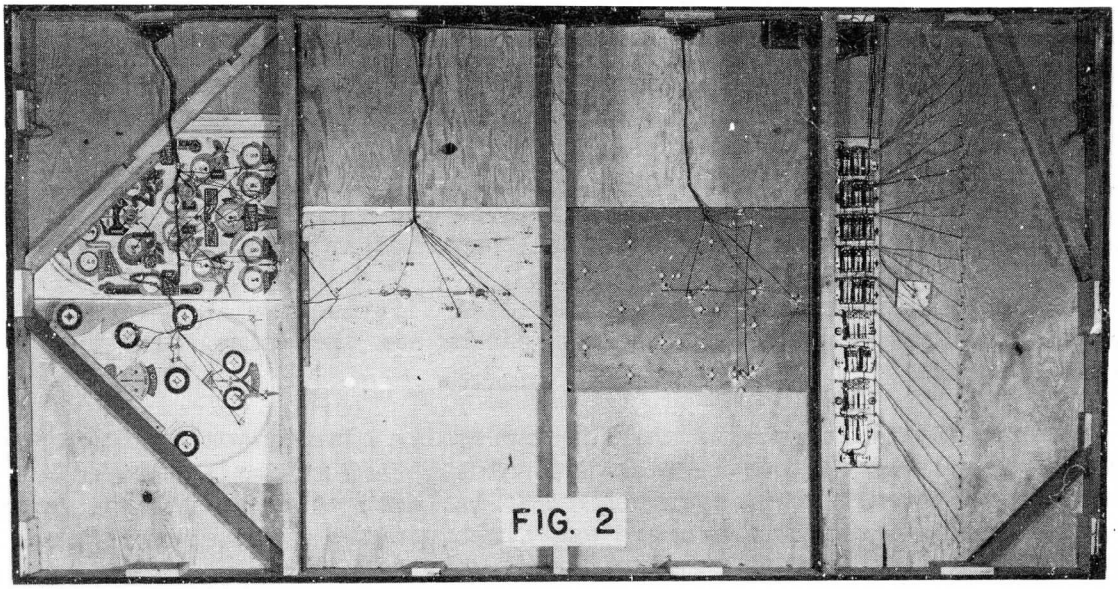


FIG. 2

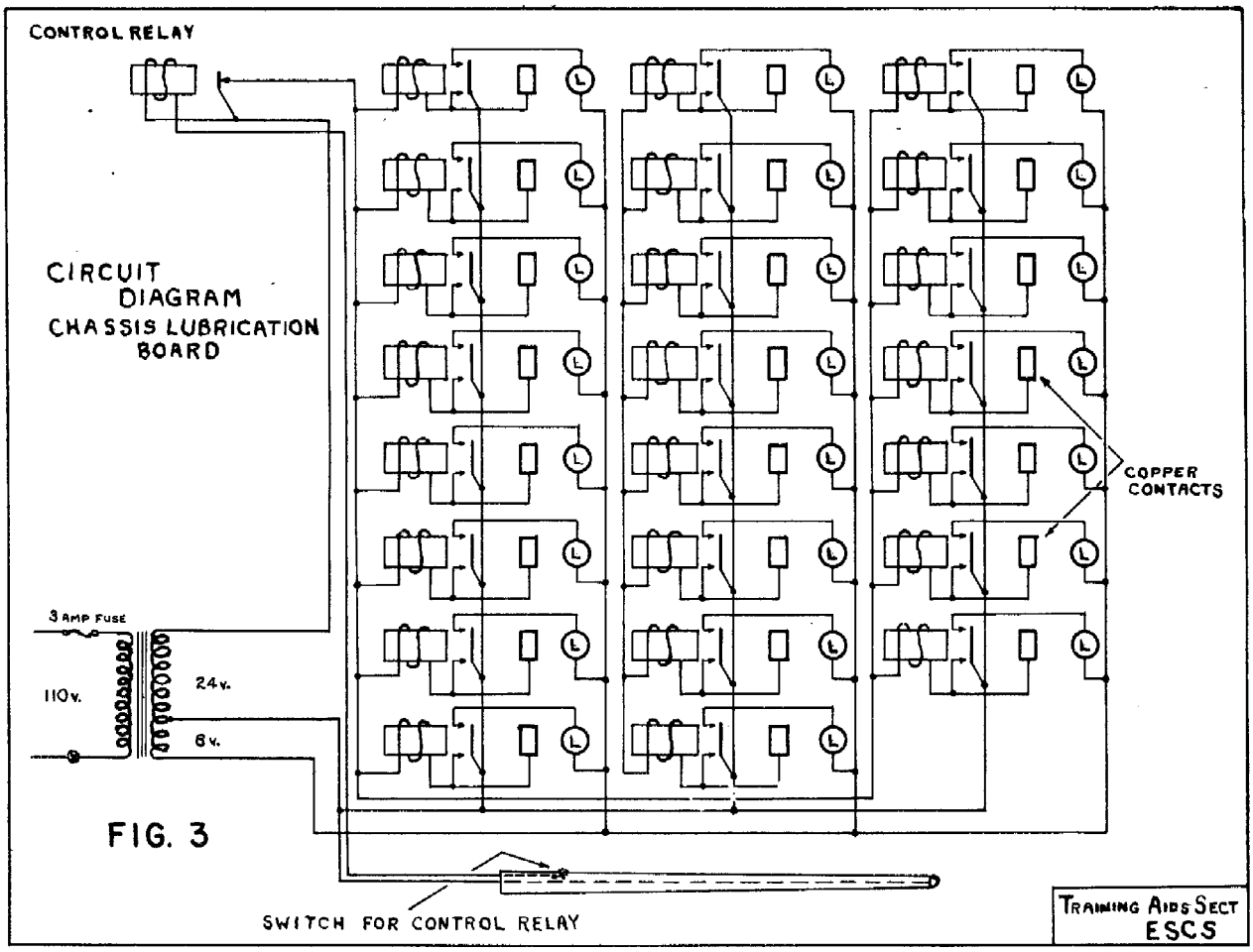


FIG. - 3

The rear view is shown in Figure 2 and the wiring diagram in Figure 3. It is of interest that all lamps, sockets, wire, relays, transformer and miscellaneous hardware were obtained from illegally used pinball machines that had been confiscated by county police and turned over to ESCS as a valuable source of electrical components. Even the wood from the pinball machines was employed as sub-panels as will be noted in the rear view photo.

The only new materials used consisted of fifty square feet of three-eighths inch plywood and thirty feet of one by six inch pine, plus the necessary paint.

Because of its large size and the impressive clarity with which the lamps designate the various lubrication points, this board is a forceful and effective demonstrator, even when used in lectures to very large groups. For added student comfort the board was first painted a soft pastel shade of green giving a flat surface to eliminate light reflection.

DRY CELL BATTERY INFORMATION CHARTS

As Signal Corps dry batteries are widely used, and as complete information concerning some types is difficult to secure in the field, the following three pages are devoted to a chart and diagrams giving truly comprehensive data on all Signal Corps types.

This material is unclassified and is being purposely placed at the center fold of this issue so that it may be easily removed for use as a wall chart if so desired.

SIGNAL CORPS DRY BATTERIES

OCTOBER 16, 1943

Signal Corps Battery	Signal Corps Stock No.	Terminal Voltage	Terminal Types	No. of Cells	Cell Type	DIMENSIONS (inches) Length	Width	Height	O.A.H.	Volume (Cu Ft)	Weight (lbs)	TEST DATA Resistance (ohms)	Initial Drain (amps)	DISCHARGE SCHEDULE	End Voltage	SPECIFIED SERVICE LIFE Initial	3 Month	6 Month	9 Month	12 Month	Signal Corps Drawing	Signal Corps Spec.	Signal Corps Battery
BA-1	3A1	3	Flat Cap	2	E	1 9/32	Dia.	6 1/16	6 1/8	0.0045	0.6	13.33	0.225	4 minutes each 1/4 hour, 10 hours per day, 5 days per week	1.67	8 Days	7.2 Days	6.5 Days	6.4 Days	6.0 Days	11204A1	70-101	BA-1
BA-2	3A2	22.5	Flexible Lead	15	A	3 1/2	2 3/32	2 21/32	3 1/32 (Note 1)	0.013	1	2500	0.009	Continuously	17	80 hours	75 hours	70 hours	60 hours	50 hours	11206A1	70-102	BA-2
BA-8	3A8	22.5	Flexible Lead	15	D	6 5/8	4 1/8	3 1/8	3 1/2 (Note 1)	0.045	4.5	1250	0.018	Continuously	17	225 hours	220 hours	210 hours	200 hours	195 hours	11207A1	70-108	BA-8
BA-9	3A9	4.5	Flat Spring (Figure 1)	3	B	2 17/32	27/32	2 5/8	3 1/16	0.004	0.4	20	0.225	4 minutes each hour, 10 hours per day, 5 days per week	2.8	7 days	6.75 days	6.25 days	5.5 days	5 days	11203A1	70-109	BA-9
BA-15-A	3A15A	1.5	Screw & Nut	2	F	2 21/32	1 5/16	4 1/16	4 7/16	0.009	0.9	20	0.15	2 BA-15-A in series discharged continuously	1.8	85 hours	80 hours	75 hours	70 hours	60 hours	SC-A-1661	70-115	BA-15-A
BA-23	3A23	1.5	Screw & Nut	1	G	2 5/8	Dia.	6 1/8	6 7/16	0.02	2.4	7.5	0.2	Continuously	0.9	175 hours	(After 2 Months 140 hrs.	160 hours	145 hours	125 hours	11205A1	70-123	BA-23
BA-26	3A26	22.5, 45	Spring Clip	30	F	8 1/4	4 1/2	7 3/8	7 15/16	0.17	12.4	2000	0.023	Continuously	17/22.5 Sect.	300 hours	290 hours	275 hours	255 hours	230 hours	11212A1	70-126	BA-26
BA-27	3A27	-1.5, -3, -4.5	Screw & Nut	3	D	4 1/16	1 1/2	3 1/8	3 1/2	0.0124	1	20	0.225	4 minutes each hour, 10 hours per day, 5 days per week	2.8	26 days	25 days	24 days	21 days	18 days	11213A1	70-127	BA-27
BA-28	3A28	4.5	Flat Spring (Figure 2)	3	A	2 1/16	11/16	2 5/16	2 3/4	0.0036	0.3	50	0.09	4 minutes each hour, 10 hours per day, 5 days per week	2.8	11 days	10.5 days	10 days	9 days	7.5 days	11214A1	70-128	BA-28
BA-30	3A30	1.5	Flat Cap	1	D	1 11/32	Dia.	2 1/4	2 13/32	0.0019	0.3	13.33	0.225	2 BA-30 in series 4 minutes per 1/2 hours, 10hours per day, 5 days per week	1.67	16 days	15 days	14 days	13 days	12 days	SC-A-535	70-130	BA-30
BA-31	3A31	4.5	Screw & Nut	3	B	2 13/32	27/32	2 23/32	3 3/16	0.0038	0.4	20	0.225	4 minutes each hour, 10 hours per day, 5 days per week	2.8	7 days	6.75 days	6.25 days	5.5 days	5 days	SC-A-1662	70-131	BA-31
BA-32	3A32	3 "A" Unit 144 "B" Unit 13.5 "C" Unit 4.5 "D" Unit	Socket (5 hole) (Figure 3)	6 96 9 3	G B B B	8	5	6 13/16	7 7/32	0.19	14	7.5 7.5 3,600 7,200 540 open 90 open	0.4 0.4 0.04 0.02 0.025 0 0.05 0	Each unit 2 minutes thru first resistance, 4 minutes thru second resistance cycle repeated	2 115 11.5 3.5	25 hours	24 hours	23 hours	21 hours	18 hours	SC-D-1465	70-132	BA-32
BA-33	3A33	45, 135	Screw & Nut	90	A	6 1/4	3 9/16	5 3/16	5 3/4	0.074	6	15,000	0.009	Continuously	100	80 hours	75 hours	70 hours	60 hours	50 hours	SC-A-8811	70-133	BA-33
BA-34	3A34	-1.5, -3, -4.5 -6, -7.5	Screw & Nut -7.5 is Flexible Lead	5	B	4 1/8	7/8	2 7/8	3 3/8	0.007	0.6	35	0.214	4 minutes each hour, 10 hours per day, 5 days per week	4.5	7 days	6.5 days	6 days	5.5 days	5 days	SC-A-1411	70-134	BA-34
BA-35	3A35	1.5	Screw & Nut	4	F	2 11/16	2 11/16	4	4 7/16	0.0185	1.5	7.5	0.2	Continuously	0.9	125 hours	120 hours	110 hours	95 hours	75 hours	SC-A-6383	70-135	BA-35
BA-36	3A36	-22.5, 45	Screw & Nut	30	B	4 1/2	2 9/16	5 7/8	6 3/8	0.04	3	3000	0.015	Continuously	35	60 hours	55 hours	50 hours	45 hours	40 hours	SC-A-6384	70-136	BA-36
BA-37	3A37	1.5	Flat Cap	1	J	1 11/32	Dia.	6	6 3/16	0.005	.6	5	0.3	5 hours per day, 5 days per week	1	12.5 hours	12.25 hours	12 hours	11.5 hours	11 hours	SC-A-6385	70-137	BA-37
BA-38	3A38	103.5	Flat Cap (Figure 4)	69	N	1 11/32	1 11/32	11 5/8	11 23/32	0.012	1.3	3000 8000	0.035 0.013	2 minutes thru first resistance, 4 minutes for second, cycle repeated	65	6.0 hours	5.75 hours	4.75 hours			SC-A-6386	70-138	BA-38
BA-39	3A39	7.5 "A" Unit 150 "B" Unit	Socket (5 hole) (Figure 5)	5 100	F A	6 1/2	3 13/16	7 1/8	7 9/16	0.109	8.5	37.5 3600	0.2 0.042	Each unit 2 minute discharge, 4 minutes open circuit, cycle repeated	5.5 110	40 hours	38 hours	35 hours	30 hours	20 hours	SC-D-6300	70-139	BA-39
BA-40	3A40	1.5 "A" Unit 90 "B" Unit	Socket (4 hole) (Figure 6)	4 60	G B	5 5/16	4 1/8	7	7 7/16	0.094	7.4	2.3 2.3 2000 4100	0.65 0.65 0.045 0.022	2 minutes thru first resistance, 4 minutes thru second resistance, cycle repeated	1.1 65	20 hours	19.5 hours	18 hours	16 hours	14 hours	SC-D-6301	70-140	BA-40
BA-41	3A41	4.5 "A" Unit 25.5 "B" Unit 60 "C" Unit	Socket (5 hole) (Figure 7)	3 17 40	N N N	2 3/8	2 1/8	3 1/2	3 1/2	0.01	1	80,000	0.0011	Continuously	65	100 hours	(after 12 Months 90 hours	85 hours			SC-A-6303	70-141	BA-41
BA-42	3A42	1.5	Flat Cap	1	C	1 1/32	Dia.	1 3/4	1 29/32	0.00097	0.1	15	0.20	2 BA-42 in series, 4 minutes each hour, 10 hours per day, 5 days per week	1.67	9 days	8.65 days	7.97 days	7.26 days	6.29 days	SC-A-535	70-142	BA-42
BA-43	3A43	1.5 "A" Unit 45 "B" Unit 45 "C" Unit	Socket (6 hole) (Figure 8)	4 60 30	F AA N	3 7/8	3 3/32	1 1/16	7 1/4 (Note 2)	0.065	5.1	4.3 7500 40000	0.35 0.012 0.0011	10 hours per day, 5 days per week	1.1 65 35	30 hours	26 hours	20 hours			SC-A-7066	70-143	BA-43
BA-44	3A44	6	Screw & Nut	4	6	10 1/2	2 3/4	6 3/4	7 1/2 (Note 3)	0.125	9		0.5	Constant current discharge	4	25 hours	24 hours	23 hours	22 hours	21 hours	SC-A-7067	70-144	BA-44
BA-45 (Note 5)		1.25	Flat Cap	1	21mm Cell	5/8	Dia.	11/32	11/32	0.00006	.005			Check open circuit voltage							SC-A-7068		BA-45
BA-46		1.5	Snap Fastener	1	Special	1 13/16	Dia.	4 1/16	4 3/16	0.0063	0.6	5	0.3	Continuously	0.9	15 hours	14 hours	13 hours		11 hours	SC-A-8808		BA-46
BA-47		45	Snap Fastener	30	P					0.0078	0.8	4500	0.01	6 minutes thru 1st resis-	34	10 hours	9 hours	7.5 hours		4 hours	SC-A-8809		BA-47

		90 "B" Unit	(Figure 6)	60	B	$5\frac{5}{16}$	$4\frac{1}{8}$	7	$7\frac{1}{16}$			2.3 2000 4100	0.65 0.045 0.022	and resistance, cycle repeated	45								
BA-41	3A41	4.5 "A" Unit 28.8 "B_1" Unit 60 "B_2" Unit	Socket (5 hole) (Figure 7)	3 17 40	N N N	$2\frac{3}{8}$	$2\frac{1}{8}$	$3\frac{1}{2}$	$3\frac{1}{2}$	0.01	1	80,000	0.0011	Continuously	65	100 hours	(after 2 months) 90 hours	85 hours			SC-A-6303	70-141	BA-41
BA-42	3A42	1.5	Flat Cap	1	C	$1\frac{1}{32}$	Dia.	$1\frac{3}{4}$	$1\frac{29}{32}$	0.00097	0.1	15	0.26	2 BA-42 in series, 4 minutes each hour, 10 hours per day, 5 days per week	1.87	9 days	8.65 days	7.97 days	7.96 days	6.29 days	SC-A-535	70-142	BA-42
BA-43	3A43	1.5 "A" Unit 90 "B_1" Unit 45 "B_2" Unit	Socket (8 hole) (Figure 8)	4 60 30	F AA N	$3\frac{7}{8}$	$3\frac{3}{32}$	$1\frac{1}{16}$	$7\frac{1}{4}$ (Note 2)	0.065	3.1	4.3 7500 40000	0.35 0.012 0.0011	10 hours per day, 5 days per week	1.1 65 35	30 hours	26 hours	20 hours			SC-A-7066	70-143	BA-43
BA-44	3A44	6	Screw & Nut	4	6	$10\frac{1}{2}$	$2\frac{3}{4}$	$6\frac{3}{4}$	$7\frac{1}{2}$ (Note 3)	0.125	9		0.5	Constant current discharge	4	25 hours	24 hours	23 hours	22 hours	21 hours	SC-A-7067	70-144	BA-44
BA-45 (Note 5)		1.25	Flat Cap	1	Bias Cell	$\frac{5}{8}$	Dia.	$\frac{11}{32}$	$\frac{11}{32}$	0.00006	.005			Check open circuit voltage							SC-A-7068		BA-45
BA-46		1.5	Snap Fastener	1	Special	$1\frac{13}{16}$	Dia.	$4\frac{1}{16}$	$4\frac{3}{16}$	0.0063	0.6	5	0.3	Continuously	0.9	15 hours	14 hours	13 hours		11 hours	SC-A-8808		BA-46
BA-47		45	Snap Fastener	30	P	$2\frac{15}{16}$	$1\frac{1}{4}$	$3\frac{9}{16}$	$3\frac{11}{16}$	0.0078	0.8	4500 1000	0.01 0.045	6 minutes thru 1st resistance, 2 minutes thru 2nd resistance, cycle repeated	14	10 hours	9 hours	7.5 hours		4 hours	SC-A-8809		BA-47
BA-48	3A48	1.5 "A" Unit 90 "B" Unit	Socket (4 prong) (Figure 9)	6 60	CD A	10	$2\frac{7}{32}$	$4\frac{7}{8}$	$4\frac{7}{8}$	0.053	5	5 9000	0.3 0.01	5 hours per day, 5 days per week	1.1 65	60 hours	57 hours	53 hours	47 hours	40 hours	SC-A-6908	70-146	BA-48
BA-49	3A49	1.5 "A" Unit 67.5 "B_1" Unit 67.5 "B_2" Unit	Socket (5 pin) Plus 2 guide holes in top (Figure 10)	2 45 45	E N N	$5\frac{9}{16}$	$1\frac{1}{2}$	$6\frac{9}{16}$	$6\frac{9}{16}$ (Note 4)	0.045	2.5	3 4.3 3000 13500	0.5 0.25 0.04 0.009	2 minutes for 1st resistance 4 minutes for 2nd resistance B_1 and B_2 connected in series and discharged thru 1st resistance for 2 minutes and thru 2nd resistance for 4 minutes	1.1 85	6 hours	5.75 hours	4.75 hours			SC-A-7069	70-149	BA-49
BA-50		3	Wire Coil Socket	2	AA	$1\frac{1}{8}$	$\frac{9}{16}$	2	$2\frac{3}{8}$	0.00096	0.1	12	0.25	Continuously	1.8		30 min.	20 min			SC-A-11320	70-150	BA-50
BA-51	3A51	67.5	Snap Fastener (Figure 11)	45	N	$2\frac{11}{16}$	$1\frac{3}{8}$	$3\frac{11}{16}$	$3\frac{3}{4}$	0.008	0.9	2000 5300	0.034 0.033	2 minutes thru 2000 ohms 4 minutes thru 5300 ohms cycle repeated	42	6 hours	5.75 hours	4.75 hours			SC-A-8810	70-151	BA-51
BA-53	3A53	22.5, 45	Screw & Nut	30	AA	$3\frac{1}{16}$	$1\frac{15}{16}$	$4\frac{9}{16}$	$5\frac{1}{8}$	0.017	1.6	3800	0.012	Continuously	34	10 hours	9.17 hours	8.33 hours	6.66 hours		SC-A-9557	70-153	BA-53
BA-56		45	Snap Fastener (Figure 12)	30	N	$2\frac{9}{16}$	$3\frac{1}{32}$	$3\frac{41}{64}$	$3\frac{11}{16}$	0.0053	0.6	1300 3500	0.035 0.013	2 minutes thru 1300 ohms, 4 minutes thru 3500 ohms cycle repeated	28	6 hours	5.75 hours	4.75 hours			SC-A-11736	70-156	BA-56
BA-57		1.5 "A" Unit 90 "B" Unit	Socket (3 hole) (Figure 13)	8 60	R F	$4\frac{1}{16}$	$1\frac{15}{16}$	$4\frac{9}{16}$	$4\frac{9}{16}$	0.02	1.6	4 7500	0.38 0.012	Continuously	1.0 68	1 hour 50 min.	1 hour 45 min.	1 hour 20 mins.			SC-A-9599	70-157	BA-57
BA-58	3A58	1.5	Flat Cap	1	AA	$\frac{35}{64}$	Dia.	$1\frac{29}{32}$	$1\frac{33}{32}$	0.00027	0.03	40	0.075	2 BA-58 in series, 4 minutes each 1/2 hour, 10 hours per day, 5 days per week	1.87	5.5 days	5 days	4 days	3 days		SC-A-9558	70-158	BA-58
BA-59		45	Socket (5 hole) (Figure 14)	30	155 Mini-Max	$3\frac{17}{32}$	$1\frac{3}{4}$	$5\frac{1}{2}$	$5\frac{1}{2}$	0.019	2	1500	0.03	Continuously	35	10 hours	9.5 hours	9 hours	7.75 hours	6.5 hours	SC-A-9628	70-159	BA-59
BA-63	3A63	22.5, 45	Socket (5 hole) (Figure 15)	30	AA	3	$2\frac{5}{16}$	$4\frac{1}{8}$	$4\frac{1}{8}$	0.017	1.4	3800	0.019	Continuously	34	10 hours	9.17 hours	8.33 hours	6.66 hours		SC-A-9659	70-163	BA-63
BA-65	3A65	1.5	Socket (2 hole) (Figure 16)	4	P	$2\frac{5}{8}$	$2\frac{5}{8}$	$4\frac{1}{16}$	$4\frac{1}{16}$	0.016	1.5	7.5	0.2	Continuously	0.9	125 hours	120 hours	110 hours	95 hours	75 hours	SC-A-9560	70-165	BA-65
BA-67		3 "A" Unit 90 "B" Unit	Socket	8 60	R P	$4\frac{1}{16}$	$1\frac{15}{16}$	$4\frac{9}{16}$	$4\frac{9}{16}$	0.02	1.6	16 7500	0.19 0.012	Continuously	2.2 68	1 hour 50 min.	1 hour 45 min.	1 hour 20 min.			SC-A-7623	70-167	BA-67
BA-70	3A70	4.5 "A" Unit 90 "B_1" Unit 60 "B_2" Unit	Socket (8 hole) (Figure 17)	9 60 40	G B B	$10\frac{3}{8}$	$4\frac{9}{16}$	$7\frac{7}{8}$	$8\frac{7}{32}$	0.25	16	12.5 8.00 5850 2150	0.36 0.56 0.026 0.07	4 minutes thru 1st resistance, 2 minutes thru 2nd resistance, repeated B_1 and B_2 in series, 4 minutes thru 1st resistance, 2 minutes thru 2nd resistance, cycle repeated	3.6 110	16 hours	15 hours	14 hours	13 hours	11 hours	SC-D-7085	70-170	BA-70
BA-80		4.5 "A" Unit 90 "B_1" Unit 60 "B_2" Unit	Socket (8 hole) (Figure 17)	9 60 40	F A A	$10\frac{3}{8}$	$4\frac{9}{16}$	$5\frac{3}{8}$	$5\frac{23}{32}$	0.156	9	12.5 8.00 5850 2150	0.36 0.56 0.026 0.07	4 minutes thru 1st resistance, 2 minutes thru 2nd resistance, repeated B_1 and B_2 in series, 4 minutes thru 1st resistance, 2 minutes thru 2nd resistance, cycle repeated	3.6 110	8 hours	7.5 hours	7 hours	6.25 hours	5 hours	SC-D-11237	70-180	BA-80
BA-200/U		6	Spring Type	4	F	$2\frac{11}{16}$	$2\frac{11}{16}$	$3\frac{15}{16}$	$4\frac{3}{8}$	0.018	1.5	40	0.16	Continuously	4	12 hours	11.5 hours	11 hours	10 hours	8.5 hours	SC-D-6699	70-300	BA-200/U
BA-202/UF (Note 6)		1.5	Flat Cap	1	D	$1\frac{11}{32}$	Dia.	$2\frac{3}{8}$	$2\frac{7}{16}$	0.0019	0.3	0.07	42.86	2 BA-202/UF in series, 0.005 seconds each 1/4 hr. 6 hours per day, 5 days per week	0.5	100 discharges	95 discharges	90 discharges	84 discharges	75 discharges	SC-A-7660	70-302	BA-202/UF
BA-203/U		6	Socket (Figure 18)	8	F	$3\frac{15}{16}$	$2\frac{25}{32}$	$5\frac{9}{16}$	$5\frac{9}{16}$	0.032	3.3	20	0.30	Continuously	4	12 hours	11.5 hours	11 hours	10 hours	8.5 hours	SC-A-7661	70-303	BA-203/U

NOTES:
1. 3/8" allowance has been made for space occupied by flexible leads.
2. Allowance has been made for space occupied by the web strap.
3. Web strap does not project beyond terminals except when used as handle. Dimension includes space occupied by terminal.
4. Web strap does not project beyond flange on bottom of battery except when used as handle. Dimension includes space occupied by flange.
5. BA-45 is titled Bias Cell BA-45 instead of Battery BA-45.
6. BA-202/U is similar to BA-30 except has a high flash current characteristic
7. The information in this chart should not be used for the purpose of bidding or manufacture. Specifications or drawings for such purposes should be obtained from the Contracting Officer direct through an intermediary prospective bidder or contractor.

SIGNAL CORPS DRY BATTERY TYPES

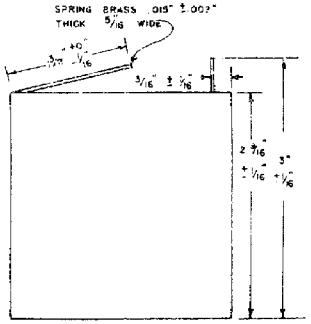


FIG. 1 BA-9

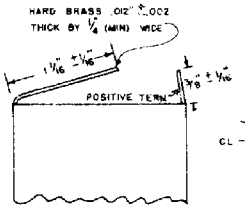


FIG. 2 BA-28

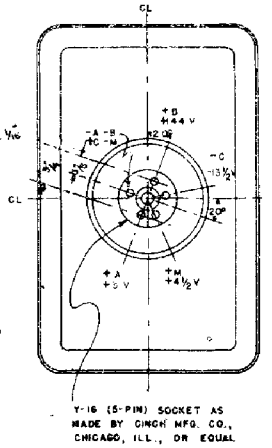


FIG. 3 BA-32

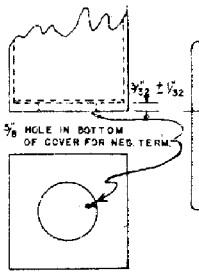


FIG. 4 BA-38

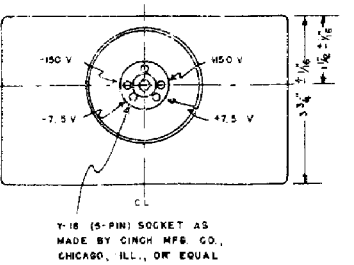


FIG. 5 BA-39

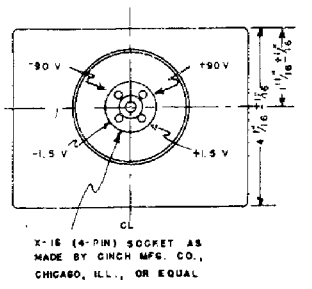


FIG. 6 BA-40

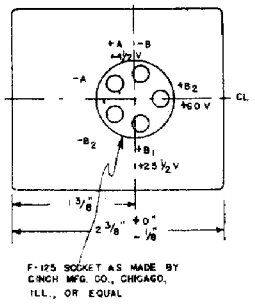


FIG. 7 BA-41

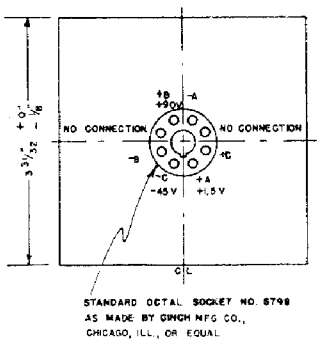


FIG. 8 BA-43

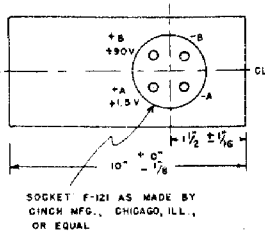


FIG. 9 BA-48

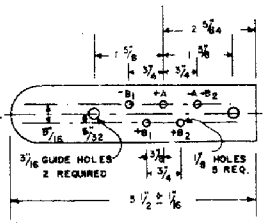


FIG. 10 BA-49

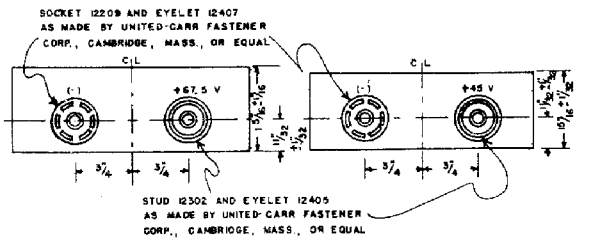


FIG. 11 BA-51

FIG. 12 BA-56

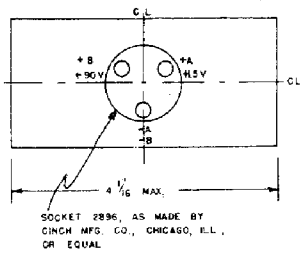


FIG. 13 BA-57

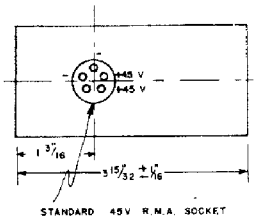


FIG. 14 BA-59

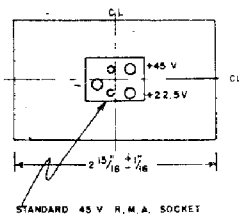


FIG. 15 BA-63

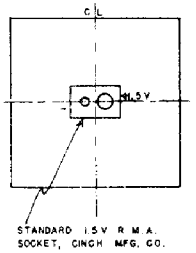


FIG. 16 BA-65

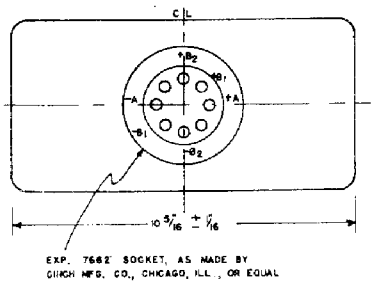


FIG. 17 BA-70 & 80

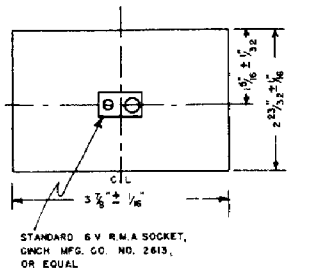


FIG. 18 BA-203/U

EQUIPMENT NOTES

SIGNAL CORPS BOARD

SIGNAL CORPS BOARD CASES APPROVED BY CHIEF SIGNAL OFFICER

Signal Corps Board Case No. 533 - Improvised Reel Mounts for Vehicles Used in Cross-Country Wire Laying. Approved 30 September 1943.

The Signal Corps Board was directed to determine methods for improvising mounts for Reel Unit RL-26-A, RL-31, and Axle RL-27-B, in vehicles used for cross-country wire laying; and to submit drawings and instructions for constructing and installing the mounts recommended.

The method prescribed in TM 11-360 for mounting Reel Unit RL-26-A in 0-Truck, 2½-Ton, 6x6, cargo, is satisfactory and training in its use is well established in signal organizations.

The report of the Signal Corps Board in Case No. 514, Vehicles and Equipment for Cross-Country Wire Laying, approved by the Chief Signal Officer, 11 May 1943, recommended the construction and installation of an improvised mount for Reel Unit RL-26 in 0-Truck, 3/4-Ton, 4x4, Weapons Carrier with Winch.

FIG.-1

Many field organizations have been experimenting with improvised reel mounts in the 0-Truck, 1/4-Ton, 4x4, some of which have damaged the vehicles. It was considered advisable that an approved standard method of mounting reel units on both the 0-Truck, 3/4-Ton, 4x4, Weapons Carrier with Winch, and on the 0-Truck, 1/4-Ton, 4x4, should be furnished in the form of detailed working drawings suitable for inclusion in appropriate training literature.

The principal problem in-


FIG.-2

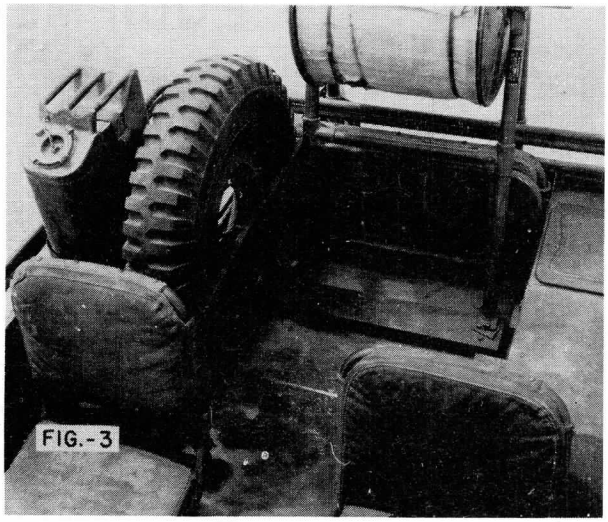


FIG.-3

volved in this case was the method of mounting reel units in the O-Truck, 1/4-Ton, 4x4. Reel Unit RL-31 was found to be the only standard reel unit suitable for mounting in this vehicle. The method of mounting improvised and tested at the Proving Center, Aberdeen Proving Ground, Maryland, was selected as most satisfactory and is illustrated herewith.

Figure 1 shows a right front view of the truck with gas tank, spare tire and reel mounted in the approved manner. Figure 2 shows the detail of hardware and method of attachment at the rear of the vehicle and in Figure 3 are shown the hardware, method of attachment of reel mounting, and the arrangements for gas can and spare tire at the rear interior of the truck body.

The approved recommendations in this case state that no further consideration will be given to any type of improvised mount for Axle RL-27; to furnishing power for wire recovery by means of a power take-off on O-Truck, 1/4-Ton, 4x4, or O-Truck, 3/4-Ton, 4x4, Weapons Carrier; or to the standardization of Reel Unit RL-45.

Provision is also made to amend the specifications for Reel Unit RL-26 to include the hardware necessary for mounting Reel Unit RL-26 in O-Truck, 3/4-Ton, 4x4, Weapons Carrier, with Winch, using as a guide the drawing and list of materials appended to the report and to include bolts for mounting the reel in O-Truck, $2\frac{1}{2}$-Ton, 6x6, Cargo.

The specifications for Reel Unit RL-31 are to be amended to include the hardware necessary for mounting the reel unit in O-Truck, 1/4-Ton, 4x4, using as a guide drawings and list of materials appended to the report of the Signal Corps Board. The materials used are as illustrated in the accompanying photographs.

It was also recommended that information and illustrations be included

in the next revision of TM-362, Reel Units RL-31, showing: (a) the approved method of mounting RL-31 on the tail gate of O-Truck, 2½-Ton, 6x6, Cargo, by means of the tail gate brackets; (b) the proper method of mounting Reel Unit RL-31 by means of the toe clamp in an O-Truck, 3/4-Ton, 4x4, Weapons Carrier; (c) the approved method of mounting Reel Unit RL-31 in O-Truck, ¼-Ton, 4x4, and (d) the latest type brake as currently supplied with Reel Unit RL-31-A.

Attachment Kit 297 (U. bolts) is to be reclassified from "standard" to "obsolete," removed from OCSigO Circular No. 10-1, and further procurement discontinued.

Personnel and Training Service, OCSigO, will also prepare and publish at the earliest practicable date, training information showing the approved method of mounting Reel Unit RL-31 in O-Truck, 1/4-Ton, 4x4.

Signal Corps Board Case No. 501 - Testboards BD-101-T1 and BD-101-T2. Approved 2 October 1943.

The Signal Corps Board was directed to supervise service tests on two testboards developed by the Signal Corps General Development and Bell Telephone Laboratories, respectively, and to assist in the preparation of military characteristics for proposed Testboard BD-101.

The use of testboards for the clearing of trouble has been established practice in commercial telephone exchanges for many years. As yet, no equivalent equipment has been standardized by the Signal Corps for use in military field telephone exchanges. However, the using arms have been compelled to improvise testboards and have urgently requested that equipment be provided for this purpose.

Due to increased capacity and complexity of modern military field telephone and telegraph systems, it was considered advisable to make a study of the need for specialized testboards in the higher echelons; and to service test equipment developed especially for the purpose of expediting the testing and location of faults in the exchanges of the larger military units.

Three types of testboards were considered in this study: (a) Testboard BD-101-T1, developed by the Eatontown Signal Laboratory; (b) Testboard BD-101-T2, developed by the Bell Telephone Laboratories for use in field military units; (c) A testboard developed by the Bell Telephone Laboratories at the request of Plant Engineering Agency and designed for exchanges operated by the Army Communications Service.

The Signal Corps Board found that the size of corps and division centrals does not warrant the use of special testboards of the types tested as auxiliary equipment in these units. The use of Switchboard BD-72 for temporary operation, as a switchboard in the early stages of installation of these centrals, and later as a temporary testing board is favorably considered. The old monocord switchboard also may be used at the smaller centrals and

construction centers. Signal Corps Board Case No. 540 is a detailed study of the requirements of corps and division for test equipment at the headquarters central office. A report in this case is expected at an early date.

The Board decided that the size and complexity of the Army Communication System makes it advisable to operate a testboard in connection with that central. Service test model BD-101-T1 was found to most nearly meet the needs of an Army Telephone Central Office Set. However, certain modifications are considered desirable. The recommended modifications included some of the better features of the Testboard BD-101-T2. The testboard designed for Plant Engineering Agency was found to be unsuitable for use by tactical organizations.

Briefly summarized the approved recommendations in this case provided for the preparation of Military Characteristics for Testboard BD-101; the presentation of a modified Testboard BD-101-T1 to the Signal Corps Technical Committee for classification; the preparation of specifications for Testboard BD-101; the coordination of a suitable basis of issue with the Commanding General, Army Ground Forces and the Commanding General, Army Air Forces; and the initiation of a study to investigate the basis of issue necessary to insure that suitable test equipment is provided for use on repeatered circuits and carrier systems.

GROUND SIGNAL

REPLACEMENT ENGINES AVAILABLE SOON FOR LAUSON ENGINE IN REEL UNIT RL-26-( )

As excessive maintenance has been required by Lauson engines, used in Reel Unit RL-26-( ), they have proven unsatisfactory for extended operation in the field; consequently these engines and their replacement parts are no longer being procured. Briggs & Stratton engines are being procured to replace all Lauson engines in Reel Unit RL-26-( ), and their delivery to all depots throughout the United States is expected to begin by 15 December 1943. Replacement will be made as rapidly as availability of the new engines permits.

Reel Unit RL-26-( ), when equipped with the Lauson engine, will be used only within continental United States. This engine will be replaced by the Briggs & Stratton engine as soon as such replacement engines become available. Pending this, the Lauson engines will continue to be used, but spare parts will be obtained only from similar salvaged motors.

The Briggs & Stratton replacement engines should be requisitioned in accordance with their stock number description, which follows:

Replacement Engine, Briggs & Stratton, Model A or AP, as used on Reel Unit RL-26; Signal Corps Stock No. 3H1901-AP.1.

MICROPHONE COVER M-367 PROTECTS AGAINST ICE AND DUST

(NOTE: As the Signal Corps Technical Information Letter does not at present normally reach the communications officers of lower units, and as line units will be major users of Microphone Cover M-367, it is suggested that Signal officers reading this article call the information contained therein to the attention of communications officers of associated organizations. —— ED.)

When temperatures are at freezing or below, moisture from a speaker's breath condenses and freezes on the microphone into which he is talking. This ice plugs up the small holes in the face of the microphone, rendering the device useless.

This condition has been overcome by providing Microphone Cover M-367, which permits the passage of sound, but is impervious to breath moisture. The cover is an ordinary commercial bowl cover, such as housewives use on small bowls or milk bottles in their refrigerators. It is made of fabric which has been moisture-proofed, and has an elastic band or a draw-string whereby it can be fastened to the microphone in question. It is cheap, readily available, uses no critical materials and does not appreciably impede speech transmission, but tears easily and should be treated with care.

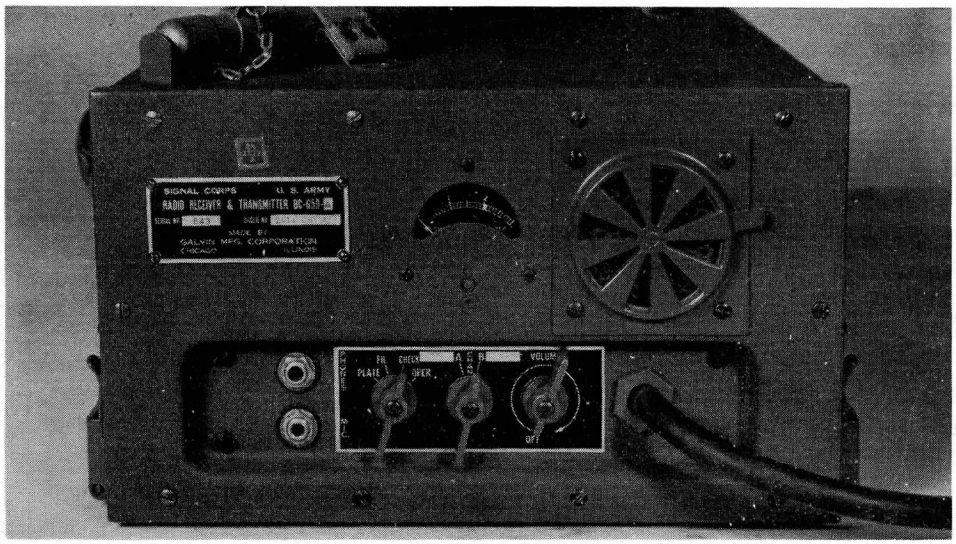
Cover M-367 has been procured for use with Microphone T-17, the common hand-held microphone with the built-in push-to-talk switch, and for Radio Set SCR-536, the handie-talkie, and is now supplied with those items as issued by Signal Corps depots. Supply Letter No. 173 has been issued describing the cover and its intended use, which includes dusty and sandy conditions as well as freezing. This Supply Letter may be used as the basis for requisition, in the regular manner, of one each Microphone Cover M-367, Stock No. 2B1567 or 2B1617/128 for each Radio Set SCR-536 or Microphone T-17 by all using organizations. The cover has been procured in large quantities, with ample provision for spares, use and normal wear and tear. It has not been procured for items other than the SCR-536 and T-17 but will also fit most handsets and other microphones now in use, and in an emergency may be pressed into service wherever needed.

Fort Monmouth Signal Laboratory is working on a problem of providing more rugged microphone covers, designed for specific microphones. This problem is still in the development stage, and the improved covers will not be ready for use this winter.

In the meanwhile, all organizations likely to encounter below freezing or excessively dusty conditions should provide themselves with Microphone Cover M-367, which has proved to be extremely important for the maintenance of phone communications in freezing weather. The cover, negligible in weight and size, should be stored with the set so it will not be lost or hard to find for, when it is needed, it is likely to be badly needed.

NEW PROTECTIVE COVER GUARDS LOUDSPEAKER IN SCR-609 and SCR-610

A new protective cover, provided with louvers which may be opened or closed at will, has been designed to guard the diaphragm of the loudspeaker of Radio Receiver and Transmitter BC-659 from damage caused by concussion resulting from gunfire. According to reports, such damage had occurred in the field.



The protective cover has been tested by the Tank Destroyer board and found satisfactory. The speaker output is down 1 point on the "R" scale when the speaker louvers are open, and down only 2 points on the scale when they are closed. The speaker is safe from the effects of concussion caused by gunfire when the louvers are in the latter position.

The new speaker cover will be added to current production of Radio Set SCR-609 and SCR-610, both of which include BC-659.

FLASHLIGHT FILTER M-384 REQUIRES USE OF 150 MA LAMP

Flashlight Filter M-384 is a disc of white plastic designed to be placed behind the lens of Flashlight TL-122-A or TL-122-B in order to decrease the amount of light emitted and to permit the escape of none but diffused rays.

However, the light provided by Lamp LM-35-A, as ordinarily used in these flashlights, is too great to make practical the use of the flashlight filter in the field. For this reason, the LM-35-A should be removed, and a 150 milliampere bulb of the PR-9 type should be substituted. The stock number of this bulb is 6Z6762.

The PR-9 bulbs should be requisitioned for replacement of Lamp LM-35-A as used in flashlights TL-122-A and TL-122-B prior to requisitioning of Filter M-384.

With the low amperage bulb and the filter in place, the light can be seen at distances less than 1200 feet under normal night conditions.

CARRIER HYBRID CF-7-( )

Carrier Hybrid CF-7-( ) is being provided to convert from four-wire to two-wire operation and vice versa where transmission of CF carrier is desired for relatively short distances over a two-wire open-wire line. CF-7-( ) is used at junctions between spiral-four cable and two-wire open-wire lines, on either side of Repeater Set TC-23 in a two-wire open-wire line, or between the two-wire line and Telephone Terminal Set TC-21 or Repeater Set TC-23 at a junction of two-wire and four-wire facilities. The Carrier Hybrid CF-7 also includes compositing equipment so that the d.c. signaling and telegraph channels obtained from the simplex legs of the spiral-four cable also may be transmitted over the open-wire line. See Block Schematic Diagram - Figure 1.

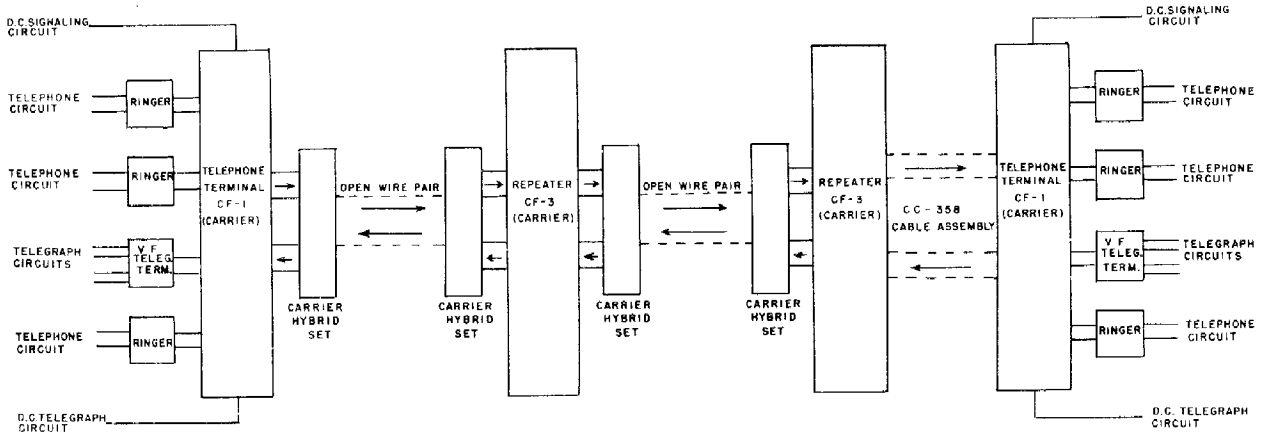


FIG. 1- FOUR CHANNEL CARRIER TELEPHONE SYSTEM USING CARRIER HYBRID SETS.

Carrier Hybrid CF-7 will be a complete unit in itself, requiring no power supply or auxiliary apparatus with the possible exception of ground rods when used in remote locations. CF-7 is approximately 22½ inches long, 9-3/4 inches wide, 7-3/4 inches deep and weighs approximately 51½ pounds. Its Stock Number is 4B1467A. CF-7 is composed of a hybrid repeating coil, a 13 KC low pass filter, an adjustable balancing network, a variable building out condenser, d.c. telegraph composite equipment and line protectors. The circuit schematic diagram is shown in Figure 2. These components are mounted on one side of a 19-inch panel and housed in a portable field case. Circuit controls and bind-

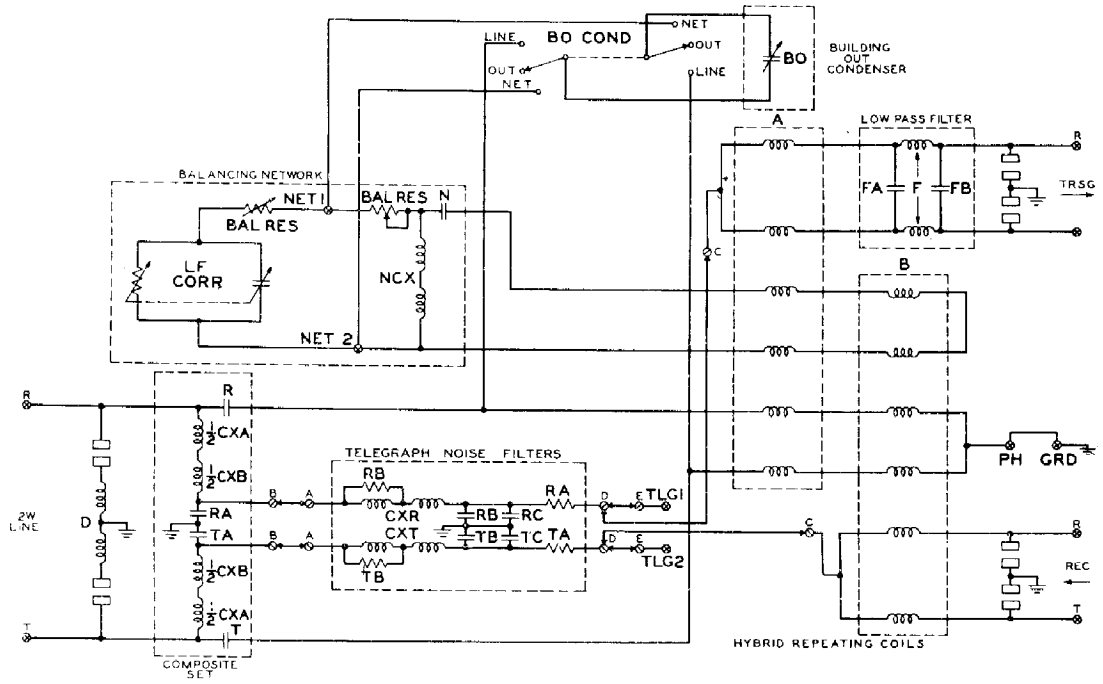


FIG. 2 - PRELIMINARY SCHEMATIC DIAGRAM OF CARRIER HYBRID CF-7

ing posts appearing on the other side or face of this panel are as follows (see photograph - Figure 3):

1. Binding posts for making external connections to:

   a. Transmitting and receiving leads of the four-wire circuit.
   b. The two-wire line.
   c. A phantom circuit.
   d. Composite telegraph circuits.
   e. Ground.
   f. An external network.

2. Screwdriver-slot adjustments for:

   a. Coarse building-out condenser switch.
   b. Low frequency corrector switch.
   c. Coarse balance resistor switch.
   d. Fine building-out condenser taps.
   e. Fine balance resistor-taps.

3. A terminal strip for making connection to internal telegraph filter and simplex circuits.
4. Cover plates for line and cable protectors.
5. Instruction cards.

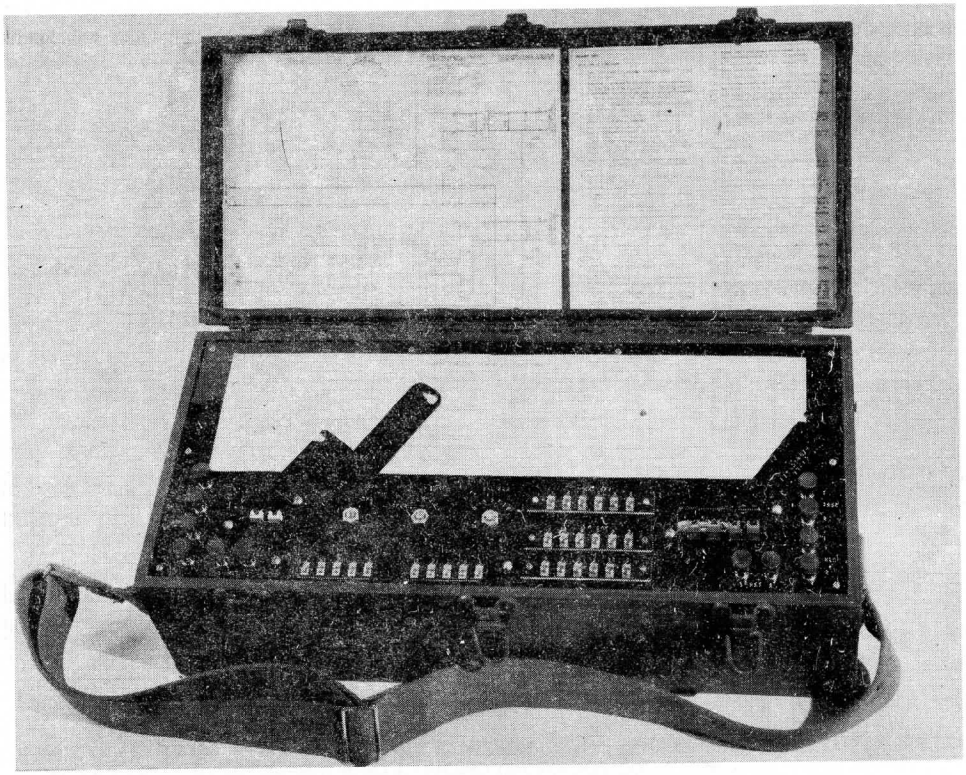


FIG. 3 - CARRIER HYBRID CF-7

The length of two-wire circuits over which spiral-four carrier equipment can be operated using Carrier Hybrid CF-7-( ) is primarily determined by obtainable balance in the compromise network. Longer two-wire circuit operation can be obtained by use of Converter Set TC-33 and Repeater Set TC-37 which make use of group modulation rather than the hybrid balance principle. However, TC-33 and TC-37, if standardized, will be available at a later date than CF-7. Carrier Hybrid CF-7-( ) was standardized on 30 June 1943. CF-7 is expected to be available for issue about 1 February 1944.

Carrier Hybrid CF-7-( ) possesses the advantages of being small, compact and not requiring a power source. While it is not considered as suitable for use in long multi-repeatered two-wire systems and under conditions where carrier must be applied to all pairs of a pole line, it is well suited to applications where it is necessary to derive one or two short two-wire carrier systems from the pairs available on a pole line.

Service test results, and considerations based on them, indicate that the possible lengths of circuits using Telephone Terminal CF-1 (major component of TC-21) and Repeater CF-3 (major component of TC-23) on a two-wire basis by means of Carrier Hybrid CF-7 are substantially as presented in the following tables.

TABLE I

ESTIMATED MAXIMUM REPEATER SECTION LENGTHS USING TELEPHONE TERMINAL CF-1-( ) (CARRIER) AND REPEATER CF-3-( ) (CARRIER) AND THE 2-WIRE CARRIER HYBRID CF-7-( ) ON A FOUR-PAIR OR EIGHT-PAIR OPEN WIRE LINE

	Repeater (rptr.) section lengths - miles							
	6-db net loss						30-db net loss	
	20-db balances			25-db balances			20-db balances	25-db balances
Description	No rptrs.	1 rptr.	3 rptrs.	No rptrs.	1 rptr.	3 rptrs.	No rptrs.	No rptrs.
080 H.D. copper	118	88	70	131	113	95	259	272
104 H.D. copper	167	125	100	185	155	135	367	380
128 H.D. copper	200	150	120	210	180	150	440	450
165 H.D. copper	241	181	144	246	210	173	530	535
080 40% Copper-steel	57	43	34	65	57	48	125	134
104 40% Copper-steel	87	65	52	97	83	70	191	201
128 40% Copper-steel	125	94	75	135	116	97	275	285
104 30% Copper-steel	65	48	39	74	64	54	142	151
128 30% Copper-steel	91	68	54	98	84	71	200	207
109 Galv. steel	15	12	9	18	15	13	34	36

NOTE: The above figures are for one system on any pair of a four-pair or eight-pair open wire line or for two systems on nonadjacent pairs. Other combinations will in general require much shorter repeater sections for cross-talk reasons.

TABLE 2

ESTIMATED MAXIMUM REPEATER SECTION LENGTHS USING TELEPHONE TERMINAL CF-1-( ) (CARRIER) AND REPEATER CF-3-( ) (CARRIER) AND THE 2-WIRE CARRIER HYBRID CF-7-( ) ON RUBBER-COVERED PAIRS OR CABLE

	Repeater (rptr) section length in miles			
	6-db net loss			30-db net loss
Description	No. rptr.	1 rptr.	3 rptrs.	No rptr.
Cable Assemblies CC-358 (one pr. only)	16	11	7	42
Wire W-143, nonloaded	12	10	9	23

NOTES: The above figures assume 15-db balances at 12 kc on the loaded wires and 25-db balances at 12 kc on the non-loaded wire. They also assume all repeaters lined up to approximately the same output levels. Somewhat longer lengths could be used by "tapering" the repeater sections.

PANEL SET AP-50-A SUPERSEDES AP-50

A new item of equipment, Panel Set AP-50-A, supersedes Panel Set AP-50. It is used by ground units to identify themselves to friendly aircraft.

The units of AP-50 are included in AP-50-A, and all the AP-50 sets in the field are to be converted into Panel Set AP-50-A by the using organizations. The basis of issue for the necessary additional items is Supply Letter No. 175, dated 20 May 1943.

Panel Set AP-50-A consists of the following items:

1 each Panel AL-140 (Stock No. 6A3140)
1 each Panel AL-141 (Stock No. 6A3141)
2 each Case CS-150 (Stock No. 2Z1890-150)

In order to convert Panel Set AP-50 (which contains 1 each Panel AL-140 and 1 each Case CS-150) into Panel Set AP-50-A, 1 each Panel AL-141 and 1 each Case CS-150 should be requisitioned in the usual manner. Nomenclatures and stock numbers of Panel AL-141 and Case CS-150 should appear on the requisition as given above.

Panel AL-140 is approximately 12 feet by 31 inches in size, and is fluorescent neon red on one side and white on the other. Panel AL-141 is the same size, but one side is fluorescent arc yellow instead of red.

Lest the term "fluorescent" as applied to the colored sides of these panels be misleading, it should be explained that neither "phosphorescence" nor "radioluminescence" is meant. When illuminated by daylight, the colored sides of Panel AL-140 and AL-141 not only reflect incident light, but emit additional light as well, thus gaining in visibility over non-fluorescent materials. They emit but little visible light when activated by invisible ultra-violet ("black light"), and none when light is absent.

Further information on Panel Set AP-50-A will be included in a change to FM 24-5. Most effective methods of using such panels are fully described therein.

TRAINING OF MILITARY PERSONNEL IN CRYSTAL GRINDING TECHNIQUES

For the past several months the Crystal Branch of Camp Coles Signal Laboratory has been engaged in training a number of teams whose function will be to grind crystals on special frequencies in the various theaters of operation. Emergency requests for small quantities of crystals on special frequencies from the various theaters of operation led the Office of the Chief Signal Officer to start this program so that considerable time could be saved by manufacturing these special frequency crystals on the spot within a few hours after the needs had been determined.

Each crystal grinding team, consisting of three enlisted men and an officer, has received intensive instruction in the grinding, hand finishing and testing of crystals. In addition to providing the training program, this Laboratory has been instrumental in the procurement and shipping of hundreds of items required to set up complete crystal finishing shops.

Two experimental field crystal shops were set up at Camp Coles in dymaxion shelters for use during the training period. The equipment in these shops is essentially the same as that being supplied to the teams for their overseas operations and is partly illustrated in the accompanying views.

Lapping machines are used to grind crystal blanks nearly to final frequency. The machines are modified drill presses. The blanks are placed loosely in a thin circular holder and revolved between two iron plates coated with abrasive. The calibrated receiver is used to determine, by audible means,

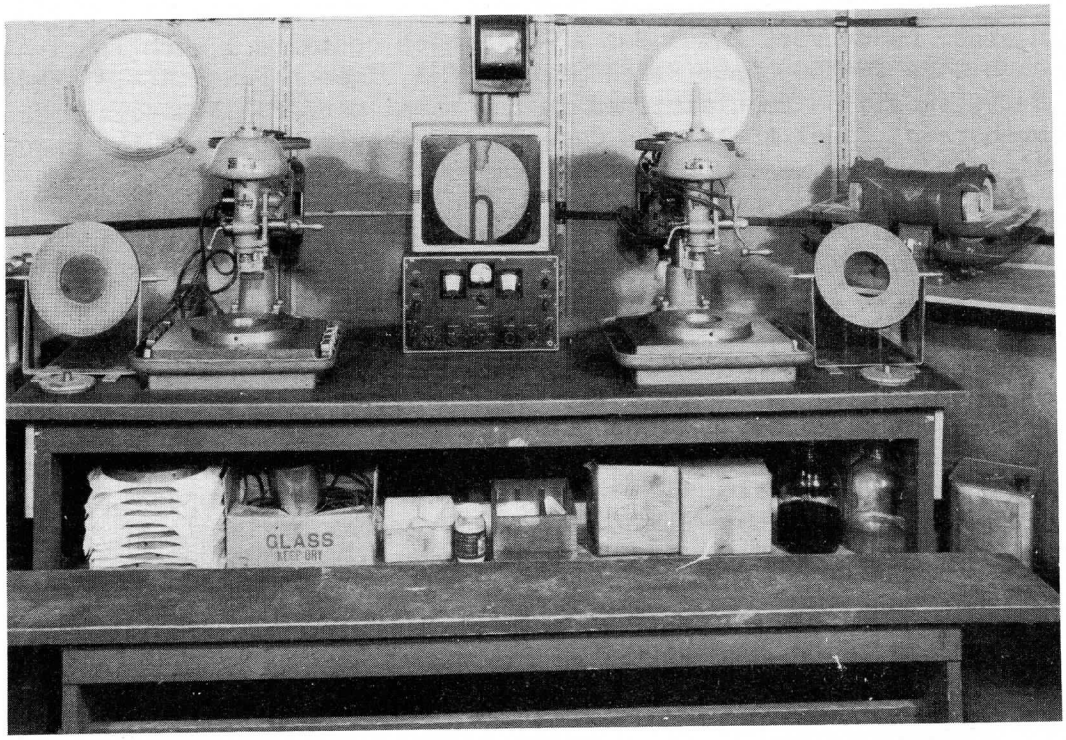


FIG. 1 - LAPPING MACHINES FOR GRINDING CRYSTALS. A PART OF FIELD CRYSTAL SHOP.

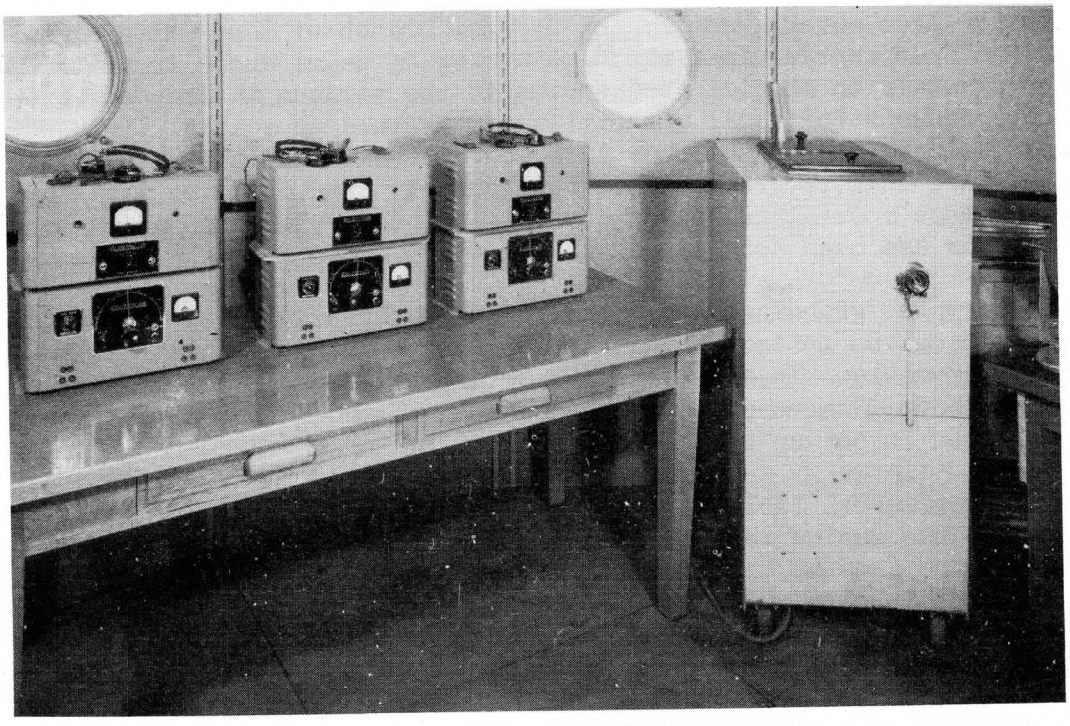


FIG. 2 - DUPLICATORS AND REFRIGERATOR

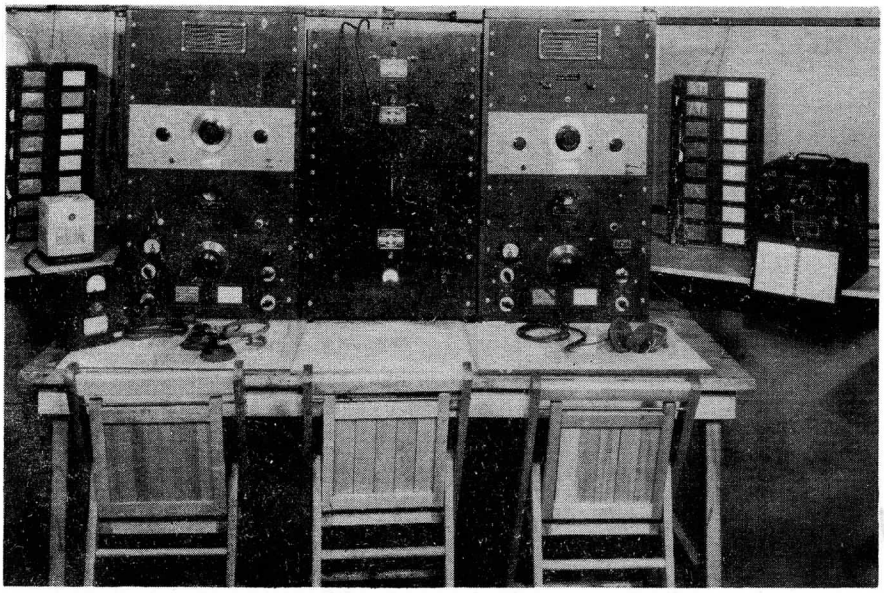


FIG. 3 - STANDARD FREQUENCY TEST EQUIPMENT

the progress of the lapping.

The duplicator provided consists essentially of a test circuit and an electronic frequency meter. The use of these duplicators enables the operator to grind a crystal blank to the same frequency and activity tolerances as a standard crystal. A refrigerator is used to run the crystal through the temperature-test cycle which in some cases is over the range -50°F. to +190°F. Both frequency and activity of the crystal must stay within certain limits in this temperature range.

Standard frequency test equipment includes a highly accurate secondary standard and means for checking it against signals of known frequency, as for example WWV. It is used for measuring the frequency of the crystal in test sets which subject the crystals to operating conditions approximating those encountered in the radio set itself. This is necessary because both the frequency and the activity of a given crystal will vary with the type and constants of the oscillator circuit. A number of test sets are furnished each team in order that the circuit conditions of a wide variety of radio equipment may be simulated.

In addition to the necessary equipment and supplies, each team is supplied with a wide assortment of crystal blanks and holders from which it is possible to produce in the field practically any crystal that may be required for any type of radio set, whether it be a "handie-talkie" or a long range fixed station communication set.

Headquarters for the organization and equipping of these teams is in the Quartz Crystal Section, Engineering and Technical Service, Office of the Chief Signal Officer in Washington.

EQUIPMENT LACKING? IMPROVISE!

Pertinent Thoughts from the 293rd Signal Company
(Special), Camp Butner, North Carolina

The Radio and Message Center Sections

When anyone makes the remark that there is no way of successfully training a section or team if there is no equipment -- and that remark is often made -- don't believe it! Equipment or no, training must be carried on! How to do it? By making the most of your local situation.

Many newly activated units waiting (and praying) for equipment have solved this problem. However, very little information is available on the methods used. Perhaps the reason for this is that over a period of time the organization that used improvision so successfully did not keep a written account of what it did. Or, it may have been presumed that every unit is capable of thinking for itself -- which is as it should be. Sometimes an officer is transferred to a unit that is being activated from an older one. In that case he is fortunate in that he can transmit the successful ways of improvising to his new organization and that officer becomes an asset. This does not happen too often, however, so we're "starting from scratch." What to do?

First of all an estimate of the training situation has to be made. That is:

1. How good are the radio operators?
2. How good are the radio repair men?
3. How good is the Message Center personnel? (This includes code clerks.)

Secondly, the material on hand has to be considered. Third, and this is the rub, what are you going to do about it?

Radio Personnel Training

Let us presume that we have a supply of radio operators, high speed. That's about fifteen words per minute (no kidding, it's true!) Naturally they must be built up to twenty-five and thirty words per minute. The company commander can set aside two hours a day for code practice alone. The equipment? Telegraph Set TG-5's. Anyone can beg, borrow -- but not steal -- a TG-5. These offer a start. Hook 'em up in a series and let your one good operator send. Surprisingly, it works!

Now comes the procedure. It cakes a good week, two hours a day, to put over the new C.C.B.P.I. (Combined Communications Board Procedure #1). Equipment? Paper, pencil, chalk and a blackboard. Approximately ten days have now passed -- about this time the men should be chafing to get at those TG-5's and try out this procedure. Don't be alarmed if they seemingly forget everything they know. In another week they will be rounding into shape.

Here again the officer has to use his ingenuity and improvise. Select a couple of good non-coms. Sit down with them and explain the tentative set-up for writing messages for transmission on the TG-5's. At this point the practice of not touching a key unless absolutely necessary should be impressed on the men. This is necessary for TG-5 battery conservation as well as training in signal security. Next set up the men in groups of about five to a team and have anywhere from three to five teams. They are now sections and will remain in their respective groups until further notice. Now set up the TG-5's and assign a call sign to each one. There are now, say, five radio stations ready to handle traffic. By starting off with a net of five stations you can maintain supervision over the entire group until you are satisfied they are capable of handling traffic correctly.

This can now be followed by setting up separate nets. This gives the men practice in having relay stations and a NCS (Net Control Station). Make the NCS responsible for the operation of the entire set-up. Various arrangements of the TG-5's will make the system more interesting. After the third week of this, the men will be spoiling to get "on the air." That's good!

Message Center Personnel Training

Paper, pencil and training editions of the DFCT2 (Division Field Code, Training Edition No. 2) and AGL-T2 (Air-Ground Liaison Code, Training Edition No. 2) are all that are necessary to begin the message center training. During the time the radio sections have been undergoing training, the message center men should be receiving instruction. Believe it or not, the message center should have as much practice in procedure as the radio section. This is readily accomplished by including the message center personnel with the radio personnel when teaching the procedure.

Another angle on this is seeing that the personnel concerned are taught to print correctly. Many a radio operator has gone "Dit Happy" trying to "decode" the printing on a piece of paper. Bad printing definitely slows down transmission. Once again the officer should get hold of a couple of likely non-coms and explain the means to the end. After a thorough course in the use of codes and ciphers, especially the Converter M-209-( ) and Cipher Device M-94, write up about fifty messages and check accuracy against time.

In teaching message center procedure, it is bad business to say that there is only one way a message center can function. Hard and fast rules should be used only for training purposes and they should be few in number.

Remember the 20-second goal, the time allowed for all clerical work in a message — exclusive of cryptographing and decryptographing.

At this stage of the game the men in both the radio sections and message center sections are ready to be combined. It will be necessary to fix on two or three non-coms the responsibility involved. If you don't, the radio section will assure you that the message center is all wrong, and the message center will assert that the radio men are slightly "off the beam." By fixing a definite routine and responsibility this will be by-passed about eighty-five percent. Follow the same routine as for the radio men in placing the men in sections. Assign each message center to a radio station and you are ready to go.

Proper Coordination

Before any attempt is made to operate the message center and radio sections as one unit, there are a few things that must be done:

1. Make up about fifty messages per team (message center and radio constitute a team) in clear text. This is the traffic and the only authorized. Have about twenty-five percent of them marked "send in clear." Those not marked will be cryptographed.
2. Place the message center as far away from the radio station as possible. Stress the fact that what goes on in the respective sections concern those sections only and the non-coms in charge.
3. Work up an SOI (Signal Operation Instructions) showing time of opening and closing the sections.
4. Be sure that improvised files are available for the sections (envelopes will do nicely).
5. Keep the code clerks segregated.
6. If appropriate forms are not available, make them up.
7. Work up a list of expected functions and procedure in the following suggested manner:

a. Procedure to be used.
b. Radio and message center set-up:
   (1) Call Sign
   (2) Location of radio station
   (3) Locations of message centers
c. Non-coms in charge
   (1) Section 1.
d. Governing principles
   (1) All call signs are confidential
   (2) No military phraseology
   (3) Radio security measures, etc.

In about two weeks the officer can break away from the routine for a few days and take up the subject of authenticators. Three or four days on this should be all that are required. It may now be put in use. The three or four day "rest" is advised for obvious reasons. You may find that the message cen-

ter will clear more messages than the radio station. That is normal and is not a cause for worry unless the average is very noticeable.

From Dry Air to the Real Stuff

Just prior to going on the air, assuming the equipment has arrived, the officer will find that several of the radio operators are a bit jumpy. Don't chide them. It is a natural reaction and will remedy itself by a few days of operation. Explain to them very carefully the Do's and Dont's of radio transmission which include signal radio security.

Here again an information letter should be used as a guide for the message center and the radio station. Make it clear and concise. Remember that anything that can be misunderstood Will Be misunderstood. The use of charts showing the amount of traffic handled at the various message centers and radio stations makes for greater interest and the spirit of competition will grow daily. Just impress on the men that there is no difference in operating a TG-5 or a radio set in that there are keys on both. At this point the repair men will have a bit of practical work to do.

If you have instructed the men in all sections properly and have observed all the ground rules, you should experience very little trouble. There will be changes, but if the foundation is well laid the changes will not upset the routine.

Well, it's your baby now. Good or bad you'll function as a team. Your job is to "Get the Message Through" ... to do so with dispatch and accuracy.

NEW BATTERY CASES

Correction Notice. In reference to the article titled "New Battery Cases" on page 41 of No. 23 (October 1943) SCTIL, the following corrections should be noted:

1. Telephone EE-91 replaces Telephone EE-71 and not Telephone EE-5.
2. The common battery type Telephone EE-91 does not require the use of Battery Case CS-119 or CS-119-A. However, a limited quantity of modified Telephones EE-91 (for local battery operation) is under procurement and will require a 3-volt battery supply. The batteries used for this type telephone may be housed in the new Case CS-119 or CS-119-A.

MAINTENANCE NOTES

SCR-268-( )

Numerous reports have been received on the failure of the high voltage transformer in the scope of the SCR-268-( ). As a result of these complaints all scopes placed on SCR-268-B, serial No. 1001 or higher, and the SCR-268-C will have one ampere fuses in the primary circuit of the high voltage transformer.

These same scopes will also have the feed-through insulators, which support the high voltage wires, eliminated and replaced with a phenolic strip. This strip is to have holes in it through which the wire can be run without using any feed-through insulators. This will eliminate moisture and dirt causing arc-overs on these connections. An improvement kit, to alleviate this trouble, is being procured for all scopes on all SCR-268's and SCR-268-B's up to serial No. 1000 and will be distributed on automatic issue as soon as they are available. At present it is anticipated that these kits will be available sometime during January 1944. It might be parenthetically added that several organizations in the field have found it expedient to devise some means, either by the use of bakelite or other phenolic strip, or a strip of wood, to eliminate this difficulty. It is recommended that this procedure be followed on any occasion of similar trouble pending receipt of necessary improvement kit.

Another item which seemed to cause quite a bit of trouble in this circuit was a triple 0.2 mfd, 4,000-volt oil-filled capacitor, manufactured by Industrial Corporation which spewed oil onto the high voltage cables. This, in turn, caused rapid deterioration of the insulation on these wires. This capacitor was interspersed in production with Tobe Deutschmann type SIC-510M-6EU. On SCR-268-B beginning around serial No. 1000 the former capacitor was dropped from production. It is recommended that any scopes which are found to have the Industrial Corporation capacitor should be serviced and the capacitor replaced with a Tobe Deutschmann. This can be obtained by requisition under Stock No. 3DA200-1.

At the same time this replacement is made, all high-voltage wires should be thoroughly cleaned of any grease that might be accumulated on them.

It is further recommended that the filter capacitors in this circuit be frequently checked for possible small DC leakage. Even an extremely high DC resistance on any, or all three, of these capacitors will necessarily create a sufficiently heavier drain to overload the high-voltage transformer.

Numerous reports on the 0.25 megohm high voltage circuit on the oscilloscope (schematic No. 31-1 31-2) have indicated that the resistors were too small in wattage capacity to withstand the strain which was placed on them

from various causes. Accordingly, on all SCR-268-B, beginning with serial No. 1001, these resistors were replaced with 0.5 megohm resistors of 2 watts each (Signal Corps Stock No. 3Z6750-7). These are used by placing two in parallel in the place of one of the old resistors. It is recommended that any of the older sets needing servicing in this respect be changed according to this plan.

In an effort to relieve eye strain of the operator and at the same time permit a more accurate observation of the desired figures on the screen, a DC Restorer Circuit has been added on all SCR-268-( ) from serial No. 1001. A kit for changing all of the older scopes has been designed and will be available in the near future. These will be issued on automatic issue as soon as they are available. Essentially, the added circuit consists of a 6H6 Tube, two 220,000 ohm resistors and a change in the electrical position of the vertical positioning control.

SCR-584

Instability in the regulated power supply RA-72-( ) necessitates frequent adjustment of the narrow range gate delay when range is adjusted from zero to maximum. This trouble may be corrected by replacing condenser C-810 (0.002, 600 volt) in rectifier RA-72-( ) with a 0.01 MFD., 600 volt condenser. This change is being incorporated in the Radio Sets SCR-584-( ) currently in production.

Numerous reports have been received indicating that the Barco slow speed joints in the transmission lines of the earlier Radio Sets SCR-584-( ) are failing due to corrosion. The manufacturer is replacing these joints with chromium plated or stainless steel joints. Prior to the receipt of the replacement joints, the failure of existing joints may be minimized by disassembling them every three to five days, removing any corrosion with crocus cloth and lubricating them with a light neutral oil. It is expected that all defective transmission line joints will be replaced in Radio Sets SCR-584 before these sets are shipped to overseas theatres.

LE ROI POWER UNITS PE-74/84

Failure of the water pumps and fan pulleys on these power units have necessitated a complete re-design of this equipment. The failures resulted mainly from:

1. Lack of strength in the fan pulley. Normal belt tension was of sufficient magnitude to cause permanent deflection of the pulley. The pulsating lateral shaft stresses resulting from the eccentric rotation of the distorted pulley would often break the water pump shaft and send the fan through the radiator.

2. Improper location on the water pump shaft of the tapered pin which holds the fan hub to the shaft. This pin was originally located just ahead of the front pump bushing in an area of high shaft stress. If the pin were installed too tightly, the shaft was somewhat weakened by distortion and frequent shaft fractures occurred.

Machined, cast-steel fan pulley replacements (Le Roi part No. 1A36-249) and redesigned water pump assemblies (Le Roi Part No. 1A13-360-1) are under procurement for all Le Roi engines not equipped with the newer types. These will be issued automatically to all units on a priority basis — active theatres first. All Le Roi engines with serial numbers above 163199 are equipped with the improved pumps and pulleys.

Strict adherence to the following may aid in lengthening the life of the older types of assemblies:

1. Check belt tension frequently, particularly during changing weather;
2. Always use the minimum amount of belt tension necessary to avoid slipping;
3. If necessary to remove the tapered pin holding the fan hub to the pump shaft, exercise extreme caution to avoid inserting it too tightly.

SCR-588

(Quoted from an Overseas Report)

"Breakdown of one of the 5-7 KC Transformers (REL No. 12239) in the thyratron control unit is a common failure which usually limits antenna rotation to one direction.

"A good substitute for these transformers is the impedance matching transformer from the loudspeaker of any discarded receiver. The impedance values are not critical, but the heavier winding should be used at the primary.

"Station ___ was twice forced to make this emergency repair. Smooth antenna operation was assured, and there was no apparent difference in operation."

CORRECTION: ANTENNA MOUNTING BLOCKS

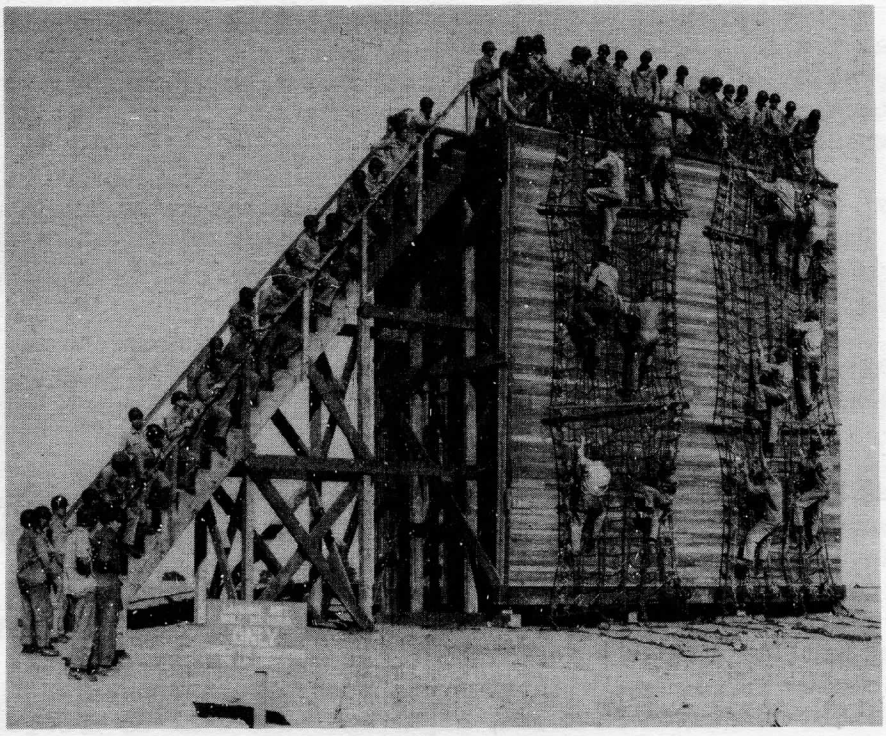
The antenna mounting block mentioned on Page 19 of the September 1943 issue of the Signal Corps Technical Information Letter (No. 22) was incorrect in that it omitted mention of Radio Set SCR-510 and SCR-610. The stock number of the block used with SCR-509 and SCR-510 is 2A245A/B1. The stock number of the block used with SCR-609 and SCR-610 is 2Z734.

MILITARY TRAINING

COMBAT TRAINING AT CAMP KOHLER

Landing Net Training

A modified debarkation scaffold, simulating the side of a troop transport, now provides Camp Kohler Men with experience in going over the side of a ship and down a rope net. Constructed recently in the obstacle course area, the new training aid has been included in the regular physical exercise program, and all training and administrative companies are required to work out on the net every other week during the scheduled obstacle course periods.



The scaffold is comparable to a transport, although not the exact size. The deck is 26 feet, above the ground, with a four-foot deck rail around the 13 by 25-foot deck. A stairway leads to the top of the scaffold.

Rope landing nets, constructed by weaving heavy manila ropes into a pattern of squares, are swung over the rail and hang almost to the ground, with heavy weights at the bottom to keep the nets in position. First men down the net stand at the bottom and manipulate pull ropes attached there, to simulate the movement of the net on a rocking and rolling ship.

Definite technique is involved in the debarkation, and trainees are given thorough instruction before attempting the descent. Importance of uniformity is stressed. Every man puts his left leg over the rail first, to avoid collisions of heads, and climbs down by moving his left leg and arm in coordinated motion, and the same for right leg and arm.

When carrying field packs and rifles men are instructed to loosen their cartridge belt to allow their gear to hang free as they go down. The rifle is slung snugly over the left shoulder and the stock secured behind the canteen.

In going down soldiers are warned to keep their hands on the vertical ropes, to avoid getting them stepped on by men above them. They must also avoid spraddling out too much and getting in the way of other climbers.

Training in Street Fighting

Combat training soon will increase in tempo for Kohler soldiers, with the inauguration of a street-fighting tactical problem in a simulated French village now nearing completion. The skeleton town is being built near the recently opened infiltration course.

Almost any type of situation encountered in combat at close quarters can be set up in the village area. Particular emphasis will be placed on protection from booby traps, currently being used extensively by the enemy.

Four complete two-story buildings at a street corner are included, with roofless extensions on either end. Buildings are 18 feet wide, flanking one 50-foot street and a cross road 30 feet wide. The buildings extend for 75 yds.

Approaching the village from the south, troops will encounter wire, fortifications and obstacles, under blank fire from the entrenched "enemy" and will encounter surprise targets at varying distances. Firing blank ammunition the advancing troops will execute the prescribed problem.

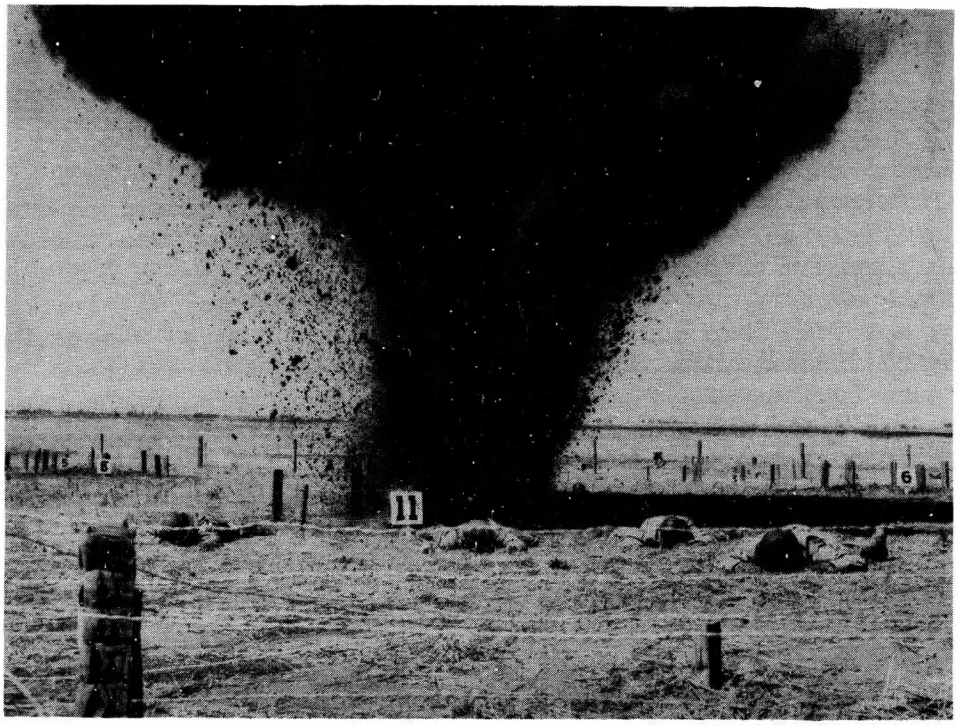
Double apron barbed wire will complicate entrance to the village, and a machine gun will be in operation against the men as they advance. Each building will contain furniture, with numerous booby traps concealed in typical places. Battle confusion in sound, sight and odor will be provided with various props including water, gas, flour, smoke.

Representing a Nazi-occupied French town, the buildings will be marked with signs, some French, some German. Typical signs include:

Auberge (inn), cordonnier (shoemaker), pharmacie (drug store), epicerie (grocery), cafe, cabaret, etc. German signs include: Nachrichten-offizier (signal officer), Truppenverbandplatz (first aid station), Kommandantur (command post), Kaserne (barracks), and others indicating Nazi occupation.

INFILTRATION COURSE

Battle atmosphere, with realistic scenes and sounds, will bring combat conditions closer to WSCTC trainees with the opening of a new infiltration course soon near the rifle range. This new training medium will be featured by live machine gun fire rattling over the heads of trainees. Two .30 calibre machine guns will spray live fire 36 inches above the ground.



CRATER EXPLOSION ON THE NEW INFILTRATION COURSE AT CAMP KOHLER.

The course is being laid out now by the Training Division. It measures 350 feet in length, 100 feet wide at one end, and fans out to 150 feet at the other end.

Starting from a trench at the wide end, trainees will run upright for about 30 yards to a double apron barbed wire fence. As they hit the dirt to clamber under the fence, the machine gun fire will start. The next 60 yards will necessarily be covered in close proximity to the ground. But to keep the course from becoming monotonous at this stage, 12 craters will spout mud-and-water explosions at convenient intervals. Then comes another barbed-wire obstacle, and a crawling dive for the last trench — near which the water-cooled machine guns are set in concrete. Machine gun fire and explosions are conducted from a 23-foot control tower at the narrow end near the finish line.

ESCUTC PERMANENT CADREMEN RECEIVE COMBAT TRAINING

Pursuing its policy of preparing every soldier for battle whether he works at a desk or in the field, the Eastern Signal Corps Unit Training Center, under command of Colonel Carroll O. Bickelhaupt, is sending all its enlisted permanent cadremen out for a two-day combat training course and bivouac at Camp Edison and the Allaire Training Area.

The two days of life in the field include instruction in field bivouac, combat firing, anti-aircraft firing, marches, camouflage, extended order, hasty field fortifications, the infiltration course, street fighting, booby traps, gas identification, and the use of the Molotov cocktail.

One-eighth of the cadremen of Camp Charles Wood and Camp Edison participate each week. Each group is divided into three platoons headed by lieutenants, with a captain as company commander and an executive officer to assist him. Instruction is in the hands of the Training Operations Branch of the Training Division, headed by Colonel Albert F. Hogle. The officers go through the complete course with the men.

The groups from Camp Wood leave at Ø6ØØ on Saturday of successive weeks and proceed by truck to Camp Edison, where the company is split up into platoons and goes to the rifle range for the combat course with the carbine, anti-aircraft firing, and the use of hand grenades. When this phase is completed, the company proceeds by shuttle movement to the Allaire area. On Saturday afternoon, the platoons receive training in hasty field fortifications, field sanitation, extended order and camouflage.

At 163Ø the company forms again to prepare the overnight bivouac. Shelter tents are pitched, individual foxholes are dug and camouflaged, guards are posted, and all measures are taken to insure security of the bivouac. After supper, a mobile projection unit is brought into the company area to show training films in the "Why We Fight" series.

Starting at Ø6ØØ Sunday, the group breaks bivouac and has breakfast, then assembles to receive instruction in the combat course, which includes the infiltration course with its training in creeping and crawling under actual fire from a .30 caliber machine gun; the booby trap house where a variety of simulated traps and anti-personnel mines await the unwary soldier; and the German village, through which the soldiers proceed under "enemy fire" from giant firecrackers and explosive charges detonated in shellholes.

After dinner, the group is instructed in basic signal communication, defense against mechanized attack, and defense against chemical attack. At 143Ø the company assembles, entrucks, and returns to camp.

The last of the eight cadre groups will start the course 23 October.

All officers of the ESCUTC stationed at Camp Wood and Camp Edison went through the complete combat course as a one-day problem last month.

REQUIREMENTS PLANNING

WIRE

ASSAULT AND FIELD WIRE

At the present time the actual requirements for both assault and field wire are in excess of the net required production for 1943 as shown on the Army Supply Program.

Requirements Planning Branch called a conference on 10 August 1943 of all interested agencies within the Signal Corps to explore the entire assault and field wire program. The purpose of the conference was to obtain facts, but not to decide policies, with a view to subsequently recommending pertinent actions to be taken for expediting the production of this wire. The principal items considered at the conference were Wire W-110-B twisted pair, Wire WS-D/TS single conductor, Wire W-130 twisted pair assault wire (Latex), Wire W-130-A twisted pair, assault wire (Vinglete), and Wire W-143 parallel pair long range field wire.

An agenda was prepared for the conference with points for discussion which included requirements and methods of computing, production capacity, methods of inspection, specifications, military characteristics, relaxing of specification requirements which tended to retard production, rejections, development of synthetics for rubber insulation, labor situation, conservation of material and labor and ways and means of increasing and expediting the deliveries of field wire in the immediate future.

The conference resulted in immediate steps being taken by all agencies responsible for the procurement and production of field wire to conserve materials, expedite production, reduce rejection and improve the entire field wire situation, which has also resulted in increased cooperation from wire manufacturers and improved good will. Specific actions which have been taken include:

1. Changing specifications and contracts as to splicing requirements which has resulted in recovery of large amounts of rejected wire and reduction of current rejections.
2. Changing the specifications as to adhesion requirements.
3. Review of the specifications in order to determine the necessity of the various requirements.
4. Survey of inspection procedure.
5. Review of specifications for Wire W-143.
6. Starting of production of Wire W-143.
7. Survey of contracts for Wire W-110-B as to distribution of short

lengths to various contractors.

8. Receiving and testing new samples of synthetic insulations.

9. Initiation of action to obtain a field test of two types of synthetic insulated Wire W-110-B.

SIGNAL CORPS POOL PLAN

The establishment of the Signal Corps Equipment Pool was the result of a recognized need for a method of providing those critical Signal Corps items which, due to their specialized nature or inherent characteristics, are not adapted to normal issue on T/BA or T/E. In general, pool items include special items of equipment, the use of which is determined by local conditions in theaters of operations rather than the general mission of a type of organization. Since only a minimum of pool equipment will appear on T/BA and T/E, it has been necessary to establish a plan for the handling of pool items to insure adequate procurement and proper issue. For this purpose, the Wire Requirements Planning Section has made a study, after coordination with all interested agencies, of the responsibilities and functions for each agency involved and has prepared an office memorandum setting forth the assignment of responsibilities relating to the handling of special items of equipment assigned to the Signal Corps Equipment Pool.

RAPID POLE LINE CONSTRUCTION

A preliminary review of the 1943 and 1944 requirements and production of rapid pole line construction materials has been made by Wire Requirements Planning Section. A tentative schedule for production for 1944 has been recommended, in order that the production line would not run out when the present contracts are completed by December 1943. A comparison of British Multi Air Line (M.A.L.) and the United States Rapid Pole Line (R.P.L.) is being made as to the merits of each, weight per mile and speed of construction. A complete review of the components included with a mile of R.P.L. will be included with this study.

REQUIREMENTS OF SPIRAL-FOUR CARRIER SYSTEMS

Original requirements of equipment necessary for the establishment of a tactical carrier system were based on amounts as authorized in T/BA, T/E and T/A. Since components of the tactical carrier system are no longer authorized on T/BA, T/E and T/A, the normal procedure for computing requirements was no longer effective.

A complete study of the requirements for spiral-four carrier systems for 1943 and 1944, including AAF, theater and training requirements has been made

and submitted to Requirements Division for inclusion in the Army Supply Program. These requirements have been approved by Army Service Forces and are at present being processed for procurement. Records have been set up showing the requirements and distribution of 100-mile spiral-four carrier system by theaters.

A complete study of both the United States and United Kingdom requirements and production of spiral-four cable through March 1944 was prepared and recommendations made to the Signal War Department Conference Group - Munitions Assignment Committee (Ground) as to the assignment of spiral-four cable for the balance of 1943 to the United Kingdom. This has resulted in an agreement by the Assignment Committee to assign only 15,000 lengths of Cable Assembly CC-358 for the last quarter of 1943, which is 27,546 lengths less than was on the army supply program for the United Kingdom for the year 1943.

PERSONNEL

ACTIVATIONS

Organization	Place	Date
995th Signal Port Service Company	Fort Monmouth, N. J.	27 September
998th Signal Service Company	Fort Monmouth, N. J.	20 September
Headquarters, Signal Service, Army	Camp Crowder, Mo.	
191st Signal Repair Company	Camp Crowder, Mo.	October
192nd Signal Repair Company	Fort Sam Houston, Texas	October
193rd Signal Repair Company	Camp Forrest, Tenn.	October
996th Signal Service Company	Fort Monmouth, N. J.	1 October

PERMANENT CHANGES OF STATION

Organization	From	To
4th Signal Company	Fort Dix, N.J.	Camp Gordon Johnston, Fla.
292nd Signal Company (Special)	Camp Butner, N.C.	Camp Bradford, Va.
67th Signal Battalion	Camp Van Dorn, Miss.	Camp Bowie, Texas
85th Signal Company	Desert Training Center	Fort Dix, N. J.
303rd Signal Operations Bn.	Camp Crowder, Mo.	Sunnyvale, Calif.

MISCELLANEOUS

The Army Service Forces Training Center will be established at Camp Gordon Johnston, Florida, on or about 1 December 1943, and will be organized by the Commanding General, Fourth Service Command. The Center will coordinate and supervise the training of such units and personnel as may be assigned to it.

The 308th Signal Operation Battalion, affiliated with the Southwestern Bell Telephone Company, was ordered into active military service 1 October 1943, as directed by the Commanding General, Eighth Service Command, and was concurrently transferred, without personnel and equipment, to Camp Atterbury, Indiana.

The 168th Signal Photographic Company, affiliated with the Research Council of the Academy of Motion Picture Arts and Sciences, was ordered into active military service 1 November 1943, as directed by the Commanding General, Ninth Service Command. It was transferred, without personnel and equipment, to Camp San Luis Obispo, California, for organization by the Commanding General, Fourth Army. The authorized strength is seventeen officers, one warrant officer, and 170 enlisted men.

The following organizations were transferred with the Infantry divisions of which they are components: the 77th Signal Company, from Desert Training Center to Indiantown Gap (Pennsylvania) Military Reservation; the 76th Signal Company, from A. P. Hill (Virginia) Military Reservation to Camp McCoy, Wisconsin.

The ASF Replacement Training Center, Camp Maxey, Texas, was discontinued 21 September 1943.

Hq. and Hq. Squadron, 73rd Bombardment Operational Training Wing (Hv), was inactivated 15 October 1943. Personnel and equipment were absorbed by other units under control of the Commanding General, Second Air Force.

The 136th Signal Radio Intelligence Company has been redesignated as the 136th Signal Radio Intelligence Company, Aviation; the 72nd Hq. and Hq. Squadron, 72nd Bombardment Operational Training Wing (Hv), has been redesignated as the Hq. and Hq. Squadron, 72nd Fighter Wing.

PROCUREMENT

GLASS AND THE SIGNAL CORPS

Although the use of glass in Signal Corps equipment is not generally looked upon as being of major importance, it is, nevertheless, one of the essential materials necessary for the production of nearly all types of Signal Corps communications equipment. One of the more important uses which first comes to mind is the use of glass in electronic tubes. Important uses of the Signal Corps for glass include optical glass for use in photographic lenses for cameras and spotting sets and various types of range finders, as a substitute material for sapphire bearings in electrical indicating instruments, flame proof insulation for aircraft electrical wiring, and, experimentally, as a substitute dielectric for mica and fixed capacitors. Other uses are found in incandescent lighting and flash-light lamps, meter faces, insulators, projection lamps for the Pictorial Service, fiber glass for heavy-duty motors and for insulating mats in storage batteries. There are many kinds of glass with varying compositions. One type of glass is lighter than aluminum; another is heavier than iron. Research men at one of the foremost glass-making concerns of the country are studying approximately thirty thousand different glass compositions and it might well be stated that there are more types of glass than of all metals and alloys combined.

Advances made in the field of optical glass within the past few years have resulted in new types of glasses which are of inorganic amorphous substance containing no silica. Substituting for silica are three elements — titanium, tantalum, and lanthanum. These types of lenses have made possible high altitude photography under conditions which were formerly considered to be impractical for satisfactory work.

Due to a situation which developed early in 1942 in the electrical indicating instrument field, there was a serious shortage of sapphire bearings. Limited use had been made of glass Vee bearings since 1930, and early in 1941 two of the major instrument companies made glass Vee bearings for part of their own equipments. Considerable work was done toward the substitution of glass-ring bearings for jewel-ring bearings and action was taken to obtain approval for substitution of glass Vee bearings for sapphire Vee bearings in $2\frac{1}{2}$-inch and $3\frac{1}{2}$-inch meters for Signal Corps use. Approximately 90 percent replacement has been accomplished. The glass used was a special development of one of the larger glass manufacturing concerns and consists of a special low-expansion borosilicate glass.

In the field of substitution of glass for mica in fixed capacitors, two methods have been experimentally employed. The first of these involved the spraying of the glass to form a thin coating on the capacitor plate material and thus serve as a dielectric, while the second involved stacking very thin sheets of glass in alternate layers of capacitor plates and glass dielectric.

Incandescent lamps for both lighting and flash lights are usually of the soda-lime-silica composition although lenses for small and medium type spot-lights may be the lead borosilicate type. Indicating instrument or meter faces are, as a rule, also cut from sheets of soda-lime-silica glass.

Insulators for Signal Corps usage have been made from soda-lime-silica, "Pyrex," and high-silica glass. Simple strain type insulators are usually of the "Pyrex" variety when such insulators are made of glass rather than steatite. Insulators used for telephone line work are of the soda-lime-silica type. Within the past several years, a new type of high-silica glass has been developed which contains approximately 96 percent silica and closely approaches the properties of fused silica. This material has a very low loss factor and high resistance to thermal and mechanical shock making it extremely desirable for insulation in radio frequency circuits. Some work has been done toward the casting of this material into varied shapes, such as grooved coil forms, but the inability to do this to a high degree of tolerance has, until the present time, precluded its use generally in communications equipment.

An unusual feature of this type of glass, which incidentally is one of the contributing factors to the inability to maintain close tolerance requirements, lies in the manufacturing process. The glass is cast with about 75 percent silica-oxide composition and after cooling is dehydrated by heating at high temperatures. In this process the article shrinks in volume about 35 percent, the pores close, and a transparent non-porous glass results. Due to the unusual manufacturing method employed, this glass is known as "resurrection" glass. As mentioned before, this glass is extremely resistant to thermal shock and articles made from it can be heated very close to white hot and plunged into water without damage.

Fiber glass is fabricated by two different processes resulting in either staple or short length fibers, or as a continuous filament type. Standard textile machines with suitable modifications are used for making up the glass fiber into various braids, tapes, and fabrics for incorporation into heavy-duty electric motors and generators, and mats for storage batteries. Fiber glass does not lose any appreciable strength, flexibility, or resiliency up to a temperature of 650° F. and its electrical properties are not greatly impaired at a temperature of 1000° F.

From the foregoing, it may readily be seen that glass today plays a very important part in Signal Corps equipment. Although plastics and other ceramics are used with certain advantages to supplant glass, it is considered that, for the majority of uses, glass is a unique material occupying a field of its own.

MILITARY PERSONNEL

TRANSFERS, DETAILS AND ASSIGNMENTS OF COMMISSIONED OFFICERS

In view of the many inquiries received by Military Personnel Branch, OCSigO, on questions of terminology and interpretations of existing regulations, the following data is submitted on the most frequently discussed matters pertaining to Signal Corps military personnel.

Arm or Service - AR 605-145, dated 6 May 1943, provides that "Officers will be assigned to the several arms and services in accordance with Tables of Organization and Tables of Allotment, having due regard for the qualifications of the officer and the interests of the service." Thus total Signal Corps officer strength is the number of officers filling authorized Signal positions, plus an additional number of Signal officers on Branch Immaterial duty.

Basic Branch - An officer's basic branch is that in which he was originally commissioned or to which he was subsequently transferred. AUS officers, first appointed to Branch Immaterial positions, have no basic branch unless subsequently detailed in an arm or service and then the basic branch will be that arm or service. An officer who has completed administrative and supply courses, for example, will be designated NMB (No Material Branch) by The Adjutant General, and will in effect have no basic branch. If this officer is given an original assignment to a Signal Corps depot, and serves for ninety days, he may be subsequently detailed in the Signal Corps, thus making his basic branch Signal Corps, regardless of future details or assignments.

Branch Material Versus Branch Immaterial - In regard to the term "Branch Immaterial" its meaning is the opposite of Branch Material which pertains to positions which are identified with technical branches of the Army, such as Field Artillery, Signal Corps, Engineer Corps, and so forth. Branch Immaterial positions are miscellaneous positions for which the qualifications of the officer, not the technical needs of the branch, are the determining factors. In other words, the branch in which the officer serves is "immaterial." However, as stated above, Branch Immaterial officers can be assigned to Branch Material positions if such are called for on tables of organizations and allotments. In exceptional cases, primarily when a T/O arbitrarily calls for a Branch Immaterial position, a Branch Material officer can be assigned to such a Branch Immaterial job, even though the officer has technical qualifications for Signal Corps duty (as an example), and is actually performing a technical Signal Corps job. This situation exists for administrative purposes only, and as a matter of fact, Commanding Officers who are given BI positions to fill, actually assign Signal Corps Branch Material officers to

BI Signal Corps jobs, Quartermaster Branch Material officers to BI QM jobs, etc.

Transfer - Transfer involves permanent assignment to an arm or service concurrent with release from permanent assignment to another arm or service, changing an officer's basic branch.

Upon his own application, a Regular Army officer may be transferred from one arm or service to another. Transfer of National Guard and Reserve Officers has been discontinued.

Detail Versus Assignment - With the exception of initial assignments and transfers to and from an arm or service, subsequent orders calling for "detail" or "assignment" do not change the officer's basic branch.

The terms "detailed" and "detailed in" should be used only in connection with shifts to arms and services wherein an officer wears the insignia, and signs correspondence, according to the arm or service to which he is detailed.

The term "assigned to" or "assigned to duty with" designates a shift to an organization, installation or activity and does not affect any change in the insignia or signature of an officer.

Indiscriminate use of the terms "detail" and "assignment" during the period July 1942 to May 1943, when the trend was toward decentralization of activities and orders were written by many installations unfamiliar with the distinction between these terms, has led to the ruling that officers whose orders were written prior to the date of the new regulation, WD Circular 126, 27 May 1943, and read "assigned to" or "assigned to duty with" an arm or service other than that in which they were commissioned, will now be considered as having been "detailed in" that arm or service if such was the intent of the orders.

Details - AR 340-15, C 7, dated 15 May 1943, provides that an officer detailed in another arm or service should indicate that arm or service in preparing the legend below his signature. Insignia which he wears is to correspond (see AR 600-40, C 18, 15 May 1943). Therefore, an officer commissioned in the Infantry as a 1st lieutenant, but detailed in the Signal Corps, will wear Signal Corps crossed flags, sign as a Signal Corps officer, but with the termination of the National Emergency, will revert to his basic branch of the Infantry.

Assignment - When an officer is assigned to duty in an organization, installation or activity of another arm or service, his insignia and the legend below his signature will not be that of the arm or service of the organization to which he is assigned, but will be that of the arm or service in which he is detailed. For example, an Infantry officer (basic branch) assigned to a

Signal Corps Depot, but detailed in the Quartermaster Corps, will wear Quartermaster Corps insignia and sign as a Quartermaster Corps officer.

Orders - Subject to certain restrictions, the commanding generals of Army Ground Forces, Army Air Forces, and Army Service Forces, as well as independent commands under the control of the War Department such as Eastern and Western Defense Commands and the several overseas commands, are authorized to:

1. Detail officers serving under their respective jurisdictions in an arm or service other than that in which commissioned; or
2. Relieve such officers from detail in one arm or service and detail them in another;
3. Detail such officers as are commissioned AUS, without assignment to an arm or service, as may be appropriate under existing restrictions.

Orders which affect the detail of officers under the provisions of AR 605-145 are to state, "By direction of the President ..."

It is intended that officers be either assigned to or detailed in arms or services corresponding with those identified with the Tables of Organization and Tables of Allotment authorizing the positions. Official steps have been taken by The Adjutant General and the Military Personnel Division, Army Service Forces, to emphasize this fact to the various field agencies writing orders.

REORGANIZATION OF INFANTRY DIVISIONS

Infantry organizations are now being streamlined to bring about more economical use of manpower, maximum fighting power, flexibility required for massing at decisive points, reduction in headquarters to speed up command, and devotion of the highest possible percentage of available strength to direct combat. Motorized Divisions will be eliminated in favor of having all divisions trained and equipped for movement by separate troop transport battalions.

To accomplish this purpose, army and corps headquarters will be reduced in strength and extensive use will be made of the pooling of special troop units. Corps serving with armies are to be primarily tactical in function, and administrative channels will be direct from army to divisions. In addition, several functions now performed in the division will be transferred to corps or army troops.

The reduced headquarters of corps not assigned to armies will be insufficient to handle administrative responsibilities. During the training period in the Zone of the Interior, such corps headquarters will be augmented by an allotment of Signal personnel amounting to one major, one captain, one

staff sergeant, one technician 3d grade, one technician 4th grade, and one technician 5th grade. The IV, XIII and XV Corps, as well as the II Armored Corps, are immediately affected by this reorganization.

While the Infantry division as a whole will be reduced approximately 8 percent, the Signal company will be cut from a strength of ten officers and 311 enlisted men to seven officers and 215 enlisted men. This large reduction is principally the result of transferring certain Signal platoons to corps battalions and companies in order to make available trained personnel for specific duties of a classified nature.

While the continental reorganizations are to take place as soon as feasible, changes in organizations overseas will be indefinite, depending upon the situation and the theater commander. Organizations affected will be permitted a 5 percent overstrength in grade 7 and the remaining personnel is to be absorbed as the commanding general directs.

LIGHT INFANTRY DIVISIONS

Three Infantry Divisions of a new type called Light Divisions have been formed on an experimental basis. They are intended for mountain, jungle or amphibious operations and will be airborne, pack or truck drawn outfits as required. The truck drawn light division has 8468 men in comparison with 13,472 now authorized the standard Infantry division. A pack outfit has 8853 men. In addition to the usual organic troops, the light division artillery includes an Anti-Aircraft battalion and an Anti-Tank company. The QM company, either "jeep" or pack, is attached.

Both the 10th and 71st Light Divisions were activated on 15 July at Camps Hale and Carson, respectively, in Colorado. They are being trained for pack operations. The 89th Light Division was formed by reorganizing the 89th Infantry Division at Camp Carson on 1 August 1943, for truck drawn operations.

Contrary to usual practice in Infantry divisions, the light division headquarters (T/O 72-1) has within its forward echelon a Signal section, consisting of a lieutenant colonel (DSO), a master sergeant (chief clerk) and a staff sergeant (operations). The remainder of the Signal personnel is in a Signal platoon (T/O 11-577) instead of the Signal company with the Infantry division.

The makeup of the Signal platoon is similar to that of an airborne Signal company (T/O 11-577). All administrative personnel such as clerks, shipping checkers, cooks, etc., have been omitted and those functions will be performed by the division headquarters company. Teletypewriter equipment is not required since that equipment is not used. Other reductions are effected in each SSN category somewhat in proportion to the overall reduction in size of the division. Four visual signalmen (SSN 765) have been added.

REORGANIZATION OF SIGNAL CORPS UNITS

The Adjutant General's memorandum, subject, "Utilization of Personnel," dated 20 August 1943, file AG 320.2 (31 July 43) PE-A-M-C, directed the reorganization of all units in defense commands and theaters of operation under standard tables of organization, as soon as new tables of organization and equipment were published. Previously, specific authorization was required.

Although units now assigned to AGF, AAF and ASF were excluded from the scope of the directive by an amendment dated 1 September 1943, it is expected that they too will be reorganized by specific directive to avoid later conflicts with the instructions pertaining to defense commands, base commands and theaters of operation. Units under movement orders, alerted and unable to reorganize prior to shipment due to lack of time, units on maneuvers, or engaged or about to engage in field operations against the enemy have also been exempted. However, when such units are withdrawn from action for rest or refilling, they are to be reorganized during that period.

AWARDS AND CITATIONS FOR SIGNAL CORPS OFFICERS

Lieutenant Colonel William Little

Lieutenant Colonel William Little, at present assigned to the Storage and Issue Agency, Philadelphia, Pennsylvania, is not only the recipient of the Award of Legion of Merit, but has also been honored twice by the French Army in North Africa which appointed him Legionnaire 1ere Classe Honoraire of the French Foreign Legion and awarded him the Croix des Services Militaires Volontaires.

The citation for the award of Legion of Merit was authorized under General Orders #53, dated 12 July 1943, for exceptional meritorious conduct in the performance of distinguished services.

The medal of the Croix des Services Militaires Volontaires has not yet been cast, and, according to information given to Colonel Little by his executive officer in North Africa, is the first award of such nature which has been made to a member of the United States Army. The citation for this award according to a free translation states that "Lt. Col. William Little, Signal Officer of the Mediterranean Base Section, proceeded with the installation and extension of telegraphic and telephonic facilities in North Africa. He displayed great energy in assuring the rapid delivery of equipment destined for the French Army. He demonstrated the greatest spirit of cooperation in organizing stages of instruction meant to familiarize the French units with the American material." The citation was signed on 9 August 1943 by Giraud.

The appointment as Legionnaire of Premiere Classe Volontaires of the French Foreign Legion was made on 30 July 1943 at an official formation of the French Foreign Legion at Sidi-Bel-Abbes, Algeria, and by "Ordre Du Regiment No. 72," Lt. Col. Little, "Chef des Transmissions de la Mediterranean Base Section," was authorized to wear the appropriate insignia. This official appointment is considered a high honor in the French Army.

The insignia of this appointment consists of a red and green ribbon, a medal to be worn on the right pocket, the button of the Legion Etrangere, which is worn as the second button on the blouse, and a green stripe on the left sleeve near the braid on the cuff, approximately in the position where chevrons indicating overseas service in the last war are now worn. According to a decision made by The Adjutant General, there is no authority in law or regulations which permits the removal of a part of the standard uniform of the United States Army and the substitution thereof of any part of a foreign Army uniform, therefore the wearing of the button in place of a button on the uniform of the U. S. Army is not authorized. In this connection, attention is invited to the provisions of Army Regulation 600-400, Paragraph 54, and changes thereto published in Circular No. 100, dated 1942. The War Department has no objection to the wearing of the service ribbon in the manner prescribed for the wearing of foreign decorations.

CLOSING OUT THE WAAC SIGNAL CORPS TRAINEE PROGRAM

On 24 September 1943 all classes in which WAAC Signal Corps Trainees were being trained as Mechanic Learners and Junior Radio Repairmen were closed, and the women who had enrolled in these courses were given the alternative of entering on active duty with the Women's Army Corps or being discharged. According to the latest reports received in Military Personnel Branch, only eight trainees wished to be discharged, approximately two hundred fifty preferring to remain in the WAC.

The Army General Classification Test scores of the WACs procured under this program were all 110 or over, some of the women attaining scores as high as 146. Reports from WAC Headquarters indicate that these Signal Corps trained women represent extremely high caliber personnel with potentialities for valuable service in the WAC. Arrangements have been made with WAC Headquarters to make all this personnel available for Signal Corps positions. Those who were not able to complete their training due to the discontinuance of the program are to be classified according to their general experience and qualifications and either assigned to positions in the Signal Corps which will utilize civilian skills not of a communications nature, or given additional training in specialties for which they are fitted and for which the Signal Corps has outstanding requisitions.