Locked case 1

No. 31

~~RESTRICTED~~

SIGNAL CORPS

TECHNICAL

INFORMATION LETTER

JUNE · 1944

ARMY SERVICE FORCES · OFFICE OF THE CHIEF SIGNAL OFFICER

SIGNAL CORPS TECHNICAL

INFORMATION LETTER

Number 31 June 1944

RESTRICTED

This document contains information affecting the national defense of the United States within the meaning of the Espionage Act (U.S.C. 50:31, 32). The transmission of this document or the revelation of its contents in any manner to any unauthorized person is prohibited.

WAR DEPARTMENT · ARMY SERVICE FORCES

E OF THE CHIEF SIGNAL OFFICER

ERVICE DIVISION · SPECIAL ACTIVITIES BRANCH

SIGNAL CORPS TECHNICAL
INFORMATION LETTER

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 The Letter is compiled mainly 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 overseas is made by The Adjutant General on the following basis: Headquarters, Theaters of Operation (25); Armies, Corps, Departments, Base Commands, Island Commands and Air Forces (10); Divisions, Brigades, Battalions 11 and Companies 11 (2).

Within the continental limits of the United States the Letter is distributed to Signal and other Ground and Service Forces units and installations by the Chief Signal Officer (SPSAY) and to air units and installations by Headquarters, Army Air Forces.

To be placed on the mailing list, to receive more or less copies, or to have mailing addresses corrected, requests should be made through channels to the Chief Signal Officer (SPSAY) in the case of overseas units and Signal and other Ground and Service Forces units within the United States, and to the Commanding General, Army Air Forces (Management Control, Reproduction Branch, AAF Annex), Gravelly Point, Virginia, in the case of air units in the United States.

WARNING This publication is issued solely to give proper and speedy dissemination to timely, useful information concerning pertinent trends and developments. Nothing herein is to be construed as necessarily coinciding with United States Army doctrine. Changes in official doctrine, as they become necessary, will be officially published as such by the War Department.

TABLE OF CONTENTS

SIGNAL CORPS TECHNICAL
INFORMATION LETTER

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 The Letter is compiled mainly 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 overseas is made by The Adjutant General on the following basis: Headquarters, Theaters of Operation (25); Armies, Corps, Departments, Base Commands, Island Commands and Air Forces (10); Divisions, Brigades, Battalions 11 and Companies 11 (2).

Within the continental limits of the United States the Letter is distributed to Signal and other Ground and Service Forces units and installations by the Chief Signal Officer (SPSAY) and to air units and installations by Headquarters, Army Air Forces.

To be placed on the mailing list, to receive more or less copies, or to have mailing addresses corrected, requests should be made through channels to the Chief Signal Officer (SPSAY) in the case of overseas units and Signal and other Ground and Service Forces units within the United States, and to the Commanding General, Army Air Forces (Management Control, Reproduction Branch, AAF Annex), Gravelly Point, Virginia, in the case of air units in the United States.

WARNING This publication is issued solely to give proper and speedy dissemination to timely, useful information concerning pertinent trends and developments. Nothing herein is to be construed as necessarily coinciding with United States Army doctrine. Changes in official doctrine, as they become necessary, will be officially published as such by the War Department.

TABLE OF CONTENTS

NORTH AFRICA

SIGNAL OPERATIONS - COMMUNICATION ZONE

The following article is a digest of a talk given by a Signal Corps officer lately returned from overseas. It discusses the extent and organization of a particular Communication Zone and cites some of the problems with which an LOC Signal officer is confronted. It contains information which will be of help to Signal officers who may find themselves similarly situated.

I have been asked to asked to talk to you on Signal operations in the Communication Zone, or what is sometimes called "Line of Communication Signals." There is a considerable difference between tactical Signal communication operations and operations in the Communication Zone. The discussion will pertain to the North African Theater of Operations. It must be understood that each of the various theaters will have its own particular methods and way of doing things. What I have to say about North Africa does not of necessity apply to all the theaters. Operations in North Africa were influenced greatly by the distances over which we were obliged to operate, as well as the scanty communications facilities found in the theater -- scanty facilities in rail, highways and in wire lines. While the distances may not seem great as compared with distances in the States, this combination of factors produced many difficult problems. It is not my intention to go into an historical account of these operations, but rather to give you some idea of communication zone establishments, how they came into being and how they are operated.

In order for you to understand these establishments, it might be well to discuss the initial phases of the campaign. As you know, the invasion of Africa was made by three task forces. The first, known as the Western Task Force, was wholly an American force and landed on the shores of Morocco in the vicinity of Casablanca. After this force had accomplished its mission, a base was set up which was known as the Atlantic Base Section. Another task force known as the Center Task Force, composed of the American II Corps, reinforced, landed in the vicinity of Oran and about three weeks after the landing there, its base, the Mediterranean Base Section, was established. MBS had the mission of supplying all the American forces from Oran to the East. The third force, a British task force reinforced by some American units, landed at Algiers and points to the East.

The British First Army took up positions along mountains and it was decided to move the American II Corps into the south flank of this line. About the first of January 1943, the Americans moved into position. This force was still based on the Mediterranean Base Section and it soon became apparent that this was an impossible situation. The distance between the Base Section headquarters and the II Corps Rear was well over 800 miles. It was therefore

decided to establish another base section immediately in the rear of the II Corps to be known as the Eastern Base Section. Its purpose was to furnish the necessary support for the tactical operations of II Corps. It was located first at Constantine and at the conclusion of the campaign, at Bizerte.

So you notice that as the fighting army moves forward, new base sections in the immediate rear of the army line come into being. These establishments may be formed either by bringing up from the rear one of the established base sections, or by organizing an entirely new section.

The overall command of the operation was under General Eisenhower whose staff was a combination of British and American staffs, having officers from the American Army, the American Navy, the British Army, the British Navy and the British Air Force. As far as the Americans were concerned, this staff acted both as an operational unit and administered the American Theater. It was not until after the fall of Sicily and the invasion of Italy that Headquarters, North African Theater of Operations, became a separate entity.

After the establishment of the Eastern Base Section, it became apparent that some coordinating body to regulate the flow of supplies to the front, between the base sections and secure the necessary flow from the States was required. To fill this need, Headquarters, Services of Supply (SOS), came into being.

That covers the establishments existing in the Theater when I left.

Now then, what is a base section? It seems to me that the best way to describe it to you is to say that it is a command similar to what you know here in the States as an area Service Command. It is a housekeeping unit and in it you will find depots, hospitals, replacement centers, railheads and the numerous establishments required for its operation. A base section is a fairly large institution and therefore, it has a staff. There is no necessity for me to describe staff and staff functions to you, but we are interested in the Signal Section of such a staff and how it operates. It may be of interest to note our experiences with staff sections. We have found that it is better to have a staff section which is slightly too small, rather than one which is too large. There are several reasons for this: a staff section which is too large tends to get itself overly involved in paper work. While it is realized that a certain amount of such work is essential, still paper work tends to slow down operations and as a result, there is much loss of time in getting action. This experience was not peculiar, of course, to the Signal Section, but was common throughout all sections in the Eastern Base Headquarters. General Pence, our Commanding General, laid down the law that nothing would be committed to writing that could be accomplished by personal contact or telephone.

To perform the necessary coordinating work, the Signal Section was divided, of course, into the normal functional set-up, namely, Supply Communications and Field Service Administration. Field Service Administration includes matters of personnel, training and general administration. It is

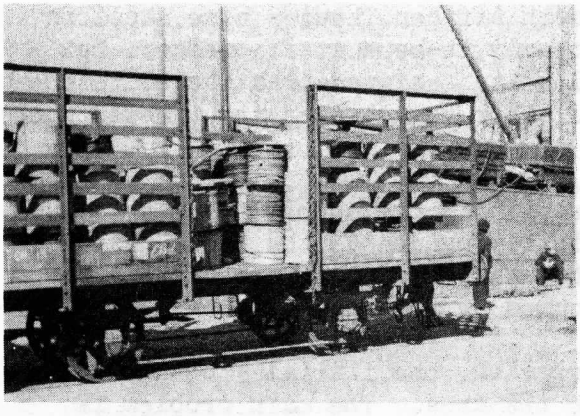
interesting to note that practice in the North African Theater base sections was for the base section Signal officer not only to be a staff officer, but to be actually in command of all the signal units assigned or attached to the base section. This was true, of course, of other branches having troops, such as Ordnance, Engineers, etc.

One of the main functions of a base section is the supply function. Supply involves two things -- first, getting into your depots the items which will be required, and secondly, the issue to using organizations of this material. How then is signal equipment secured by the base section?

Before a base section moves in for operation, the initial stockage has been set up. This follows the section into its area. The main problem is to maintain the level of supply which has been established by higher headquarters; usually thirty days for units and establishments of the base section and those other units for which it is responsible. The base section supply officer maintains a stock record. This is necessary to insure him accurate information as to the stock level in his various depots. He has a troop list which indicates the units and establishments he has to supply. He has experience tables which indicate the probable rate of consumption. Casting these records together, he is able to prepare a requisition on SOS for items he requires. Of course, he realizes that these experience tables frequently are not to be depended upon and from time to time, on some items, he will add in his serial number in the calculation -- what I mean to say is, he adjusts them in accordance with his own knowledge. These requisitions are periodical -- usually once a week. Now, that is how he gets his supply stocks -- the other half of the picture is the issue side.

For a base section operating in immediate support of troops in combat, issue involves two types of business -- wholesale and retail. By retail I mean the supplying of units and establishments located immediately in the base section and by wholesale, the bulk shipments that go into the combat zone depot. Of course, materiel is issued on a requisition basis, but by requisitions I do not necessarily mean a beautiful form, typed up in triplicate, showing stock numbers, nomenclature, amounts consumed and what not. Such a requisition would be the exception rather than the rule. A requisition may be a telephone call from one of the units with a simple request for this or that item, or a number of items. The supply officer will make note of these, tell the unit supply officer where they may be picked up and notify the depot to release them to the unit when called for; or, and this is the more common practice, the unit supply officer or supply sergeant will bring in a list of material to the supply officer and they will sit down and discuss the matter and arrive at the amounts which can be made available. The unit supply officer will either bring the list or the list will be prepared in the base signal supply office and this will be hand-carried to the depot where the items will be picked up. Requisitions may also come by teletype.

There is one thing to remember in regard to issue of equipment to units located in a base section. Just because you have a table of equipment or a



WIRE REELS BEING UNLOADED AT QUAYSIDE AT A PORT IN NORTH AFRICA

table of basic allowances for a unit, it does not follow that all items will be furnished. The basis for issue is need rather than authorization. The Signal supply officer usually knows more about the needs than the unit does, because he is aware of any contemplated operational use of the unit. He knows whether it is to be moved forward to combat or whether it is to remain in training.

You are probably wondering why requisitions for units are not processed at the depot instead of through the base section supply officer. There are several reasons for this. Items may be in short supply or items may be controlled or critical. If they are controlled, it is usually necessary to get authorization for issue from higher authority. Critical items must be sparingly issued with a view to future operational needs. There are several depots in a base section and the base section supply officer is the only man who knows the stock levels in each of the depots and so is in a position to determine where the items required may be drawn. So much for the retail business.

The wholesale business is an entirely different matter. It involves the equipment and supplies required for combat operations which are shipped in bulk to the army depot. Naturally, there can be no attempt made to edit any requisition from this source. Requisitions which appear to have mistakes as to quantities or items may be questioned, but generally speaking, what is asked for will be shipped, if it is available. If it is not available, efforts will be made to secure same from the rear. These bulk shipments are based upon requisition -- requisition prepared by the Signal officer of the tactical force. These requisitions pass through command channels, that is, through Force G-4 to the Base G-4, who in turn, distributes them among the supply sections. The supply officer then determines the amount of tonnage and bulk, so that he may be able to arrange for the required transportation.

I know that you are all familiar with what we call the "daily train." This daily train is an old fashioned custom in the army. And all problems are solved if we just get our shipment on board. However, that daily train cannot be expected to move forward everything that is required every day, nor is that daily train to be considered as an engine pulling box cars down the line. If you use the name, or the term, you must appreciate the fact that it is a combination of rail and road facilities to bring forward supplies.

Since it is impossible to get everything forward every day, the Army

G-4 will indicate on the face of his requisition the items he requires in an established priority. In other words, those things that are most badly needed get first preference for shipment. When the cube and tonnage has been figured, by the base signal supply officer, the problem of getting the goods forward is then taken up.

It is interesting to see how this is accomplished. The various branch supply officers will usually meet around the table. This conference is presided over by the base section G-4 and on the wall behind him, he will have a couple of blackboards — one of which will have columns, indicating the services and the total tonnage each service desires to move from various depots; the other blackboard, the amount of lift by rail and by truck out of each of these depots each day. The supply officers then bid one against each other for tonnage to move their equipment and finally by compromise each will get his fair share out of the total available transport. This takes care of the "run of the mill" movement forward to the Army supply installations, but there will come a time when special requisitions have to be filled, and Transportation Corps cannot meet the requirements.

We had an institution which was known as the "Beacoup Good Times American Signal Corps Trucking Association." We sold all our unsuspecting unit commanders shares in this enterprise and I can assure you they were much gratified to be taken into such an august institution. Once they had acquired a share in this "company" and it became necessary to meet an unforeseen freight movement, they were simply requested to make available their unit trucks. Naturally, this brought forth considerable weeping and wailing, but nevertheless they had taken shares in our trucking association and they were obliged to give up transportation. So we moved our own goods by our own convoys when necessary. This does not mean that the trucks would pull up alongside the stock piles, load up and then launch off into the blue. Far from it. The immense volume of traffic over the narrow, two-lane highways caused by supply convoys going and coming, and units moving into the combat zone greatly congested the roads. Hundreds of trucks each day had to get through. Congestion is to be expected, but confusion must be avoided. Hence, there was an agency known as "Q Movements" or "movement control" whose purpose in life was to see that this confusion was avoided. When you had convoys to go forward, it was necessary to get authority for these trucks to travel over the roads. Movement control, therefore, would designate the points of entry into the main highways and the roads over which these convoys would travel.

Once the supplies were turned over to the Army depots, their distribution was the sole responsibility of the Army Signal officer.

What I have said indicates to you the staff control and operation relative to supply, but supply likewise involves operational establishments for storage and issue, namely depots. It is very seldom that you will find a base section with only one depot. Goods will come into these depots either by rail or by truck and will come into your base section by boat. Therefore, you will have three types of supply establishments — ports, entransit

depots and storage and issue depots. Let us first consider the port. In this part of the world, ports are small, with a capacity, perhaps, of four or five ships at the time. Facilities for handling equipment were scarce. Ports had been bombed, were subject to bombing and therefore it was desirable that equipment be unloaded from ships as rapidly as possible for safety sake, as well as to make room for other ships.

Movement of supplies out of a port is either by rail or by truck. Such movement as can be made by rail is loaded directly from shipside to rail cars. No attempt is made to segregate equipment so unloaded as to branch or service. It is simply taken out of the hold of the ship just as it was loaded in and as soon as trains can be made up they are sent off to various storage and issue depots.

The amount of traffic which can be handled by rail is not great, hence, a large portion of it must be lifted out of holds onto docks and moved out by trucks. This, which is backloaded onto trucks, is taken on to what is known as an entransit depot. Here it is placed in one large pile where each of the supply services selects its own material. Of course, many times the equipment is loaded on a ship so that it can be segregated in unloading, but this applies mainly to Class 1, Class 3 and Class 5 supplies. Class 4 material in the larger items may also be thus handled, but seldom any Class 2, hence the need for segregation at the entransit depots.

An entransit depot is merely a location, a large field, if you will, where bulk equipment is segregated by branch and to a very limited extent by item, and held until transportation can be made available to take it to a storage and issue depot. Stocks in entransit depots are not considered for issue except in emergency. They are not inventoried or tallied in. However, a rough estimate is made as to type of equipment and quantity. This is done from packing lists attached to containers. Such information is furnished base Signal supply officer as soon as possible.

It may be worthwhile in passing to say something about the signal troops usually operating these two types of establishments. Normally, as far as Signals is concerned, it will be a Port Signal service company. A Port Signal service company operates, of course, the communication facilities for the port. Frequently this is not the case. If base section communication facilities are large enough in the area, they will include the port so as to avoid duplication in the use of equipment. It is to be remembered that each additional switchboard is a source of trouble and causes delay in handling traffic. Moreover it is not economical in men and equipment. This applies to other means as well. The receiving and shipping section normally found on the docks and at the entransit depot where they handle material passing through the area and the storage and issue section will operate any storage and issue facility within the immediate port area or can be detached from the company to operate elsewhere. The repair section will frequently become part of the base shop. Of course, the repair section has the responsibility of repairing or checking the ship's radio on ships as they come into the harbor.

THIS ENTRANSIT DEPOT IS IN A FIELD OVERLOOKING A SMALL TOWN IN TUNISIA

Now we come to the storage and issue depots. There are two types of storage and issue depots -- a signal depot or a section of a general depot. I believe the general depot is better because it has an overhead for guard as well as a labor pool on which you can draw. Depots in the area such as the Eastern Base Section bear very little resemblance to what you see here in the States. Such a depot would most likely be just a huge field adjacent to a good road net and rail facilities. If you are lucky, you may get an old barn or hay shed for your covered storage. If not, you may be able to get storage tents from the Quartermaster. The storage and issue depot is normally run by a Signal depot company or one of the storage and issue sections of such a company. Here, every piece of equipment that comes in is inventoried, and picked up on a "Tally-In." The items on this "Tally-In" are entered in the stock record account of the depot and the copy furnished to the base section supply officer for the base section record. Each piece of equipment is issued on a "Tally-Out." These three documents only are required for receiving, storage and issue operations. Inventories are made periodically as required, perhaps monthly, although it is not uncommon for daily inventory to be made of unusually critical items. These constitute the records required in depot operation.

Each piece of delicate equipment such as radios, carrier equipment and the like must be thoroughly tested at the depot to make sure they are in operating condition. It is the responsibility of the depot to see that this equipment will operate before it is issued -- a man's life may depend on it.

Alongside the depot, or in connection with the depot, is the base section shop. Here, signal equipment is repaired. It is repaired and returned, or if a repair cannot be accomplished within a reasonable time, damaged items

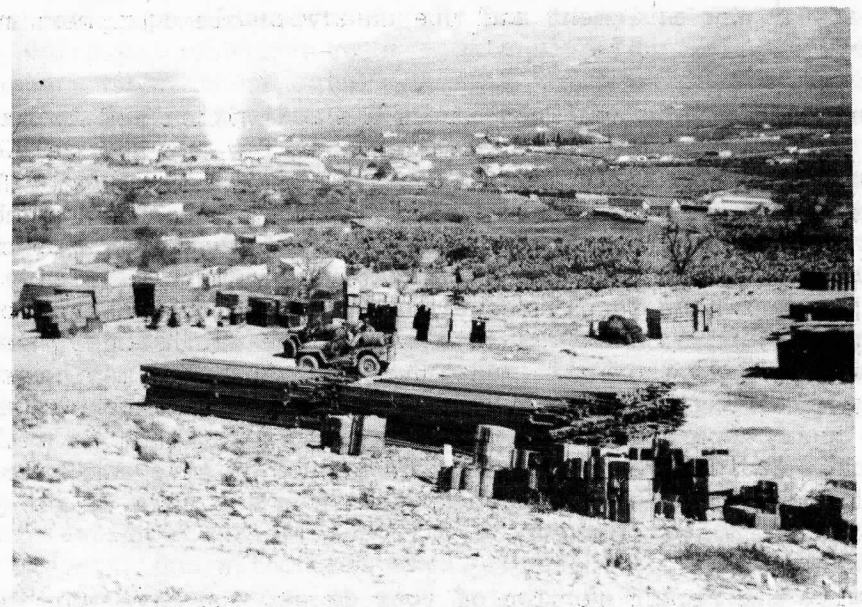
depots and storage and issue depots. Let us first consider the port. In this part of the world, ports are small, with a capacity, perhaps, of four or five ships at the time. Facilities for handling equipment were scarce. Ports had been bombed, were subject to bombing and therefore it was desirable that equipment be unloaded from ships as rapidly as possible for safety sake, as well as to make room for other ships.

Movement of supplies out of a port is either by rail or by truck. Such movement as can be made by rail is loaded directly from shipside to rail cars. No attempt is made to segregate equipment so unloaded as to branch or service. It is simply taken out of the hold of the ship just as it was loaded in and as soon as trains can be made up they are sent off to various storage and issue depots.

The amount of traffic which can be handled by rail is not great, hence, a large portion of it must be lifted out of holds onto docks and moved out by trucks. This, which is backloaded onto trucks, is taken on to what is known as an entransit depot. Here it is placed in one large pile where each of the supply services selects its own material. Of course, many times the equipment is loaded on a ship so that it can be segregated in unloading, but this applies mainly to Class 1, Class 3 and Class 5 supplies. Class 4 material in the larger items may also be thus handled, but seldom any Class 2, hence the need for segregation at the entransit depots.

An entransit depot is merely a location, a large field, if you will, where bulk equipment is segregated by branch and to a very limited extent by item, and held until transportation can be made available to take it to a storage and issue depot. Stocks in entransit depots are not considered for issue except in emergency. They are not inventoried or tallied in. However, a rough estimate is made as to type of equipment and quantity. This is done from packing lists attached to containers. Such information is furnished base Signal supply officer as soon as possible.

It may be worthwhile in passing to say something about the signal troops usually operating these two types of establishments. Normally, as far as Signals is concerned, it will be a Port Signal service company. A Port Signal service company operates, of course, the communication facilities for the port. Frequently this is not the case. If base section communication facilities are large enough in the area, they will include the port so as to avoid duplication in the use of equipment. It is to be remembered that each additional switchboard is a source of trouble and causes delay in handling traffic. Moreover it is not economical in men and equipment. This applies to other means as well. The receiving and shipping section normally found on the docks and at the entransit depot where they handle material passing through the area and the storage and issue section will operate any storage and issue facility within the immediate port area or can be detached from the company to operate elsewhere. The repair section will frequently become part of the base shop. Of course, the repair section has the responsibility of repairing or checking the ship's radio on ships as they come into the harbor.



THIS ENTRANSIT DEPOT IS IN A FIELD OVERLOOKING A SMALL TOWN IN TUNISIA

Now we come to the storage and issue depots. There are two types of storage and issue depots -- a signal depot or a section of a general depot. I believe the general depot is better because it has an overhead for guard as well as a labor pool on which you can draw. Depots in the area such as the Eastern Base Section bear very little resemblance to what you see here in the States. Such a depot would most likely be just a huge field adjacent to a good road net and rail facilities. If you are lucky, you may get an old barn or hay shed for your covered storage. If not, you may be able to get storage tents from the Quartermaster. The storage and issue depot is normally run by a Signal depot company or one of the storage and issue sections of such a company. Here, every piece of equipment that comes in is inventoried, and picked up on a "Tally-In." The items on this "Tally-In" are entered in the stock record account of the depot and the copy furnished to the base section supply officer for the base section record. Each piece of equipment is issued on a "Tally-Out." These three documents only are required for receiving, storage and issue operations. Inventories are made periodically as required, perhaps monthly, although it is not uncommon for daily inventory to be made of unusually critical items. These constitute the records required in depot operation.

Each piece of delicate equipment such as radios, carrier equipment and the like must be thoroughly tested at the depot to make sure they are in operating condition. It is the responsibility of the depot to see that this equipment will operate before it is issued -- a man's life may depend on it.

Alongside the depot, or in connection with the depot, is the base section shop. Here, signal equipment is repaired. It is repaired and returned, or if a repair cannot be accomplished within a reasonable time, damaged items

are exchanged for new equipment and the unserviceable equipment repaired when time and parts are available.

A signal repair shop will not limit its activities solely to Signal equipment. You will repair items for Ordnance, for the Medical Corps and others. You will also repair radio sets for special services. This work, of course, gets last priority. It is good training. You must remember that in places such as Africa, there are no other facilities and if you can help to keep recreational equipment going you greatly help morale. There is another reason for it, your shop facilities are limited and cannot produce all the items you might require. You may need blades for earth auger, gearing -- you can go to Ordnance and they will make them for you. You may have some buried cable to lay. The Engineer has a very handy gadget called the "angle dozier." If you have been cooperative with him, you may expect that he will help you in your needs. You fast learn that it is a game of give and take and it is only by full cooperation with everybody that you are able to get your own job done.

Along with the repair section of your depot, you have your repair company. Sections of this unit may be placed at various depots to augment your depot shop. Sections of this company also travel around from unit to unit, making repairs as they go or if repairs required are beyond their scope, exchanging equipment and bringing the damaged items to the depot shop. Ordnance has a number of vehicles, tanks and the like, that are equipped with radio. These radios must be thoroughly tested before the vehicles are sent into combat. It may, therefore, be advisable to place one of the repair sections from the repair company at the Ordnance shops.

I think this will give you some idea of the supply operations within a base section.

There is another Signal Corps function which is rather important, and that is communications. Communications within a base section or within a communication zone are quite different in their operational set-up from tactical Signal communications. With tactical organizations, the Signal unit will furnish communication for its own organization. When the Corps, Division, whatever it may be moves, all its communications, troops and facilities move with it. This is not the case with Line of Communications Signals.

Communications within a base section may be likened to a miniature Bell System, Western Union and Mackay Radio. The communication is not to serve units, but to serve areas and to provide facilities for all the units and establishments within the area.

Of course, your main establishment will be found at your largest headquarters and communication facilities will center around a headquarters. In the areas surrounding the headquarters will be found hospitals, depots and the like which by reason of the road nets, rail facilities, etc., must locate in the area. There will be several such centers in which concentrations of similar establishments will be found. There may also be training areas

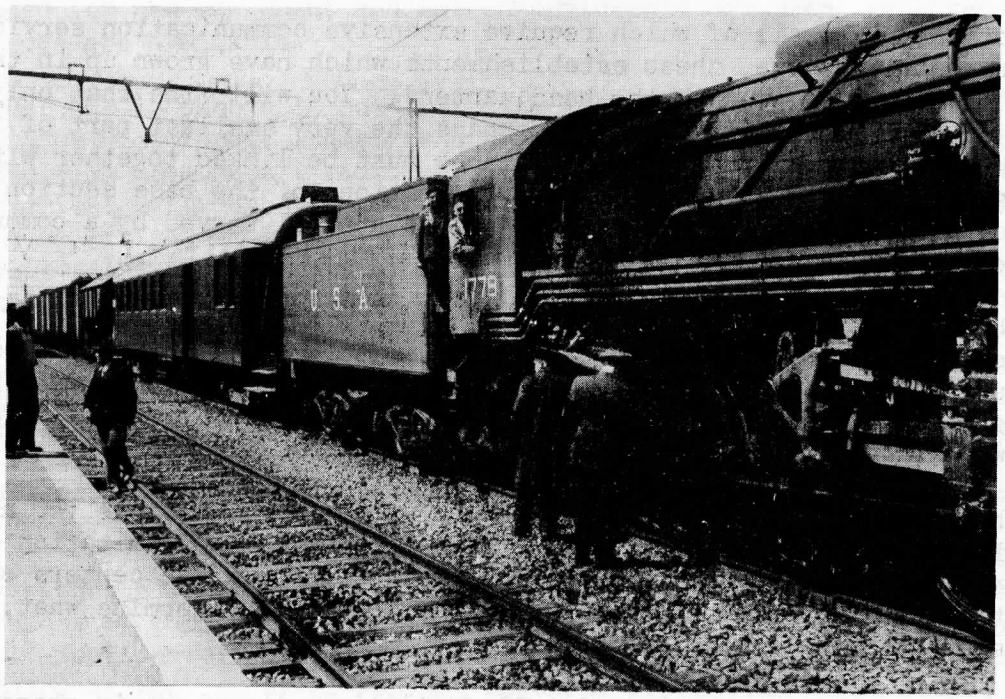
for tactical units all of which require extensive communication service. When headquarters move, these establishments which have grown up in the area do not of necessity go with the headquarters. You will find that only a part of the area communication service, perhaps the very smallest part of it can be withdrawn. All of these establishments must be linked together with the headquarters so that the administrative functions of the base section can be handled. Thus we have a number of signal setups all served by a communication net.

There seems to be no need to go into the methods of operation of switchboard or procedure for message center, radio, teletype, because methods and procedure do not differ greatly, if at all, from what you learn here in your schools. It is merely a matter of serving the different types of organizations which require electrical communications in a different way.

The base section Signal officer is, of course, responsible for all the communication operations within his area. Subject to the limitation of equipment and troops available, he will set up such traffic centers or communication centers as he feels are required. He will determine what, when, and where these facilities are to be.

However, he does not control toll facilities, though he is responsible for construction, maintenance and most of the operation of all the facilities within his area. He obviously cannot control facilities which cross the boundaries of the base section and which are used by the people of other base sections. They, therefore, are controlled by higher headquarters. AFHQ

A STORAGE DEPOT KEEPS SUPPLIES SEGREGATED AND UNDER COVER



TYPE OF RAILROAD FACILITIES IN NORTH AFRICA USED BY U.S. ARMY TROOPS

designated the circuits by number as well as alternate routes for toll circuits. Likewise, tactical or operational facilities within his area are not controlled by him. Establishment of radio nets within the base section to serve purely base section installations are his responsibility, but call signs and frequencies must be secured from higher authority. Radio nets with terminals outside the base section, are controlled by higher headquarters and established at their direction. The teletype set-up is established and operated on the same principle.

One interesting feature of the operations within the Eastern Base Section was its nature as a joint operation with the British Army. Joint use was fully made of all existing facilities and since neither the British nor the American Signal forces were sufficiently large or equipped to duplicate the establishments within the area, British installations would serve American units in their area and the Americans did the same for the British. In some cases, American installations provided the entire signal establishment for an area predominantly or wholly British. It can honestly be said that the cooperation between the two forces was complete and that at no time did any difficulty arise which caused friction.

Very little commercial type of equipment was available for use in this section. Our switchboards for larger headquarters and for toll boards were the TC-1, augmented by additional positions of BD-80A, and for smaller installations the TC-4. For radio, the principal stations used the SCR-299 and the shorter distances were either covered by the SCR-193 or the SCR-177B.

Radio stations were set up where necessary and constant traffic load kept on it. This, of course, supplemented the teletype and by keeping more or less of a constant load, the actual fluctuation in traffic normally to be expected did not appear. Teletype is considered the best means of electrical communication for fast and secure service. A very considerable difficulty arises in furnishing communications for such establishments as depot headquarters and hospitals which either do not have any T/BA equipment or where the T/BA is totally inadequate. It was found necessary to install a minimum of one TC-4 at each general hospital or depot headquarters. Hospitals were required to furnish operators. Depot headquarters were served by area communication centers because each depot had attached to it numerous service units requiring signal services.

I believe this has given you some idea of what LOC Signals does and the extent of the operations with which Signals may be faced. Seldom will you have sufficient personnel of the particular types you require to do your work. You will therefore have to get along as best you can and you will soon learn to use any and every expedient.

MAGNETO SWITCHBOARD SUBSTITUTE

Adapter Plug U-4/GT is a switching unit that may be used for terminating a local battery telephone line. The use of several plugs, along with a Telephone EE-8 for operator's set, permits establishing an emergency field magneto telephone switchboard. The adapter plug may be used also as a silent visual signal to replace the ringer in Telephone EE-8.

Physically, the Plug (Figure 1) consists of a small transparent plastic body with two binding posts for line connections, a neon lamp that responds to ringing current for line signal in series with a tubular resistance; and two combination jacks and "banana" plugs for making connections in tandem between adapter plugs. An identification plate, on which the line number may be written, is embedded in the body of the plug. The resistance and neon lamp are placed in the plastic body, making the instrument substantially moisture and fungi proof.

The adapter plugs described and illustrated in this article are laboratory models. It is expected that improvements, such as a lip on the body of the plug to facilitate handling, and insulated binding posts will be incorporated in the production design. The dimensions shown in the illustrations may be changed to a small degree. The weight is approximately one ounce.

The small size and moistureproof characteristics of the adapter plug suggest its use in jungle, mountain, amphibious and airborne operations.

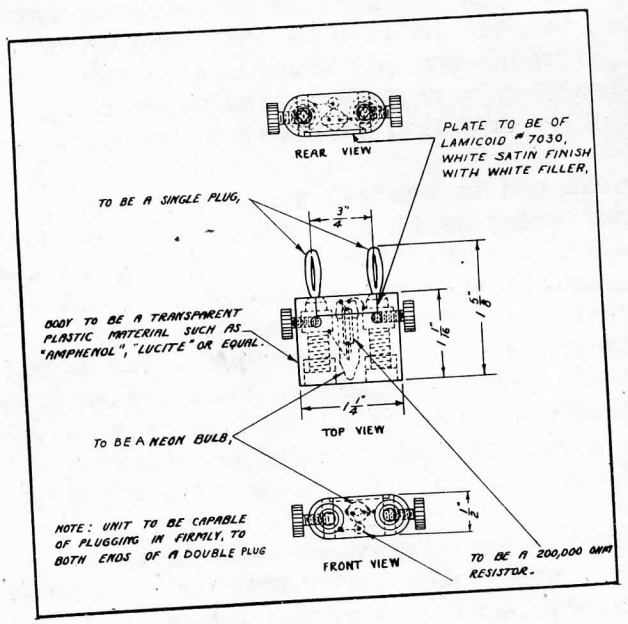
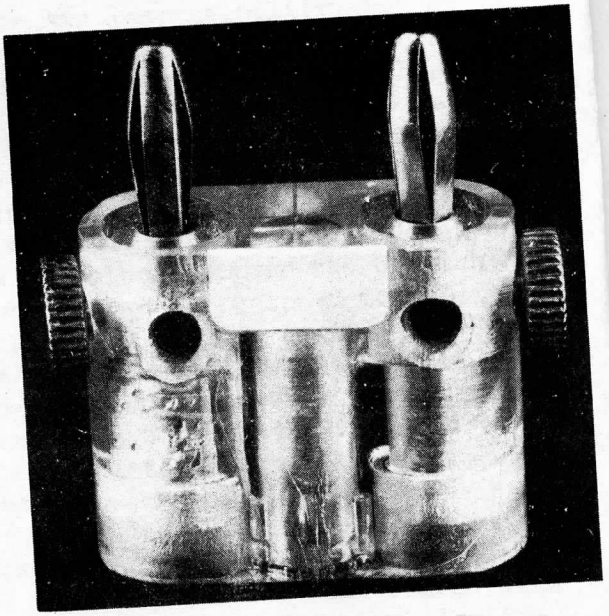


FIG. 1 - LINE DRAWING OF ADAPTER PLUG



ENLARGEMENT OF NEW SWITCHING UNIT

The plug is small enough so that a switching operator can carry enough plugs in his pocket or in a pouch attached to his cartridge belt to set up his station.

To set up a switching central, a holding rack, as shown in Figure 2, may be made to mount the plugs in an orderly manner. The rack is a plain wooden block drilled to mount seven plugs, four in the front row and three in the back row. Similar schemes for orderly mounting may be improvised in the field.

The holding rack may be secured to a tree, post, stake, log, or other firm support. The adapter plugs are then inserted in the mounting holes with the identification plate facing the operator. A Telephone EE-8 for use as the operator's set is connected to one of the adapter plug's binding posts by a two-conductor cord or a length of field wire about four feet long. It is recommended that a head and chest set be provided for the use of the operator. Each line pair leading to the switching point is connected to an adapter plug and the proper notation made on the identification plate to identify the circuit.

When the lamp in a line circuit adapter plug flashes, the operator inserts the plug associated with his Telephone EE-8 into the line plug of the calling party and challenges. When he has determined the number called, the operator removes his plug and inserts it into the line plug of the called party and rings with the generator of his Telephone EE-8. When the called party answers, the operator inserts the called party's plug into the jacks of the calling party's plug and, when he is satisfied that the connection has been made, removes his own plug.

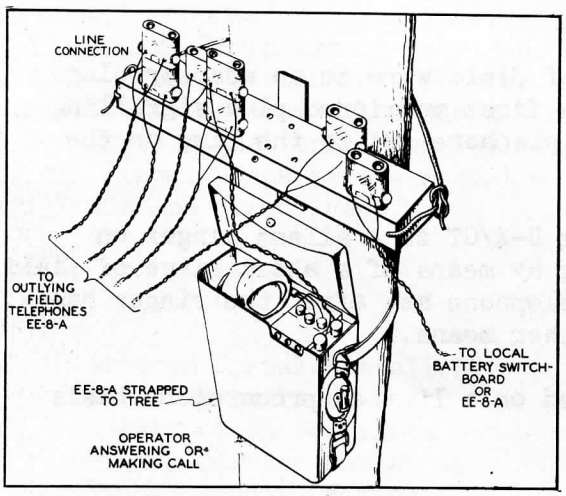


FIG. 2 - HOLDING RACK FOR MOUNTING PLUGS

A conference connection may be set up by calling the parties desired individually and connecting the adapter plugs in tandem. Figure 3 illustrates various connections that are possible. On a recall by any party, the lamps of all plugs connected will flash. The operator will then challenge and take down or change the connection as desired. When a conversation is completed, the talking parties should flash the operator in order that the connection may be disconnected.

Should a telephone user in an outpost desire to substitute a visual line signal for the bell in Telephone EE-8, the field wire pair entering the outpost should terminate in an adapter plug and the operator's telephone

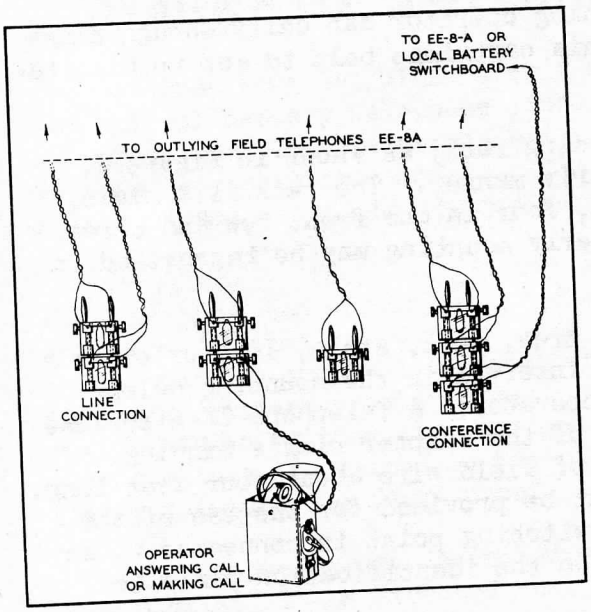
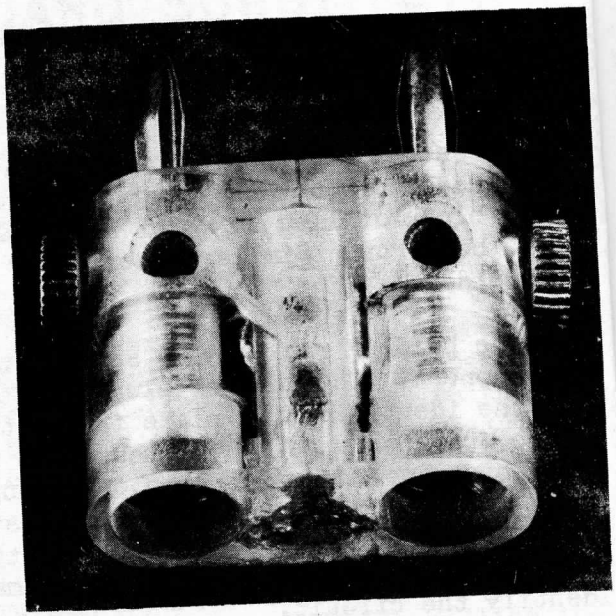


FIG. 3 - CIRCUIT COMBINATIONS POSSIBLE WITH DEVICE



VIEW OF PLUG SHOWING MALE AND FEMALE ENDS AND BINDING POSTS FOR LINE CONNECTIONS

should be connected with a short length of field wire to an adapter plug. Incoming calls will flash the lamp in the first mentioned plug signalling the operator to connect the plug on his telephone set to the plug on the field wire circuit.

Another method of using Adapter Plug U-4/GT as a silent ringer on Telephone EE-8 would be to connect a plug by means of a short piece of field wire across terminals L1 and L2 of the telephone set after the ringer has been silenced by being disconnected or other means.

Adapter Plug U-4/GT is being procured on a limited procurement basis for theater requirements.

SEVENTH ARMY PARTICIPATION IN THE SICILIAN CAMPAIGN

This concludes the article on signal communications in the Sicilian operation the first two parts of which ran last month. For a more detailed discussion of this campaign, as it applied to one Signal company, attention is invited to 3d SIGNAL COMPANY IN SICILY, published elsewhere in this issue.

ACTIVITIES OF SIGNAL CORPS PERSONNEL OF THE I ARMORED CORPS FROM 21 FEBRUARY TO 10 JULY 1943

On 21 February 1943, the Signal Officer of the I Armored Corps, Reinf., which later became the Seventh Army, was directed to report to the Chief Signal Officer of Allied Force Headquarters at Algiers. There he was informed of the contemplated invasion of Sicily, was furnished information relative to the major units involved, and was directed to prepare estimates of the Signal Corps troops required. The following Table shows his estimate of Signal Corps troops required for the reinforced corps (which was to be expanded into an Army), the Signal Corps troops actually provided (exclusive of Air Force signal units and less signal intelligence and divisional units), and the Signal Corps troops normally provided for a type field army by current T/O's and directives:

	Estimate	Actually Received	T/O & Current Directives
Armored Signal Battalion	1	1	0
Signal Battalions	2	2	1
Construction Battalion	1	0	1
Signal Service Battalion	1	0	0
Signal Repair Company	1	3 Detchmt	1
Signal Depot Company	2	1	1
Port Signal Service Company	1	1	0
Radio Intelligence Company	1	1	1
Signal Pigeon Company	1	0	1
Signal Companies (Special)	4	4	4
Units of Signal Photo Company	8	4	1 Co
Signal Operations Company	0	1	0
Signal Operation Battalion	0	0	1

In order that the signal section would be well filled when the I Armored Corps became Seventh Army, the Signal Officer submitted requisitions to bring

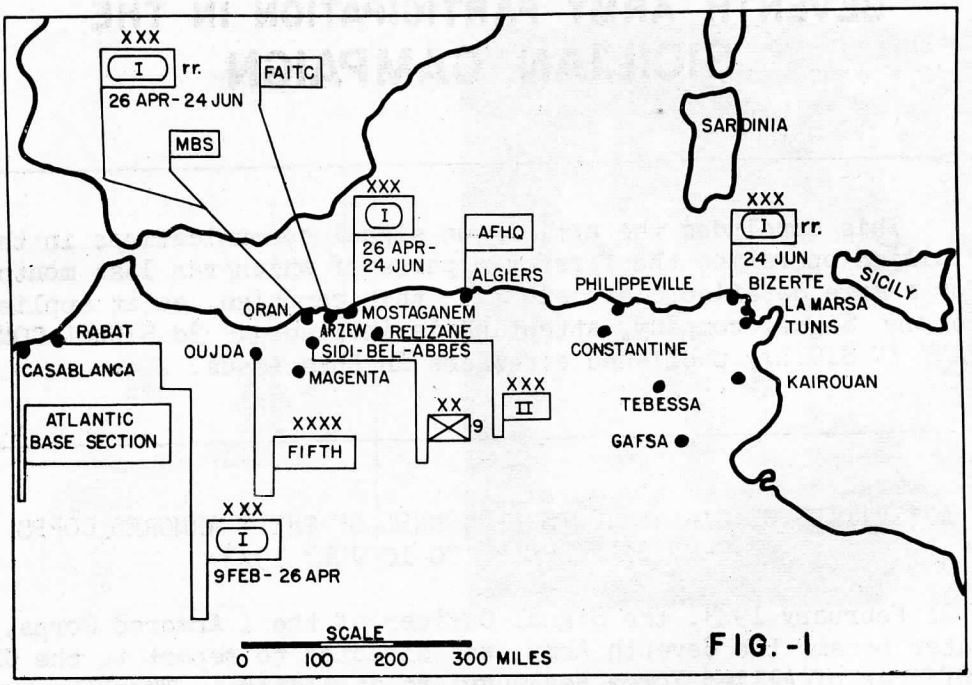


FIG.-1

the section up to 16 officers and 50 enlisted men. The number of officers approved was reduced to 12. At no time during this phase did the number of enlisted men exceed 21 men. The Signal Officer requested 20 officers and 40 enlisted men for a base signal section. He was advised that most of these officers would come from the States and would not be available to assist during the planning phase. However, a few officers were obtained from North Africa to assist in signal supply matters.

On 23 February signal planning began at Rabat, shown in Figure 1. For this planning phase, I Armored Corps Headquarters worked under Force A for planning; all administrative matters, however, had to clear the immediate superior Headquarters, Fifth Army. Some confusion existed.

First Plan

On 25 March, plans for the invasion of Sicily were prepared and approved by higher headquarters. These called for a British assault on southeastern Sicily between Licata and Scoglitti on D day. On D plus 2, the 3rd Division Reinf. would land at Sciacci — on D plus 5 three American forces would land, one at Castelmarre, another north of Palermo, and a third between the two cities. So, with the plan approved, the Signal Officer began preparation of the detailed signal plan, and the necessary training directives were issued for signal units.

The training of Signal Corps troops presented quite a problem. The initial stages of the Sicilian invasion involved the simultaneous landing of a large number of troops on beaches defended by an aggressive enemy. Naturally, signal communications for this type of operation were quite com-

plicated and very different from the communications employed when units are operating entirely on land. Considerable effort, therefore, was made to provide the necessary special training in amphibious operations for Signal Corps units which were to be involved in the landing.

However, the need for emphasis on training for amphibious operations was but one of many difficulties encountered. Of the Signal Corps units which were to take part in this operation, only one signal battalion and two division signal companies had had previous combat experience. Those Signal Corps units which were stationed in North Africa but which took no part in the Tunisian operation, had been operating the communications agencies at various headquarters and had little or no opportunity to carry an adequate signal communication plan to a successful conclusion. In many instances units had received new or replacement personnel to the extent of approximately 25 per cent of their total strength. The replacements, being basics, were not trained as signal specialists, and the time available for training was so limited that very little could be accomplished in the development of well trained teams.

Training

On 26 April the I Armored Corps Headquarters moved to Mostaganem. At this location, two one-day schools one month apart were held for instruction of radio operators in the frowned-upon link sign procedure. Personnel so trained then gave instruction to operators in their units. A seven-day school was conducted by the Mediterranean Base Section in Oran on the installation, operation and maintenance of carrier equipment. Some training was given in the use and maintenance of the British speech plus simplex and speech plus duplex equipment.

BATTLE PRACTICE LANDING AT ARZEW

Of course the training of units other than signal units of the I Armored Corps was also going on at this time. Headquarters were widely scattered. The 82nd Airborne Division was engaged in maneuvers near Casablanca and regiments were undergoing training at the Fifth Army Invasion Training Center in the Arzew area. Units were in Casablanca, Oujda, Sidi-Bel-Abbes, Oran, Mostagenem, Relizano, Algiers, Constantine, Phillippeville, Tebessa, Gafsa, Kairouar, Bizerte, and Tunis. The air line distance from Casablanca to Bizerte is approximately 1,100 miles.

To deliver tactical and administrative messages, maps, overlays and regulations to these units in a maximum of 24 hours required the maximum use of radio, telephone, teletypewriter and motor messenger. In addition an air courier officer service was set up jointly by The Adjutant General and the signal section. The Adjutant General furnished five officers as air couriers, who, working directly with the Signal Officer, were responsible for the safe delivery of all classified documents between Corps headquarters and the various sub-message centers established at Constantine, Tebessa and Bizerte. These officers travelled 2,260 miles daily by air, excluding special delivery runs. I.

Signal Corps personnel operated the sub-message centers and the motor messenger service. The latter was charged with the delivery of messages from the sub-message centers to the organizations concerned. The motor messengers covered from 700 - 1,000 miles per day in furnishing this service.

Teletypewriter circuits were set up between Mostagenem, Algiers, Oran, Relizane, Arzew, and Sidi-Bel-Abbes. A I Armored Corps command net and an administrative radio net were in operation.

Second Plan

Then on 3 May the plan was changed. The new plan was the one actually followed in the campaign. G-4 plans were greatly affected by the change. The original plan called for the early capture of the port of Palermo, but in the new plan, there were few ports and it was necessary to provide for supply over the beaches for possibly 30 days (actually it was only 17 days before Palermo was captured). Fortunately the change was made just two days after the organization of the signal supply section. II.

Based on the new plan initial estimates were made for signal supplies, and requisitions were submitted for sufficient equipment to bring all units up to full T/BA authorization and to provide for 21-day maintenance. During the planning phase, a total of 29 requisitions were prepared to be filled in the U. S. and 63 requisitions to be processed in North Africa. These requisitions represented approximately 19,220 tons of signal equipment which it was necessary to receive, record, and issue, or to prepare for over-water transportation to Sicily to form the initial stock for the signal supply depot when established on the island. That figure is relatively high when it is noted that only 121,730 tons of supplies were used in the entire operation. These signal requisitions alone represented three times the total weight of ammunition expended during the entire campaign. III.

The culmination of the planning phase for the signal section of the then I Armored Corps was the issuance on 21 June of the signal communication plan, the index to which (with parts extracted for security purposes) is given on the following page.

INDEX
ANNEX #10

SUBJECT

c. Special Messengers
d. Radio Communications
e. Wire Communications
f. Visual Communications
g. Authenticator Systems
h. Codes and Ciphers
i. Radio Intelligence
j. * * *
k. British Officers on Liaison Duty
l. Naval Fire Control Parties
m. Air Support Parties
n. Military Personnel for Headquarters Ships
o. Communication Isolation Plan

IV. Administration

11. General
12. Motor Vehicles
13. Supplies
14. Shipment of Supplies
15. Signal Depot
16. Marking of Supplies

V. Command

17. Signal Operations Instructions.

APPENDICES.

- - - - - - - - - - - -

Of particular interest are the following highlights which have been extracted from the Signal Communication Plan:

* * * * *

I, 2, d. Existing Commercial Facilities.

(1) Initially, each task force commander will have complete control of all telecommunication facilities in areas occupied by his troops. This control will be exercised through his signal officer, who will coordinate the exploitation of these facilities and their allotment to the various services.

* * * * *

(4) Installations secured will be operated by signal personnel of the Allied Forces. Friendly alien personnel may be employed provided their integrity can be established, but they will not be employed without adequate supervision.

ASSAULT TROOPS REHEARSE "HITTING THE BEACH"

(5) Broadcast transmitters will be taken over as military stations and will, if required, be used initially for communication purposes. They also may be required in the early stages of the operation for broadcasting of announcements by the military commander. As soon as these stations can be released from purely military use, they will go to control of personnel of P.W.S. including technical personnel, which will accompany each task force. The technical personnel will be available to operate broadcast stations in the initial period when the transmitters may be required for purely military communications.

* * * * *

(7) All civil telephone services will be discontinued as such. Local telephone services will be reopened for military purposes and requirements and certain public services or individual civilians may be allowed access to local telephone services. Among these will be included such civilian agencies or persons, for example, hospitals and doctors, as may be nominated by AMGOT. Such agencies or persons will have no direct access to long distance telephone services, but may be permitted by AMGOT to make calls when necessary from military offices.

I, 3. Command Posts

a. A.F.H.Q.
Main - Algiers
C.P. - Malta

b. Headquarters Force "A"
Tactical - Malta (returning to Tunis. area)
Main and Rear - Tunis area (probably La Marsa)

c. Headquarters Seventh Army
C.P. - (1) Headquarters Ship
(2) Sicily later
Rear - (1) Bizerte
(2) Sicily later

Section III. 7. Sub-Forces under Seventh Army.

a. II Corps

(1) (a) 2. In D plus 4 follow-up		Pers	Veh
*** Signal Bn.		932	249
Det. *** Sig Co (Depot)		25	2
	Total	957	251

b. 45th Division

(1) (a) 2. Units in assault			
*** Signal Co		226	56
Det. *** Sig Photo Co		7	1
Broadcasting Det		3	--
*** Sig Co (Spec)		202	25
		438	82
3. In D plus 4			
Det. *** Sig Co (Dep)		25	2

c. 1st Division

(1) (a) 2. Units in assault			
*** Signal Company		226	56
Det *** Sig Photo Co		7	1
Det *** Sig Repair Co		21	6
Det *** Sig Co (Spec)		118	3
Broadcasting Det		3	--
	Total	375	66

d. 3rd Division

(1) (A) 2. Units in assault			
*** Signal Co.		226	56
Det *** Sig Photo Co		7	1
Det *** Sig. Rep. Co.		21	6
*** Sig Co (Spec)		195	15
Broadcasting Det.		3	0
	Total	452	78

e. Force Afloat

(1) (a) 2. Units in the assault			
*** Sig. Arm'd Co.		256	51
Det. *** Sig Co		49	--
	Total	305	51

III. 10. Detailed Signal Plan

* * * *

d. Radio Communication

(1) Radio silence

(a) No radio set will be allowed to switch on during the voyage. Communications officers will be personally responsible that this order is carried out, and will take steps to bring to the notice of all radio operators that infringement of this order may jeopardize the safety of the entire convoy.

Veh
249
2
251

(b) Radio silence may be broken when leading troops are ashore, or when the element of surprise is lost, or in an extreme emergency during the ship to shore movement on the authority of the Commanding General, Seventh Army.

(2) Batteries

56
1
--
25
82

(a) Every radio set operated from dry batteries will land with new batteries installed and three new sets of batteries as spare. These spare sets of batteries will be carried in a water-tight container. No time expired batteries will be used.

2

(b) Storage batteries will be fully charged prior to embarkation.

* * *

56
1
6
3
--
66

e. Wire Communication

* * * *

5. Interruption of the Commercial Wire System

* * *

56
1
6
15
0
78

b. Advance units will be instructed to cut wire lines leading into enemy territory. This includes telephone, telegraph, and railroad dispatch lines. The near end of the enemy portion of such lines will be short-circuited and grounded.

c. Enemy central offices will be secured intact if possible and all troops will be instructed to establish a guard over such installations. Power supply should be interrupted to central offices to insure that the enemy does not use the equipment. The minimum amount of damage should be done to the central office equipment so that it can be readily restored for our use. Particular care should be taken to secure all records since

51
--
51

this will greatly facilitate the re-establishment of communication. Signal officers of the various units will make plans for taking over central offices as soon as possible after they are captured.

d. Every precaution will be taken to prevent losses to Signal Corps personnel from mines and booby traps while working on any type of enemy communication facilities.

* * * *

c. Communication Isolation Plan

(1) Radio broadcast and communication stations will be located on operation maps in the hands of all units down to and including Battalion Commanders.

(2) Radio communication will be interrupted as soon as possible and with least possible damage to the equipment. Attack will be directed to power and antenna installations rather than transmitter equipment.

* * * *

IV., 14. Shipment of Supplies

Initial and 7-day maintenance equipment will be carried along with the troops. Each 1st and 2nd follow-up convoy will carry seven days maintenance for the troops already at the destination.

* * * *

15. Signal Depot

* * * *

e. Stockages:

(1) Initial - 7 days maintenance carried by units plus 7 days maintenance on first follow-up plus 7 days on second follow-up to be maintained in beach dumps by Storage and Issue Section of the Signal Depot Company.

(2) Levels - 30 days reserve plus ten days working margin to be maintained by necessary requisitions.

* * * *

An unusual appendix was one entitled "Summary of Local Power Supply in Towns," which covered hydro electric sources and locations of hydroelectric and thermal power stations in Sicily.

TRAINING FOR STREET FIGHTING

The signal plan was furnished to the task forces and signal training again intensified -- the plan was followed during the operation. The resulting successful signal communications justified the 4 months spent in the preparation of the plans and the $4\frac{1}{2}$ months devoted to Signal Planning for the operation.

In all reports of battle experience prior to the Sicilian Campaign, the soundness of basic principles prescribed in current training literature has been confirmed. This confirmation is again noted in the Seventh Army Report on the Sicilian Campaign. However, as in all operations certain weaknesses are disclosed and many lessons are learned. A few of the latter, pertaining to signal communications, as reported by the Commanding General, Seventh Army are covered in the Fourth Phase:

LESSONS LEARNED FROM THE CAMPAIGN AS THEY APPLY TO SIGNAL COMMUNICATIONS

Planning Phase

The signal officer must have a complete troop list of units early in this period in order that he may plan for necessary specialist training and compute the signal supplies required. This list must be augmented at the earliest practicable date with the numbers and types of signal units available for the operation in order that the Signal Plan may be formulated.

Training

In any future operations involving the use of signal troops, the training of such troops must be conducted under the supervision of the senior force signal officer. This instruction must be continuous except during actual operations.

Particular emphasis must be placed on thorough training for the coming operation in mine and booby trap detection and removal, and in the use and maintenance of teletypewriter equipment. The latter type of training is especially needed by signal battalions.

The message center of the force commander is the nerve center of the entire operation. In the past its importance has not been fully realized by all units.

Message Center

Uniformly the number and quality of personnel provided is inadequate. In general, there is a definite lack of sufficient clerks, and maintenance specialists for code devices in the message centers of Army, Corps, and Divisions. In the higher echelons the message center must have two officers of field rank — all message center officers should be of mature and sound judgment.

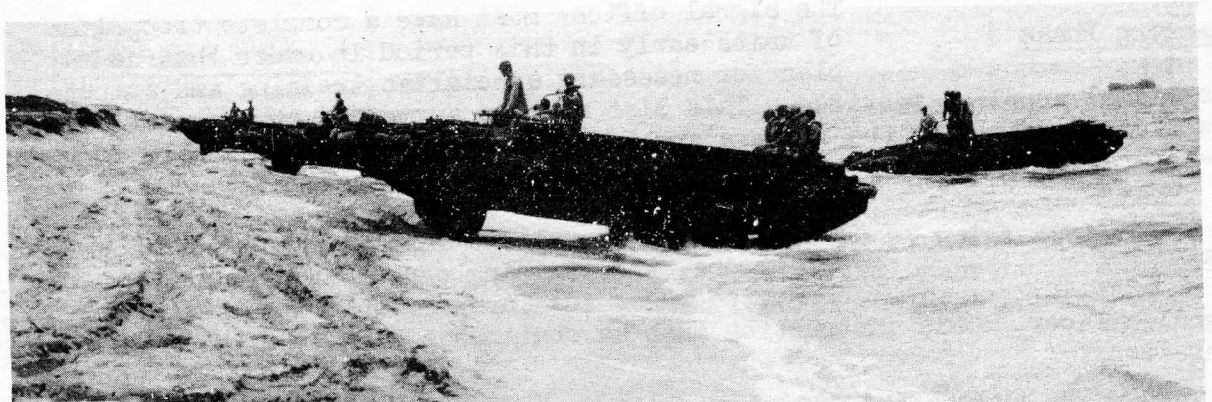
There must be a redefinition of The Adjutant General's Mail and Distribution Sections, and the Signal Corps Message Center duties. Incoming and outgoing messages are unnecessarily delayed by having to pass through two offices as well as the Secretariat of the Chief of Staff at one headquarters before delivery to the addressee.

Radio

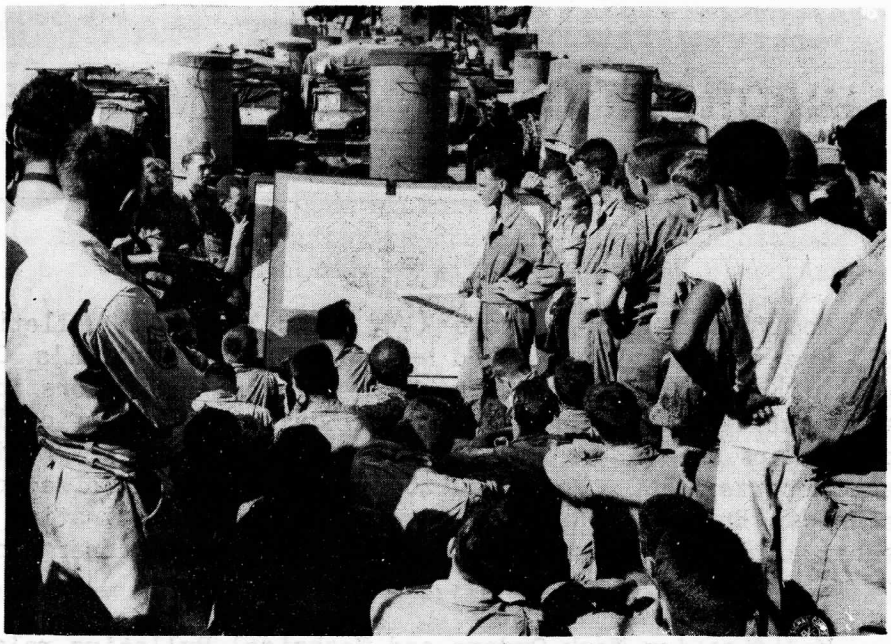
During the assault landing period administrative traffic must not be transmitted over tactical radio channels. Considerably more high powered radio channels are required by an Army headquarters than can be provided under current Tables of Equipment. Where an amphibious operation is involved, additional sets of a type such as the SCR-299 installed in a water-proof shelter in a 2½-ton amphibious truck are required on the basis of two for each Army, Corps and Division.

Wire

A standard transposition scheme must be prescribed by the force signal officer to be used by all signal troops in line rehabilitation. This scheme must be rigidly adhered to, to prevent cross-talk and noise as the circuits are extended. At the same time it must be emphasized that in a rapidly



DUKWS BEING MANEUVERED FOR THE INVASION



INSTRUCTIONS CONTINUE EVEN AS THE ARMADA APPROACHES ITS OBJECTIVE

moving situation it is usually better initially to lay new wire lines rather than to rely on repaired enemy lines. In Sicily the rehabilitated civilian commercial circuits were found to be unreliable for the use of carrier equipment.

Tables of Organization — All combat units should be brought up to T/O strength, plus 15 percent for enlisted men and officers of junior grade at the earliest practicable date preceding an operation. The overstrength is of vital importance since experience has shown that due to sickness and other reasons approximately 10 to 15 percent of any command will not be available to the commander on D Day.

Consideration must be given to the fact that in amphibious operations the signal section of higher headquarters must be divided into two echelons, each capable of operating independently. Once ashore the section will still function in two echelons, one at the tactical, and the other at the administrative command post.

Practically all T/O's of signal units within an Army require changes. In all cases, not enough personnel are provided.

Among the Army signal units there must be included an Army signal battalion for each Corps assigned or attached to the Army. In addition to the above there must be included one construction battalion, one operations battalion which must include one radio operations company, two signal depot companies, one signal repair company, one signal photographic company, one signal radio intelligence company, and appropriate signal intelligence detachments for each Army and corps headquarters.

INFORMATION ON EQUIPMENT

Modification Work Orders (MWO) and Technical Bulletins (TB) are now being published by the Adjutant General's Office. These publications supersede maintenance letters formally published for Ground Signal Equipment. Modification Work Orders are generally originated by Unsatisfactory Equipment Reports (AGO Form No. 468) from using organizations. Technical Bulletins are prepared for the dissemination of technical data, information relative to improving operation, and maintenance of equipment.

Modification Work Orders and Technical Bulletins relating to specific equipment are numbered so that they may be associated with the Technical Manual for that equipment.

Approximately 20 Modification Work Orders and 25 Technical Bulletins have been published to date for Ground Signal Equipment. These publications may be obtained through regular AGO channels. Information relative to available MWO's and TB's and their distribution may be found in Field Manual FM 21-6.

Maintenance Letters Nos. 1 to 64 inclusive, except those superseded by MWO's or TB's and No. 61 and No. 62 which have been canceled, may still be obtained, as long as supply lasts, on request from:

Officer in Charge,
Ground Signal Maintenance Branch,
Signal Corps Ground Signal Agency,
Architect Building,
17th and Sansom Streets,
Philadelphia 3, Pennsylvania.

RUSSIAN WIRE COMMUNICATION

Always a land of mystery to her western neighbors, the vast domain of the U.S.S.R. became even more of a closed book after the Revolution of 1917. Since then Russia has sought to develop and modernize her political and industrial structure with a minimum of foreign aid. Consequently, comparatively little information on existing Russian telecommunications has been available to her enemies or allies -- either before or since Axis armies began their ill-fated drive into Russia on 22 June 1941.

However, within the past year U.S. military observers have been given greater freedom in inspecting both civil and military telecommunications within Russia. Their reports have cast some light on the wire systems over which Red Army operations and the other activities of the Soviet Union are partially controlled.

The following information is based on recent dispatches from military observers and from other reliable reports published between 1917 and 1940.

PREWAR WIRE SYSTEMS

By comparison with other European countries the telecommunications system operated by the Tsarist government prior to 1917 was neither extensive nor modern, and consisted, primarily, of telegraph lines between the major eastern Russian cities and telegraph trunks to several adjacent nations, as well as a few urban telephone systems in cities the size of Moscow, Petrograd, or Kiev.

About 1919 the new government initiated a long range program for modernizing and extending the national telecommunications network. Control of existing and proposed plant was vested in a succession of commissariats and, later, in a Soviet Chief of Communications.

Initially, the government concentrated on linking the major cities west of the Ural Mountains with improved telegraph and telephone systems. As new industrial cities were built, cooperative farms set up in agricultural areas (such as the Ukraine), and as the industrial and military importance of Siberia increased in the late 1920's and early 1930's, modern telegraph and telephone facilities were provided for these areas.

As the U.S.S.R. began her rise to the status of a major world power, wire traffic to foreign countries increased. By 1936 telephone service was available to 17 nations, and telegraph service to even more.

A noteworthy Soviet wire line project, placed in operation in 1940, links communication centers in western Russia with the Siberian Pacific coastal area. This installation consisted, originally, of approximately 5,600 miles of two pair, 4mm (158 mil) copper, open wire carrier line be-

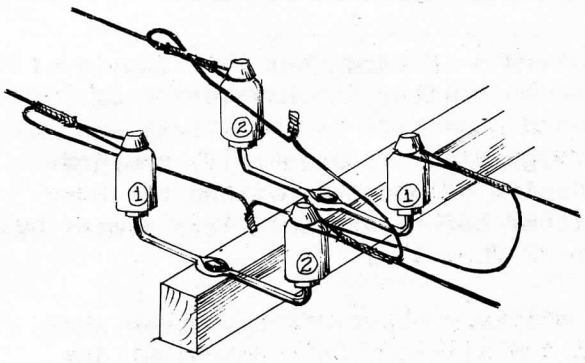


FIG. 1 - BRITISH TYPE TRANSPOSITION BRACKET

tween Moscow and Khabarovsk -- in southeastern Siberia. These circuits were reported to be capable of carrying 19 duplex telegraph channels, 7 telephone channels, radio broadcast and telephoto channels simultaneously. Repeater sections, between the 23 intermediate repeater stations, averaged 413 Kms (256.5 miles) each. One pair of wires was transposed every Km (.621 mi) and the other every 2 Kms. Short sections of cable, used within large cities, were loaded for carrier operation if over .5 Km (.13 miles) long. Frozen ground and swamps presented the greatest engineering problem along the line route, which generally paralleled railroads and existing highways.

Prior to the German invasion, modern automatic telephone centrals were generally equipped with Ericsson (Swedish) apparatus.

In 1938 an American telephone engineering periodical reported that telephoto service was available between 10 main industrial cities. At that time all traffic passed through Moscow, but direct inter-city links were projected. Telephoto traffic was classified as ordinary, urgent and "lightning."

WARTIME COMMUNICATIONS

The control of both civil and military communication agencies is now vested in the Soviet Chief of Communications. Civil and military systems are closely interwoven and, although the civil agencies generally operate only the fixed installations, a military system may be constructed to augment a civil system in any given area. Rehabilitation of captured facilities is usually performed by military communications units who turn these facilities over to civil units as the tactical forces move forward.

While the Russian Army considers radio as the primary means of communication, wire, visual or messenger service is always available as an alternate means. Unofficial reports indicate that messengers, rather than wire communication, are used to augment radio forward of battalions. Airplane messengers, traveling in liaison type planes, are often employed near the front as well as to the rear.

At the time German forces occupied western Russia the wire network in that area paralleled railway lines or main highways. A good grade of 25 to 40 foot wooden poles carried the wire on 8-pin, angle iron crossarms which were equipped with steel pins and a fair grade of single petticoat, porcelain insulators. On some line routes as many as 10 or 12 circuits were

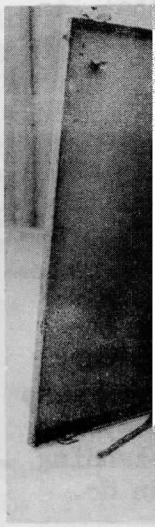


FIG. 2 - A R
WHICH ALS

more comm
method of

Trar
as no tra
appear to
arms were
pole, or
crossover
were note

Gerr
sians we
than the
indicati
had been
extent a
and '42.
back, t
wires an
fort to
than the
Italy.
areas, w
mitted,
tions, a
off or
towns or

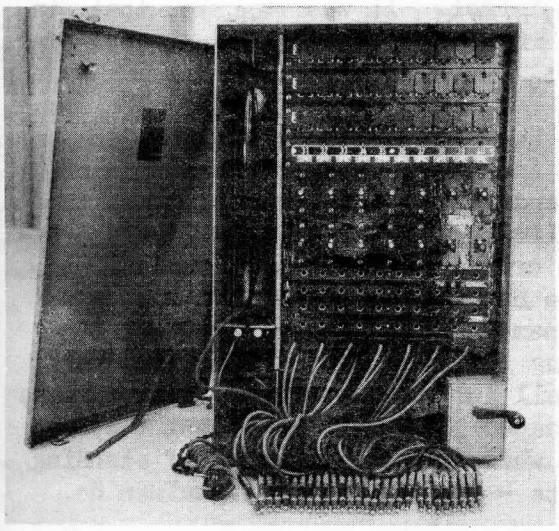


FIG. 2 - A RUSSIAN 30-DROP SWITCHBOARD WHICH ALSO CONTAINS 10 TRUNK CONNECTIONS

installed on "J" brackets (the continental pole bracket) placed one above the other, with alternate brackets staggered on opposite sides of the pole. On the lines observed, poles were spaced at 20 to 30 per Km (110' to 166' spans), with push braces being used instead of wire guys at line corners. A number of wood poles were set by placing short sections of steel rails in the ground and fastening the pole to the rail so that the butt was entirely above the ground.

Three to four mm. (.117 to 156 mil - #9 to #6 AWG) iron wire was used extensively prior to German occupation but, for recent rehabilitation work, 9 to 14 ga. iron or copper alloy wire has been used. A few sleeves were noticed, but a twisted splice, similar to the Western Union, was more common. The observers were unable to obtain specific data on the method of gauging sag, but noted that the lines were uniformly sagged.

Transposition schemes were difficult to analyze from ground observation, as no transposition plans were available. As a rule, the schemes did not appear to be of a uniform type. The transposition brackets used on crossarms were similar to the British Thornilly bracket (see Figure 1) and, where pole, or "J," brackets carried the lines, loose vertical, or "butterfly," crossover transpositions were employed. Few phantom group transpositions were noted on lines close to the front.

German pole lines observed in territory recently recaptured by the Russians were of a less permanent type than those of Russian construction, indicating that existing Russian lines had been used to the greatest possible extent as the Germans advanced in 1941 and '42. As German forces were driven back, they systematically destroyed wires and insulators but made less effort to destroy poles and crossarms than they had in Tunisia, Sicily, and Italy. In the North African combat areas, when the speed of retreat permitted, poles were cut in three sections, and wire and hardware carried off or destroyed. Except in or near towns on the Russian front, 80 per-

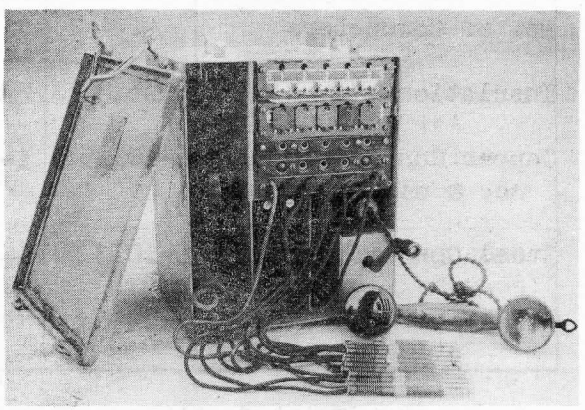


FIG. 3 - RED ARMY FIELD SWITCHBOARD PROBABLY USED BY BATTALIONS

cent of the poles and crossarms were left intact. It was reported that, in rural areas, frequently only the wire and insulators on the lowest crossarm were damaged or removed.

Line restoration work observed along the Kiev-Zhitomir highway, including the replacement of wire, hardware and poles, was progressing somewhat slowly -- as measured by American standards. It is possible that the speed of restoration was affected by the limited amount of motor transportation and hand tools provided for the line crews. A few reels, similar to the U.S. Army Reel RL-17, were seen in use but it was noted that wire was usually paid out from coils carried by linemen, which caused frequent tangles. After being laid on the ground along the line route, the wires were carried up each pole, sagged and tied -- all in one operation. Linemen were equipped with safety belts and climbers shaped like half moons but they seemed to prefer sitting on the crossarms while working instead of standing on their "hooks" and leaning on their belts -- as U.S. Army signalmen do.

When withdrawing, the Axis forces removed practically every piece of inside plant equipment -- even telephone instruments -- and American Telephones TP-6 and EE-8 have been used extensively in restoring service. Captured German switchboards and central office equipment were used when available, since magneto and common battery local lines and manual or dial trunk circuits could be terminated on these boards.

Russian field cable (field wire) is normally used as far forward as battalion headquarters and is somewhat similar to U.S. field and assault wire, as indicated in the following table:

U.S.-RUSSIAN FIELD WIRE

DESCRIPTION	U.S. TYPES		RUSSIAN TYPES		
	W-110B	W-130	Single Assault	Double Assault	Telg. & Telephone
No. of Conductors	*2	*2	1	+2	+2
Insulation	Rub.	Rub.	Rub.	Rub.	X
Copper Conductors no. & dia.in inches	3-.0135	1-.010	2-.0117 or .0129	2-.0117 or .0129	1-.0175
Steel Conductors	4-.013	6-.0095	5-.0117	5-.0117	7-.0117
Weight per mile-lbs.	130	32	44.7	92.23	54.22

* - Twisted pair
\+ Probably twisted pair
X - Probably rubber and braid covered.

Russian Army and Corps signal units are also reported to use a 1.1 mm. (.0429 in or approximately #17 AWG) bare bronze wire for constructing open wire lines.

Field telephone equipment employed by Soviet troops at the beginning of the war was generally of German design but recently issued equipment appears to be predominantly of Russian design and manufacture. A sound powered pocket telephone is one of the newer pieces of wire equipment issued. The average line capacities of Russian field switchboards are, approximately:

1. Corps CP's - 300 line
2. Division CP's - 20 to 30 lines
3. Regimental CP's- 9 to 12 lines
4. Battalion CP's - 5 and 6 lines

The switchboard illustrated in Figure 2 is probably a division board, that in Figure 3, a battalion board.

An inspection was made of the government railroad telegraph station at Kursk, which was located about 2 Kms from the railroad station to provide security from bombing attacks. Circuits leading to this station were brought to within 50 feet of the building on pole lines and then carried into the station by underground lead cable. The frame was fused, but the testing facilities provided did not seem adequate for accurate line testing. All messages were brought in and delivered by messengers, and transmitted and received on Russian automatic, tape-printer type apparatus. Operators pasted the original printed message tape on message forms and had to write, in long-hand, any extra copies that were required.

FIELD ARTILLERY SIGNAL OPERATIONS

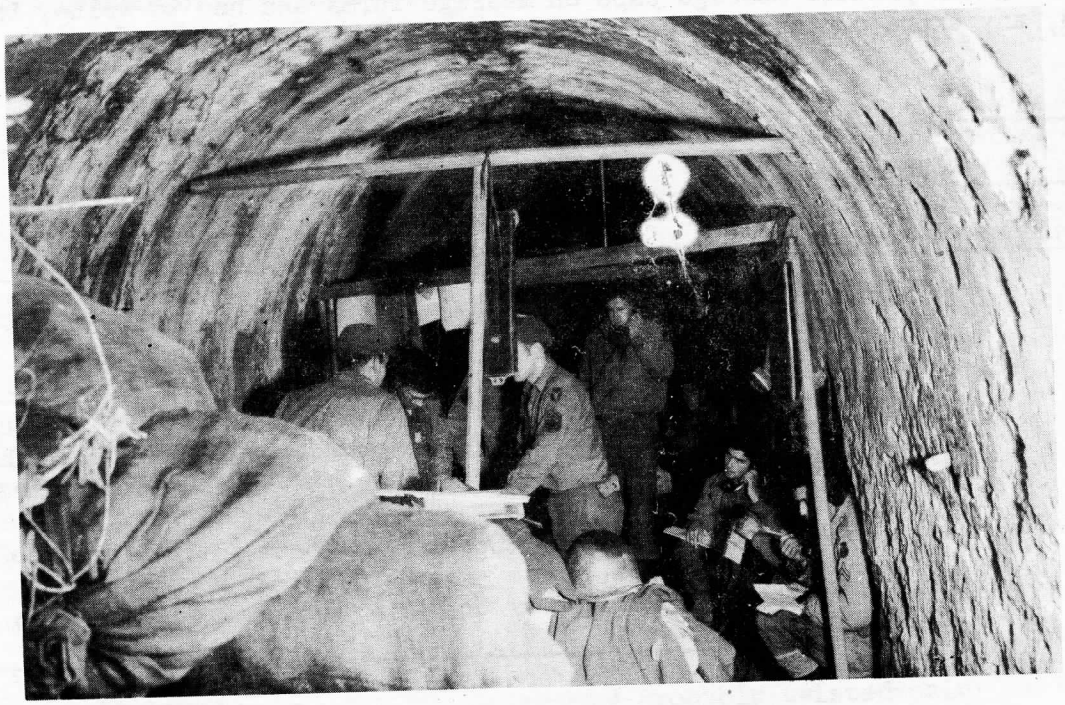
Comments on field artillery signal communication have recently been obtained from Italy and the Pacific. It should be noted that these comments tend to confirm reports from other sources on signal communication in general:

COMMENTS FROM ITALY

"The Infantry Regimental CP moves forward by short bounds, a mile to a mile and a half at a time, as it should in slow advance, but the artillery battalion displaces in 6000 to 8000 yard jumps."

Most commanders believe that it would greatly facilitate the work of the forward observer if he had Radio Set SCR-536-( ) or similar light radio to enable him to get communication in a hurry while he is waiting for his wire to come in, or to use when his wire is out, as it frequently is. One general officer saw a division artillery forward observer using an SCR-536, and was impressed with it.

"This 536 was very handy and we (Corps Artillery) could use it the same way. All officers with whom I have talked like the Radio Set SCR-193 and generally say that it is the best radio we have. To insure flexibility



ARTILLERY BATTALION CP IN A CASSINO MOUNTAIN CAVE

in use of forward observers, one unit requires that forward observers have a common channel on their 610's. In the present stabilized situation, wire is laid to OP's including those for forward observers, and is regarded as a primary means of communication. The radio must be at hand, however, for instance, when and if the wire is shot out. The battery commander of the Provisional Pack Battery in one Division stated that he has had very poor success with Radio Set SCR-610-( ), which is apparently not rugged enough to operate well after movement on a pack animal. For that reason, he is much interested in the new Radio Set SCR-583-( ) which has not yet arrived in this theater."

"In our first position we had almost 100 miles of wire out. In moving (straight forward) we laid about 47 miles more and are not through yet. Of the 100 originally laid, about 40 miles are still in the net. They don't have the salvage crews here to salvage wire; you have to do that yourself. Wire is getting to be quite a critical item. You can't carry more than the T/BA load, so we have to go back and draw 32 miles at a time. We have used the 3/4-ton truck principally as the wire laying vehicle. The infantry have to use mules and lay much by hand."

On 24 December, a FA Brigade had out about 60 miles of wire; at times they had over a hundred miles laid. The division artillery wire net averages between 60 and 80 miles. As a matter of interest, it may be noted that the Division Artillery had been asked to, and had extended a line to the office of the AMG representative.

THE 240 MM. HOWITZER GOING INTO POSITION IN ITALY

"We make a practice of tying in to an infantry wire line when it is practicable and convenient. Right now we have a forward OP, which is tied in to an Infantry Battalion wire line about two hundred yards away. We frequently get quick information in this way."

Opinions were requested on the subject of desirability of continuation of training in visual communication for artillery signal personnel. Practically all commanders agreed that there has been little need for, and use of it in this theater, but that, inasmuch as the need for it may arise, it should not be dropped from training; but that it should be limited to those men who show a special aptitude for it.

The general agreement was that visual signalling will frequently come in handy in light and medium battalions, but that there is not much use of it by heavies.

KWAJALEIN OPERATION

Because of island to island operation, radio was the primary means of communication.

Communication during final phase afloat was by Radio Set SCR-609-( ) and Radio Set SCR-284-( ). SCR-609's had been installed in the Navy Observation Planes carrying artillery observers. The SCR-284-( ) was also used with the air observers. The SCR-609-( ) was much more satisfactory. The SCR-608-( ) with wet batteries was used satisfactorily. The SCR-608 mounted in a jeep is preferable, when it is possible to get ashore. The former can be brought ashore in DUKW's and is quieter in operation. The latter is easier to maintain and more mobile ashore, but must be brought ashore in a landing craft. The 600 series radio proved excellent for this type of operation.

Underwater lines were laid between islands, but were not satisfactory, since they were continually being broken by LVT's crossing the reef. Elevated lines in position area were broken by trees being felled for fields of fire on the first night and day. Vehicle drivers must be educated in wire observation, and wire must be patrolled constantly.

FA MEN OPERATING THE SCR-609 ON KWAJALEIN

Interference between Army and Navy 600 series radios was encountered. Interference was encountered between SCR-609's and Infantry 300 series radio, by bleeding in when near each other.

Five radios failed because of broken or shorted power pack cords. Of these, four were repaired and one replaced. Three failed because of water soaking. One of these was dried and put back in operation; the other two were replaced.

OPERATIONS CENTER AN/TTQ-1-( )

The Operations Center AN/TTQ-1-( ) (Transportable Filter and Operations Room Unit Assembly) consists of equipment which is installed at a central point in an air warning system for receiving information on flights and for passing information for fighter control. Telephone, power and lighting equipment, furniture and plotting material make up this assembly. The equipment collapses into small, lightweight units for ease in transportation and uses multiconductor plugs and sockets for easy installation. Connections may be made to land lines and various Signal Corps radio sets. The radio sets are not furnished as a part of this equipment.

Operations Center AN/TTQ-1-( ) replaces Information Center System SCS-5-( ) and Filter Center TC-15-( ), both of which have been classified as Limited Standard. AN/TTQ-1-( ) differs from the other two centers in that greater flexibility and uniformity of equipment is possible due to redesign of the telephone equipment, plotting tables and platforms.

Components of Operations Center AN/TTQ-1-( ) are designed for flexibility of interconnection and will meet the requirements for the following operating conditions within a building:

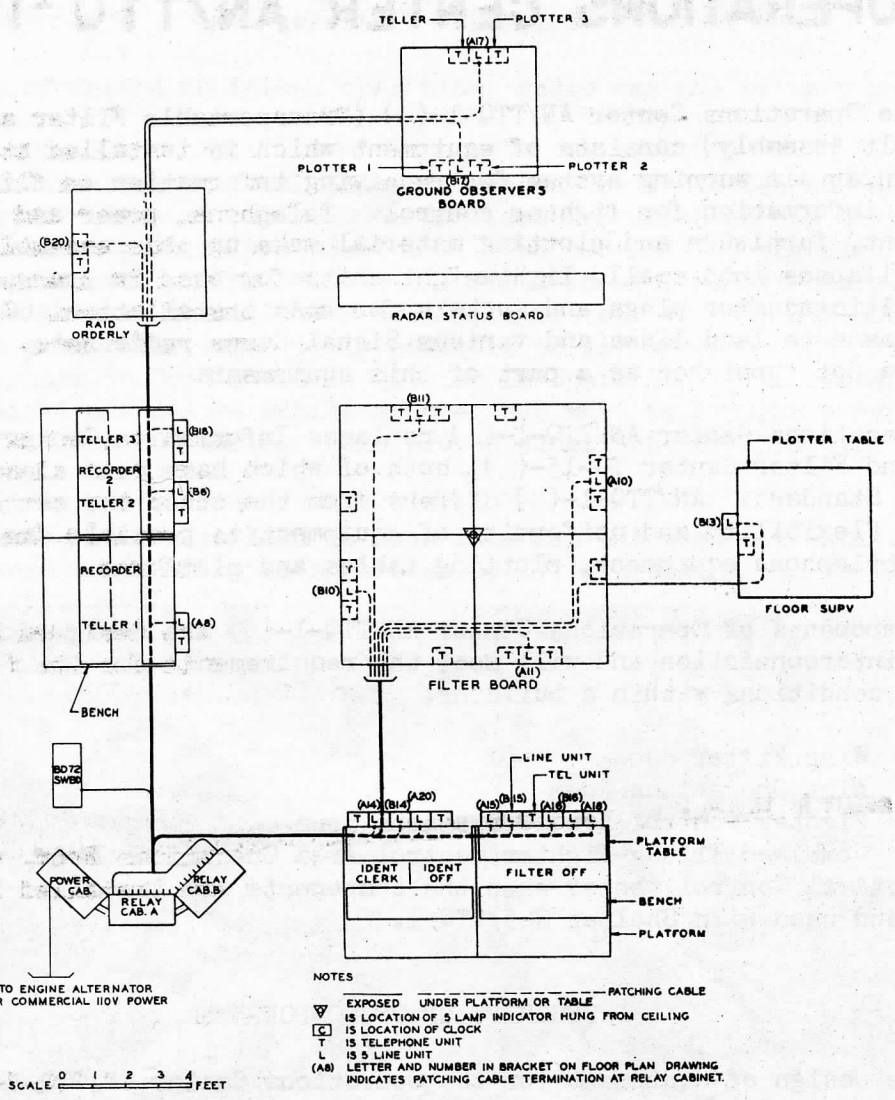
1. Wing Filter Room
2. Wing Operations Room
3. Fighter Control Area Operations Room
4. Combined Filter-Fighter Control Area Operations Room, or as a Mobile Tactical Control Center when the components are installed in 2½-ton trucks and used with Shelter S-5/TTQ-1.

DESCRIPTION OF COMPONENTS

The design of equipment for the Operations Center AN/TTQ-1-( ) is such that the carrying cases are used as platforms and platform tables when the equipment is set-up for operation.

The plotting tables are not quite four feet square and include removable legs to provide a 2 ft. 4 inch height. The tables may be used individually as intercept boards or supervisor's table, or in any combination desired for plotting boards by use of special assembly details mounted on the tables. The top of the plotting tables have a special gray finish to permit the use of casein paint for painting the maps. The maps may be removed by washing with cold water without affecting the basic finish.

A universal telephone circuit is used throughout the center except for the lines on Switchboard BD-72. This circuit may be used on land lines or radio circuits and provides for simplex operation on press-to-talk. The telephone circuit is assembled and wired as a self-contained unit in a wooden



FLOOR PLAN WING FILTER ROOM

case 7-5/8" x 9" x 4½" and is known as the Telephone Unit. Keyhole slots are provided on the front for ready attachment to buttons on the tables without the use of tools. The unit includes a jack for plugging in a handset or head and chest set, a cord and socket for battery and ringing current connection from the line unit, a cord and plug for establishing connection to a line on the line unit, a ringing key for signalling, a monitoring jack for connecting two telephone units to one line, a plug for patching talking battery and ringing current to an adjacent telephone unit, and a buzzer for audible signals on incoming calls.

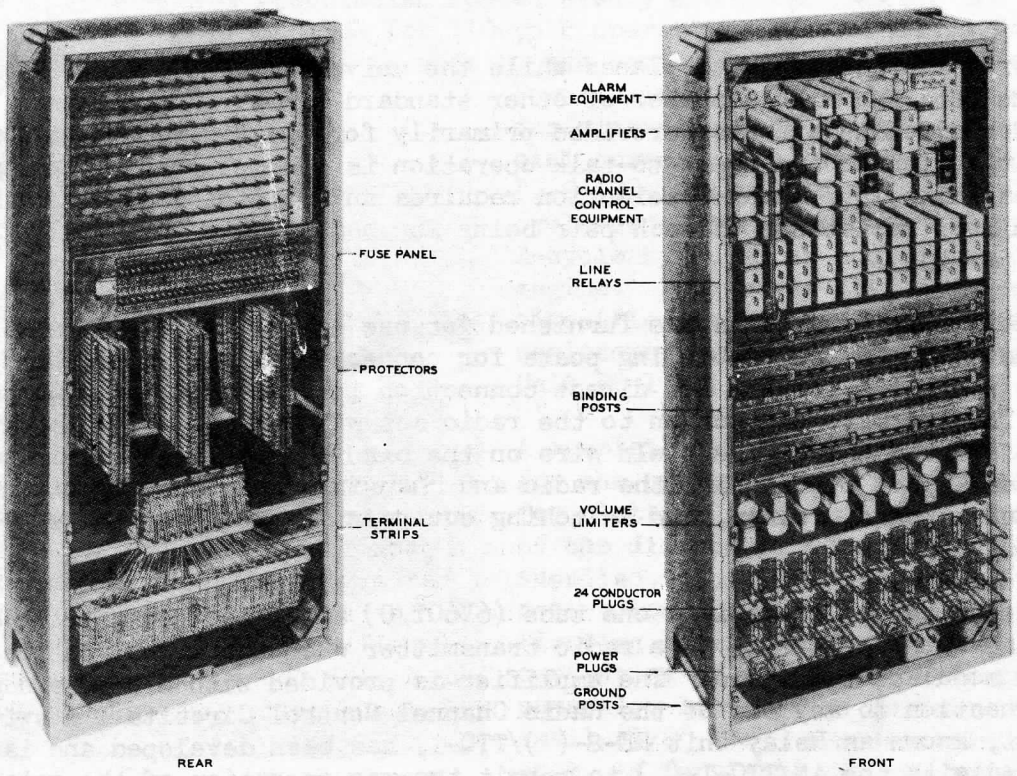
A line unit assembled in the same size case as the telephone unit is used in conjunction with the telephone unit in all applications. This unit

includes five line jacks with associated lamps, a plug for patching talking battery and ringing current to the telephone unit, and a multiconductor plug for a patching cord which brings in five line circuits, battery and ringing current from the relay cabinet. The patching cords are twenty-four conductor rubber covered cables, 35 feet long, with multiconductor connectors on each end.

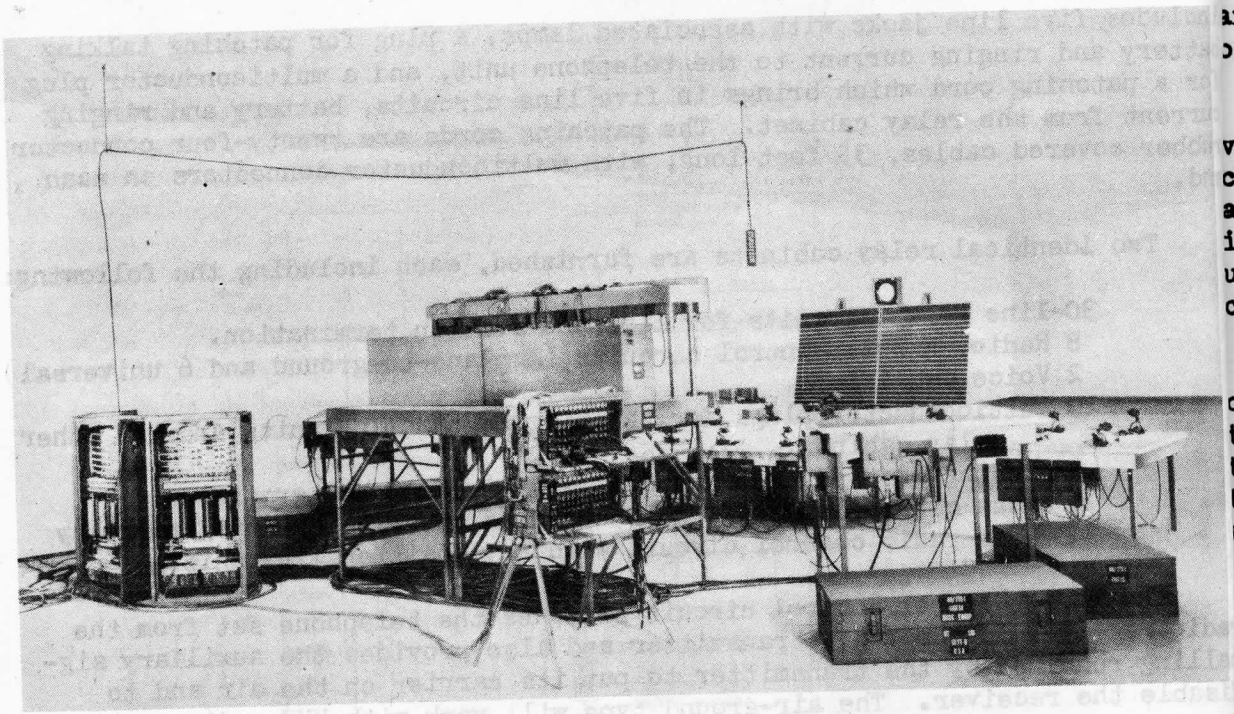
Two identical relay cabinets are furnished, each including the following:

30-line relay circuits for line and station termination.
8 Radio Channel Control circuits (2 plane-to-ground and 6 universal).
2 Voice amplifiers.
20 Multiconductor plugs for patching to the line units and the other relay cabinet.
A binding post panel to which field wire may be terminated.
A cross connecting field which permits associating any line relay or radio channel circuit with any position line unit.

The Radio Channel Control circuit switches the telephone set from the radio receiver to the radio transmitter and also provides the auxiliary signalling required by the transmitter to put its carrier on the air and to disable the receiver. The air-ground type will work with VHF radio equip-



RELAY CABINET



TYPICAL COMBINED FILTER-FIGHTER CONTROL AREA OPERATIONS ROOM

ment for communication with planes while the universal type will work with the same sets and also a number of other standard types. Four-channel selection circuits are also provided primarily for the air-ground radios. Voice transmission and press-to-talk operation is accomplished by two pairs of wires while four channel selection requires an additional pair of wires, maximum loop resistance of each pair being 260 ohms, equivalent to 1¼ miles of Wire W-110-B.

Radio Adapter details are furnished for use at the radio equipment. These details consist of binding posts for connecting field wire cabled to various plugs and sockets for direct connection to standard Signal Corps radios. This permits connection to the radio set without the use of any tools except for terminating the field wire on the binding posts and eliminates the necessity of dismantling the radio and changing soldered connections. Condensers, coils, relays, and switching equipment as required are wired into the adapters.

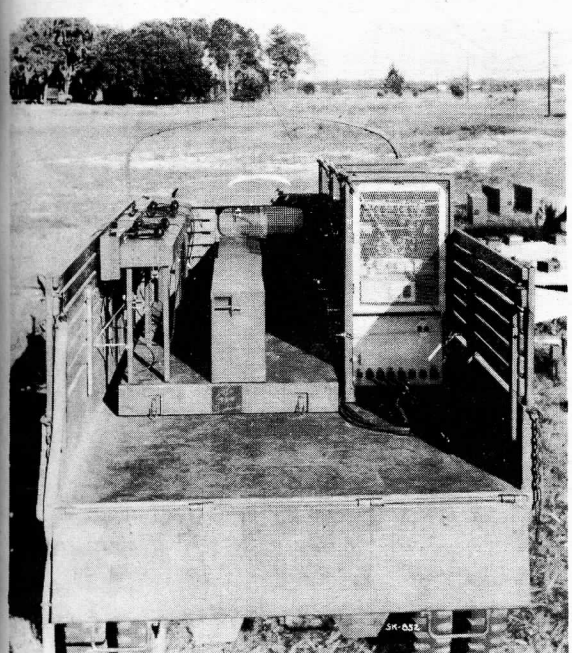
The voice amplifier is a one tube (6V6GT/G) amplifier designed to amplify the outgoing signal to a radio transmitter when the signal is too weak to modulate the radio. The amplifier is provided with a cord and plug for connection to any one of the Radio Channel Control Circuits. A switching unit, known as Relay Unit RE-8-( )/TTQ-1, has been developed and is furnished with the AN/TTQ-1-( ) to permit two-way operation of the voice amplifier for use on land lines requiring such amplification. Any amplifier may be plugged into this unit, four of which are supplied per center,

and the unit may be wired to any land line. The relay unit is under control of the press-to-talk simplex circuit of the telephone unit.

The cross-connections in both frames are identical and a chart is provided showing the cross-connections as furnished by the manufacturer and including space for listing any revisions. Various combinations of interior and outside stations and radio circuits may be obtained by use of the patching cables. Charts are provided showing the arrangement for typical layouts using the universal cross-connection pattern. Changes may be made in the cross-connections if neither arrangement provides the line required.

Two switchboards BD-72 are supplied per center for command lines. A common battery trunk unit, not a formal component of the switchboards, containing equipment for two trunk circuits, and arranged to mount in the space to the left of the switchboard where the head-chest set is stored during transportation, is furnished for each BD-72. The unit works in conjunction with a line unit on the BD-72 for operation with a common battery trunk.

One power cabinet including a 24-volt rectifier, a 160-volt rectifier and 6.3-volt filament supply for the amplifiers, a 20-cycle static ringing generator, and control equipment for the 5 lamp indicator for plotting, all operating from 105 - 125 V, 50 - 60 cycle power, and a 24-volt battery, is provided per center. Two lighting feeder cables, each 60 feet long and provided with four duplex receptacles spaced evenly along its length, and fourteen extension cord assemblies for 110-volt operation, are furnished for overhead lighting. Provision is made to use commercial power but two each Power Unit PU-8/TTQ-1 are furnished for operation when reliable commercial power is not available. The PU-8/TTQ-1 is a 3 KW, 110-Volt, 60-cycle generator driven by a 2-cylinder, 4-cycle type, water cooled, gasoline engine. This power unit has been classified as limited standard and replacement will be made with Power Unit PE-197-( ).



PLATFORM POSITIONS AND CABINETS MOUNTED IN 2-1/2 TON TRUCK

A complete set of materials needed for the preparation of the maps and for plotting under the requirements of the different types of centers is supplied. In addition a set of magnetic plotting equipment, known as Plotting Equipment MX-102/TTQ-1, and consisting of steel skids and plastic numerals, letters and designs, with small (1/8" long) magnets molded in them, is furnished with each center.

For mobile operation one set of Truck

Mounting Details is supplied with each center. The details consist of sufficient iron and steel angles, brackets, and cables for fastening the platforms, platform tables, and frames of one center to the body of two standard $2\frac{1}{2}$ ton trucks. The platform tables are mounted along one side of each truck and the trucks arranged around a clear space in which the plotting tables and equipment are set up.

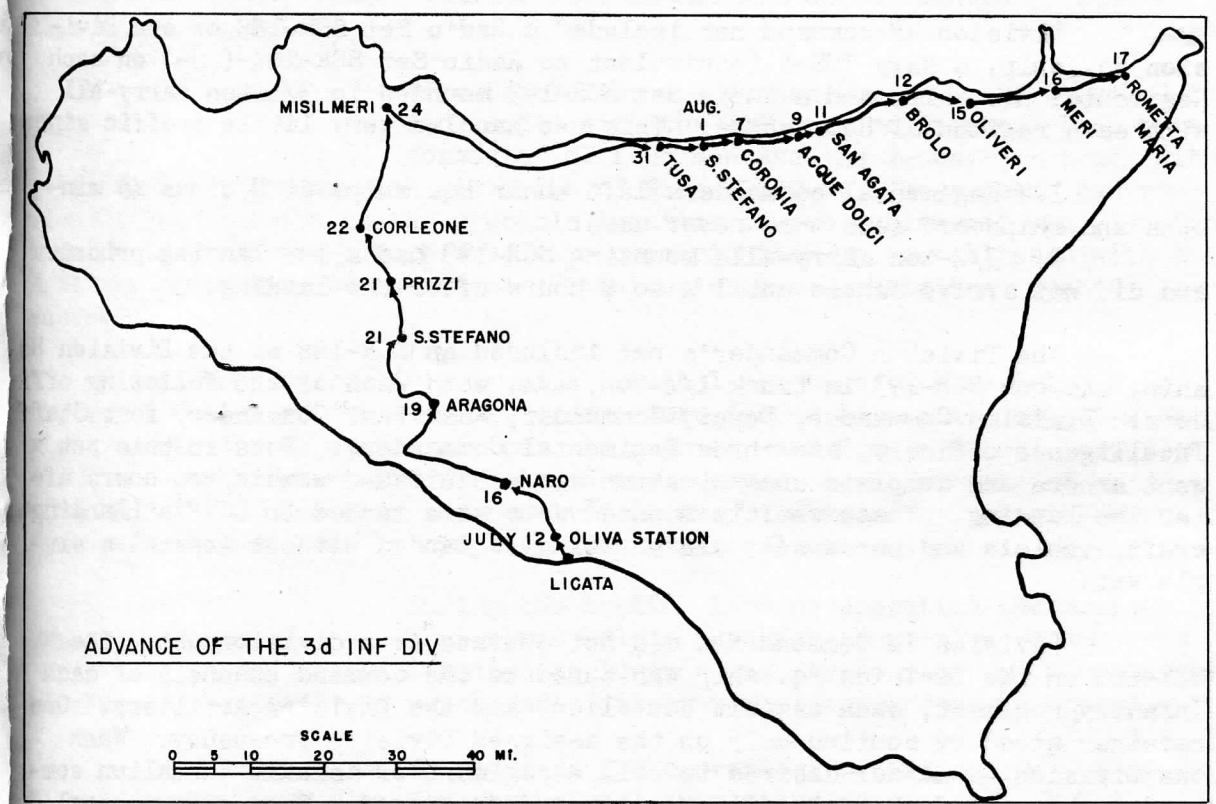
A Shelter S-5/TTQ-1 has been developed by Eatontown Signal Laboratory for use with the AN/TTQ-1 when set up as a mobile center. The shelter is 32' square and 10' high at the eaves and covers the trucks and all operating equipment except the power unit. The shelter does not contain any poles in the interior and is capable of complete black out.

3RD SIGNAL COMPANY IN SICILY

The article on "Seventh Army Participation in the Sicilian Campaign," the third and final part of which runs in this issue sketched in broad strokes the problems of signal communication in that campaign. The following article gives in greater detail the work of one signal company during the same operation. It is not an official War Department report but is based on personal experiences of an officer assigned to the 3rd Signal Company during this period. Therefore, the material contained in this article is not to be considered as official tactical doctrine.

The Sicilian Campaign was the first actual combat the 3rd Division had participated in since the landing at Fidala, French Morocco, 8 November 1942.

Anticipating that the next campaign would require highly trained amphibious troops, the 3rd Division was given intensive training in amphibious operations over a special built course in North Africa. This training was



based on lessons learned in the North African landings.

Unbeknown to the Division Signal Officer, problems in Signal communica
tion were to arise in this campaign which never before had been presented t
a division signal officer. However, at the end of the campaign the Signal
Company was highly praised by the Division and Staff on its excellent work
in keeping up continuous communication within the Division and attached uni

The Sicilian Campaign may be divided into three phases insofar as sig-
nal communication for the Division are concerned:

1. Landing Phase.
2. Advance from Licata to Palermo.
3. Advance from San Stefano to Messina.

PHASE No. 1 - PERIOD 10 JULY - 12 JULY

In the landing operation, all 3rd Division radio sets were installed and manned by Army personnel. Each Regiment improvised individual headquar
ters upon the vessels transporting them.

Composition of radio nets were as follows:

Division HF command net included a Radio Set SCR-188 on the Divi-
sion Hq. ship, a Navy TCS-5 (equivalent to Radio Set SCR-284-( )-) on each
Regimental Hq. ship, and a Radio Set SCR-193 mounted in 3/4-ton carry-all
with each regimental Hq. ashore. This net handled very little traffic sin

1. Regimental commanders left their Hq. ships at H minus 45 min-
utes and shipboard sets were never used.
2. 3/4-ton carry-alls mounting SCR-193 had a low landing priori
and did not arrive ashore until 4 to 8 hours after the landing.

The Division Commander's net included an SCR-188 on the Division
ship, and one SCR-193 in truck 1/4-ton, 4x4, with each of the following of
cers: Division Commander, Deputy Commander, Assistant Commander, four St
Intelligence officers, and three Regimental Commanders. Sets in this net
went ashore and complete communication was established within two hours a
ter the landing. These vehicle mounted sets were landed in LCVP's (Landi
craft, vehicle and personnel) eleven being so landed without loss of a si
gle set.

Division FM Command Net did not operate as a division net. The
SCR-608 on the Division Hq. ship was tuned to the command channels of eac
Infantry regiment, each assault battalion, and the Division Artillery. O
receiver stood by continuously on the assigned Division frequency. When
the Division Commander desired to call a regiment or assault battalion co
mander, he called on that officer's command frequency. When a regimental
or assault battalion commander desired to call the Division, he called on

REGIMENTA
between Div
A
opened five
A
mand Net.
other Navy
The D
1235 hours
Wire
-ton trail
viously be
Command Po
Infantry r
shore.
Fores
he early
ire. A d
as used t
ire circu
ield wire
Message Ce
itting an
ignal Sup
until D pl
1 July.

REGIMENTAL CP ON A BEACH IN SICILY

the Division frequency, the Division frequency being set up as the alternate frequency on his Radio Set SCR-610-( ). In this way the regiment and battalion commanders were able to work in two nets with one set which was light and portable enough to be with the commander at all times. They maintained contact with Division even during the process of landing.

The Division set used in the 7th Army Command Net was an SCR-188 on the Division Hq. ship. Radio contact between Division and 7th Army was established one hour after the landing.

An SCR-188 was used on Hq. ship to work Division Rear. This net opened five hours after the landing.

A Navy TCS-5 was used to work in the Engineer Shore Regiment Command Net. This set did not work satisfactorily due to interference from other Navy sets.

The Division Advance Command Post landed and opened ashore at Licata 1235 hours, 10 July.

Wire

Wire teams from the Signal Company were attached to and landed with the Infantry regiments. Each team consisted of four men and one ¼-ton, 4x4 truck with ¼-ton trailer, loaded with six miles of Wire W-110-B. These teams had previously been briefed in the probable location of the Regimental and Division Command Post ashore. Therefore, wire communication was established with all Infantry regiments one hour after Division Advance Command Post opened ashore.

Foreseeing the possibility of a critical shortage of Wire W-110-B in the early stages of the landing, orders were issued to use all existing open wire. A detachment of one officer and eighteen men from a Signal Battalion was used to supplement the Division Signal Company in the repair of open wire circuits. Open wire was repaired in many instances by patching with field wire rather than by complete open wire replacement.

Message Center

During the initial landing operation the message center was seldom used for tactical messages from Division to lower units due to staff officers transmitting and receiving by voice radio direct to the commanders concerned.

Signal Supply

In planning the operation, provisions were made for ten days signal supply and maintenance to be landed by D plus 1. However, this was not accomplished until D plus 2. The Division signal supply dump was established at Licata, 11 July.

PHASE No. 2 - PERIOD 12 JULY - 31 JULY

During this period the Division Command Post moved six times over a distance of 120 miles. Location and time of opening are as follows: (See map

Place	Time	Date	Distance
Oliva Station to Naro	0845	16	19 miles
Naro to Aragona	0600	19	28 miles
Aragona to San Stefano	1145	21	38 miles
San Stefano to Prizzi	1500	21	18 miles
Prizzi to Corlione	1132	22	17 miles

Wire At this time the enemy was in retreat. Therefore, the Infantry regiments were moving at such a speed and the distances from Division Hq. to the Regimental Hq. were so great practically all wire teams were used to maintain communication to the Infantry regiments and a combat command of 2nd Armored Division only. Open wire was rehabilitated to two infantry regiments at a distance of approximately 15 miles each. Prior to the movement of the Command Post from Oliva Station to Naro the wire lines to the regiments extended as far as 35 miles in length. Numerous cases of trouble arose due largely to sabotage. Because of the mountainous terrain and narrow roads the 2½-ton, 6x6 truck with Reel Unit RL-26 mounted was discarded as a wire layer and used to transport wire from the signal supply dump, located at Licata until 16 July, to the Advance Command Post to be picked up by the Division wire teams. Almost all wire was laid by ¼-ton, 4x4 trucks with Reel Unit RL-31 mounted, or in many cases by hand.

Radio With the intervention of mountainous terrain and the increase of distance between regiments the Division FM Command channel was dropped. The Engineer shore regiment channel was by then no longer needed.

Radio channels were overloaded at all times. This increased to dangerous proportions when wire communication failed as it did on numerous occasions. All radio channels, except the Division Advance to Division rear, were restricted to tactical messages only.

Signal Supply The signal supply dump was seldom as far forward as the Advance Command Post due to fast moving situations and limited amount of transportation.

The Division Command Post opened 0150 at Misilmeri on 24 July.

During this period the Division was out of action temporarily to reorganize and rest after the long chase across the island from Licata to Palermo.

Upon the arrival of the Division at Misilmeri it was necessary to es-

ULE PACKING RADIO SETS TO THE FRONT AT SAN FRATELLO. NOTE WIRE IN LEFT FOREGROUND, WHICH WAS LAID BY HAND

ablish a wire link to Prizzi, a distance of forty miles, to the Division lear echelon. This was done with open wire.

Based on lessons learned in the previous 10-day period, it was decided hat pack mules would be valuable to the Division to transport supplies in he mountains during the next phase of the operation. Therefore, a provisional pack train was formed within the Division. A total of twenty mules as allotted to the Signal Company to transport wire and radio sets. Two ire teams and two radio teams were organized in the Signal Company to use hese mules when needed. The wire teams normally consisted of four men nd four mules, the mules carrying two Reel DR-4 of Wire W-110-B or two iles of Wire W-130. The radio teams consisted of two men and two mules. he radio sets to be used were SCR-284.

PHASE No. 3 - PERIOD 31 JULY - 17 AUGUST

The Division Command Post moved to Tusa and opened 0345, 31 July, to repare for the relief of the 45th Division at San Stefano.

During this phase the Division Command Post moved seven times over a istance of 79 miles. Locations and time of opening are as follows: (See map)

Place	Time	Date	Distance
Tusa to San Stefano	1545	01	5 miles
San Stefano to Coronia	1345	07	4½ miles
Coronia to Aquidolci	1245	09	9½ miles
Aquidolci to San Agata	0530	11	2½ miles
San Agata to Brolo	1510	12	16 miles
Brolo to Oliveri	1920	15	17 miles
Oliveri to Meri	1530	16	15 miles
Meri to Rometta Maria	0900	17	9½ miles

Wire

Again wire in forward areas had to be laid from ¼-ton trucks, as 2½-ton trucks would have blocked traffic on the one existing narrow road. The 2½-ton trucks were used to transport wire and recover wire in the rear areas.

The mules played a valuable part for the signal company in transporting wire during this phase because the operation involved a series of enveloping movements by a regiment at a time over mountainous terrain impassable to any vehicle and passable with difficulty to pack animals. In one instance -- battle of San Fratello, 4th to 8th August -- it was found necessary to lay a five-mile line of Wire W-130 over a rocky, trackless mountainside over which a man could move only by frequent use of his hands, and for fifteen miles where wire could only be transported by the pack mules provided and laid by hand. On 10-11 August, one regiment made an enveloping movement from San Marco to Naso and this necessitated laying a twenty-mile line entirely by hand using the pack mules to transport the wire.

In a third instance, 13-14 August, two lines of Wire W-130 were laid by hand through the mountains from St. Angelo di Brolo to Patti, a distance of 20 miles.

Wire communication had more success in this phase of the operation due to two factors:

1. The Division Command Post stayed within 3 to 5 miles of the regiments on the road.
2. The lesson learned in the previous phase of the campaign of not trying to use heavy transportation in the forward areas to lay wire.

Radio

Radio communication during this phase was not as successful as previously due largely to the metallic deposits in the mountain ridges perpendicular to the Coast, which often made radio contact across the ridges impossible.

For each of the enveloping movements mentioned above, a radio team consisting of two operators and two pack mules with one SCR-284 used as a pack set were used. This set was never entirely satisfactory because it required some time to unpack and set up and usually had to have damages and misadjustments in transit repaired.

An amphibious envelopment by a battalion landing team was made 8 August and for communication one Radio Set SCR-399-( ) mounted in a 2½-ton Amphibious DUKW and one SCR-193 mounted in ¼-ton, 4x4, truck were provided to work in the Division Command and Division Commander's net respectively.

The SCR-399 proved unsatisfactory for this operation and radio communication was never established on this channel. Due to the terrain the 2½-ton DUKW could not be driven to the Battalion Command Post ashore.

The SCR-193 proved very satisfactory and radio contact was established and maintained throughout the operation.

Another amphibious envelopment by a battalion landing team was made at Brolo 11 August. For this operation two SCR-193's mounted in ¼-ton, 4x4, trucks were used and served admirably for this purpose, working in the Division Command and Division Commander's nets. They were able to follow the battalion from the beach to its objectives on high ground where larger vehicles could not go. On one occasion when the Infantry occupied a hill position where no vehicle could follow, the officer and operators with one of the sets displayed extraordinary courage in continuing to operate from an exposed position on the flat ground outside the main lines.

Signal Supply — During this phase the signal supply dump was kept as far forward as the advance Command Post at all times. This was made possible because the 2½-ton trucks, which had previously been used as wire layers, were used to transport the signal supplies and the supply routes were considerably shorter than before.

CONCLUSIONS

From lessons learned throughout this campaign the signal officer decided to reorganize the signal company to obtain a higher degree of efficiency.

It was found that 2½-ton trucks could seldom be used in forward areas advantageously. Therefore, arrangements were made within the division to turn in eleven 2½-ton trucks and draw fourteen 3/4-ton W/C trucks in lieu thereof.

Construction Platoon — The Construction Platoon was divided into teams as follows: Nine teams each consisting of six men, one ¼-ton, 4x4, W/RL-31, and one 3/4-ton, 4x4, W/C truck W/RL-31. (Wire laying teams)

Three teams each consisting of two men and one ¼-ton, 4x4, W/RL-31. (Trouble shooting teams)

Two teams each consisting of four men and one 2½-ton, 6x6, truck

W/RL-26. (Wire salvage teams)

One team consisting of 10 men to work at the Company Command Post servicing wire which had been salvaged.

Telephone and Telegraph Section

During the campaign telegraph and teletype did not operate satisfactorily. It was believed this could be remedied by proper coordination of the sets. Therefore, the telegraph sets were given to the radio section to operate. The teletype was given to the Message Center to operate and the operating personnel transferred to that section. Now this section became a telephone section only.

The telephone switching centrals previously had been semi-permanently mounted in 2½-ton trucks but this proved unsatisfactory. Therefore, the telephone centrals were dismounted and arrangements were made for them to be operated in a Command Post tent or buildings.

The section now consisted of three teams each consisting of twelve men. For transportation the section had one, 2½-ton, 6x6, truck; three, 3/4-ton, 4x4, W/C; one, ¼-ton, 4x4, truck.

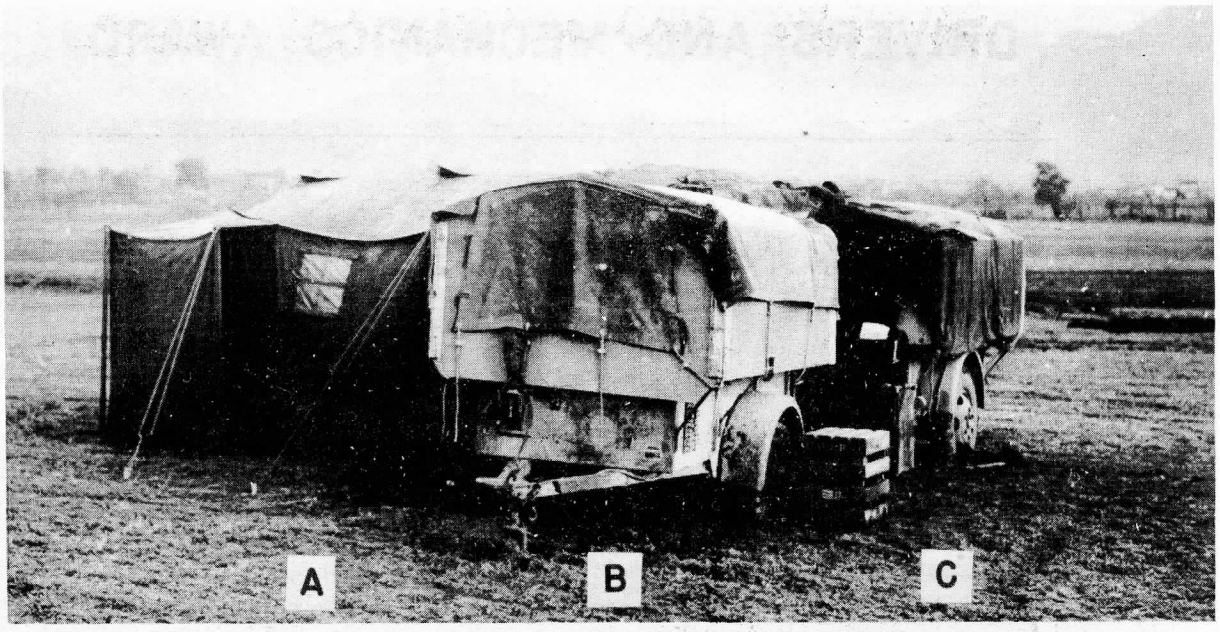
Radio Section

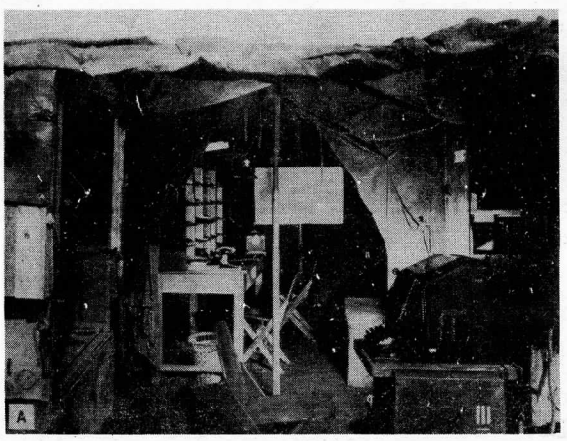
During this campaign the radio sets within the Command Post were invariably widely dispersed. Therefore the radio officer or chief radio operator could not properly supervise all the nets. As a result of this a radio control center was established to be operated in every Command Post. This radio control center was set up in conjunction with the Message Center and cryptographic installations (see Figure 1). Personnel to operate this radio control center consisted of three teams, one chief radio operator and one telegraph operator per team. The equipment used is one Switchboard BD-72 with lines to all radio stations within the Command Post and two lines to the telephone central switchboard, one Radio Receiver BC-312 for monitoring radio nets by the chief radio operator, and one special built Telegraph Set TG-5-A switchboard to operate on circuits to infantry regiments, Division Artillery and Division Rear Echelon.

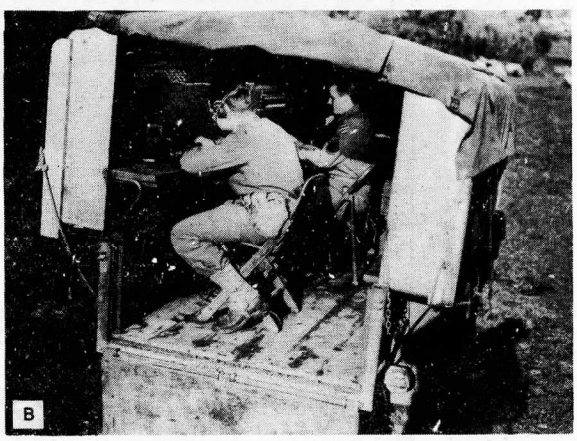
The telegraph sets at the Infantry regiments in the future would be installed and operated by the Division radio teams.

Message Center Section

The teletype equipment is installed in the message center and the operating personnel transferred to this section.







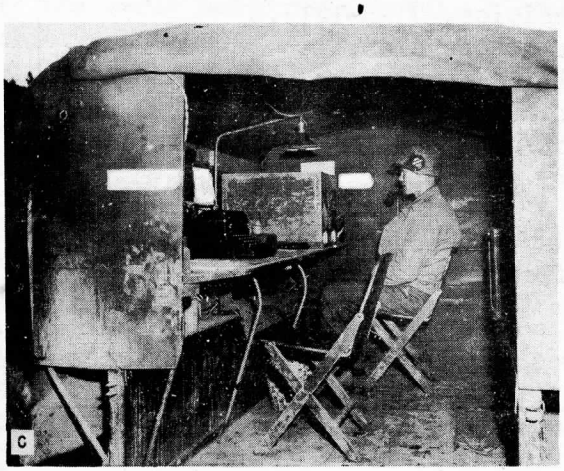


FIG. 1 - THE COMBINED COMMUNICATION CENTER IS SHOWN IN THE TOP PICTURE. THE INSTALLATIONS ARE: (A) MESSAGE CENTER, (B) RADIO CONTROL CENTER, (C) CRYPTOGRAPHIC UNIT

CAMOUFLAGE FOR RADIO SET SCR-536-( )

HOW EFFECTIVE CAMOUFLAGE MEASURES CAN BE IS INDICATED IN THIS PHOTOGRAPH TAKEN FROM 15 FEET

Recent reports from theaters of operations have indicated a need for camouflage measures to render Radio Set SCR-536-( ) less visible to the enemy when used by front line troops. This is especially true with regard to the early model sets having a smooth, glossy finish and bright silver-colored antennas.

Of several camouflage methods suggested, the following is considered the most effective and simple to apply in the field:

An issue olive drab sock is pulled over the radio set — from the bottom up -- and slits are laterally cut for the insertion of grass, leaves, or twigs provided by local terrain. A coating of black graphite grease (available at any motor pool) is applied to the extended antenna. Caution should be exercised to keep the grease away from the antenna insulator, and removal of the grease should be accomplished before telescoping the antenna. This camouflage method is particularly effective when the set is used against a background of grass, bushes or trees.

No adequate measures are known for camouflage of the antenna when it is silhouetted against the horizon or light colored barren terrain. In this circumstance, the following method of operation may be used, but only where tactical conditions permit:

Tests have shown that satisfactory operation of the set at any frequency within its range may be obtained with the use of a 100-foot length of insulated wire stretched along the ground in the general direction (±30°) of desired communication. This is important as signals will be too weak for

NO CAMOUFLAGE IS POSSIBLE WHEN A SOLDIER OR HIS EQUIPMENT IS SILHOUETTED AGAINST AN UNBROKEN SKYLINE

reception on receivers at right angles to the wire antenna. The bottom section of the telescopic antenna is extended just far enough to actuate the power switch and the wire antenna is attached to it by means of a battery clip, if available. The use of the 100-foot wire antenna in this manner will give operating ranges that equal, and in some cases exceed, those obtained with the standard antenna. For prevention of glare from the set case the olive drab sock may be used as described above.

The employment of the camouflage measures most applicable for local terrain conditions, as described above, is recommended in use of Radio Set SCR-536-( ) in advanced positions.

DESERT MANEUVER COMMUNICATIONS

In June, last year, the --- and --- Infantry Divisions were ordered to the Arizona Desert Maneuver Area. The sun, the temperatures, and the terrain made it seem impossible that troops could operate at all. Yet, four months later, these same soldiers had constructed a pyramidal tent city for themselves, could march 50 miles on the open desert without rest and with a minimum of food and water, and could work in 140 degree heat with little loss of efficiency. They were ready for maneuvers, and on 22 October 1943 the problems began.

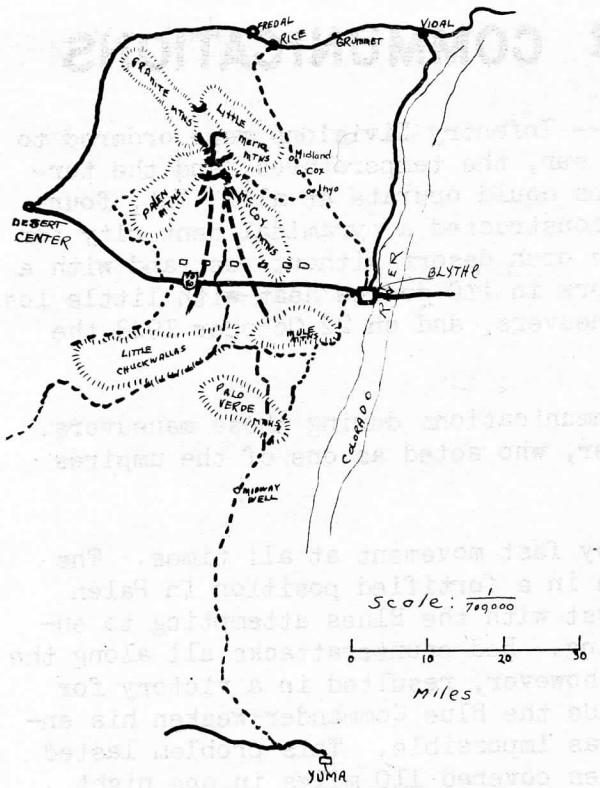
The following is an account of communications during these maneuvers. It was written by a Signal Corps officer, who acted as one of the umpires during these tests.

The maneuvers were characterized by fast movement at all times. The Blue Division attacked the Red Division in a fortified position in Palen Pass. The attack was successful at first with the Blues attempting to envelope the Red left and almost succeeding. Red counterattacks all along the line coupled with stubborn resistance, however, resulted in a victory for the Reds. The general counterattack made the Blue Commander weaken his enveloping force so that a Blue success was impossible. This problem lasted from 25 October to 29 October. The Blues covered 110 miles in one night (24-25 October), spent two days rehearsing their impending attack, and then covered 70 miles in the actual attack (27-29 October). See Map 1.

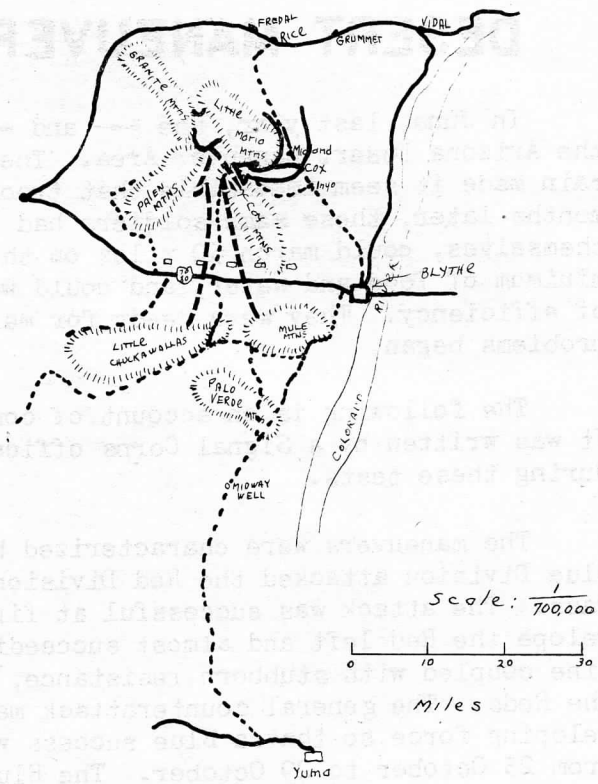
The second problem was a meeting engagement, and again the Red Mission was defensive. Blue had the offensive mission of seizing water and communication facilities between Rice and Rose. Red was to prevent Blue from crossing a line through Vidal, Grummet, and Fredal prior to 0001, 11 November. See Map 2.

From the beginning disaster haunted the Blues. They moved quickly (3 November) to the attack, advancing 50 miles north while their cavalry screened the action. On 4-5 November, several amazing episodes took place, one of which was the movement of a Red CT some 20 miles west, directly across the front of the Blue forces -- successfully. One Red company was captured intact; a Red platoon became isolated and marched 14 miles through enemy lines to rejoin their unit, unquestioned; and a full battalion of Blue artillery was captured and destroyed. On 6 November a dust storm prevented operations entirely. Then Blue struck violently and by November 8 had moved another 50 miles. They now faced the fortified Red position in Palen Pass. The action slowed but Blue advanced by taking the strong points along the eastern slope of the Palen Mountains. These points were successive anchors for the Red lines, and when they fell the lines had to fall back.

However, the attack slowed to a standstill by the night of the 10-11 November and on the morning of 11 November a Red reinforced battalion advanced on the Blues from the east. This force had marched behind the Lit-



MAP 1



MAP 2

tle Marias, through Midland Pass and up the valley between the McCoys and Little Marias. The attack was such a surprise and came from such an unexpected quarter that it finished the Blues who were caught between two forces.

During the critiques following each problem Signal communications were lauded. The praise was well deserved for both Red and Blue Signal personnel did excellently. They encountered many outstanding problems due to climate, terrain, and particularly the fast-moving situation.

Especially good was the SOP used by the Blue Division. It was published by the Signal Officer and was rigidly enforced. It gave the operations sections and construction platoon something concrete on which to rely at all times. For instance, the construction platoon had different installations for each type of operation -- march, attack, defense, withdrawal. Each installation was illustrated by a circuit diagram and explanatory notes. Also included were reasons for adopting plan "A" for a march or plan "C" for an attack. This presentation of the logic of certain plans was a help to the men who had to put the plan into effect.

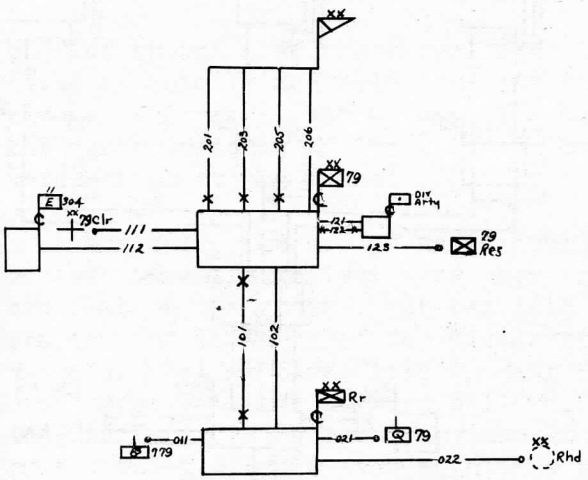
Another helpful part of the SOP was a seemingly simple statement which was difficult to carry out. It was this: "To stay within the limitations and capabilities of the construction platoon all installations except the three combat teams that desire wire must be within one and one half miles

of the axis of signal communication. This had been in force during training and the various commanders had actually found themselves without wire at times. They had come to respect that statement and it saved hours of work for the construction platoon and, incidentally, made it possible for the men to keep wire ahead of the CT's as they advanced. Had it not been for this determination on the part of the Signal Officer, the CT's would have outdistanced the hard-worked wire teams.

The Telephone and Telegraph SOP installations were likewise excellent. Plan A, Plan B and Plan C were based on the time the Division CP was expected to stay put. These plans also included the priority for telephone installation and removal. It kept phones down to a minimum and provided teeth for the Signal Officer's policy, having been sanctioned by the Commanding General. For instance, in Plan C (unstable situation) only nine lines were run, in this order:

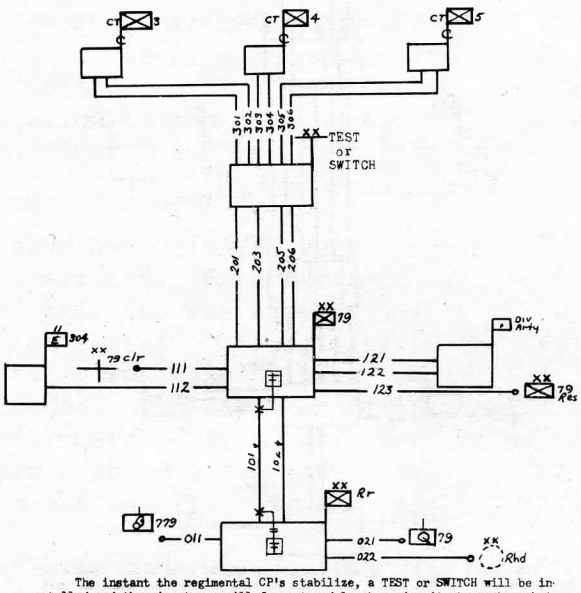
Message Center
G-3 (2 lines)
G-2 (2 lines)
C/S
G-4
D.S.O.
Public Telephone

Since G-2 and G-3 were together in the Operations truck, four of the



To stay within the limitations and capabilities of the construction platoon, all installations, except the three combat teams that desire wire must be within one and one half miles of the axis of Signal communication. Lower numbered circuit to rear echelon will be loaded regardless of length. Lower numbered circuit will also be simplexed for telegraph or teletype. Special units will be serviced out of the nearest echelon. There will be a minimum of three circuits and a maximum of six. Construction will follow single axis method along axis of Signal communication with four circuits until Regimental CP's become stabilized. Wire teams will report in every mile. Maintenance, policing, and patrolling on existing circuits will be continuous.

PLAN A, MARCH



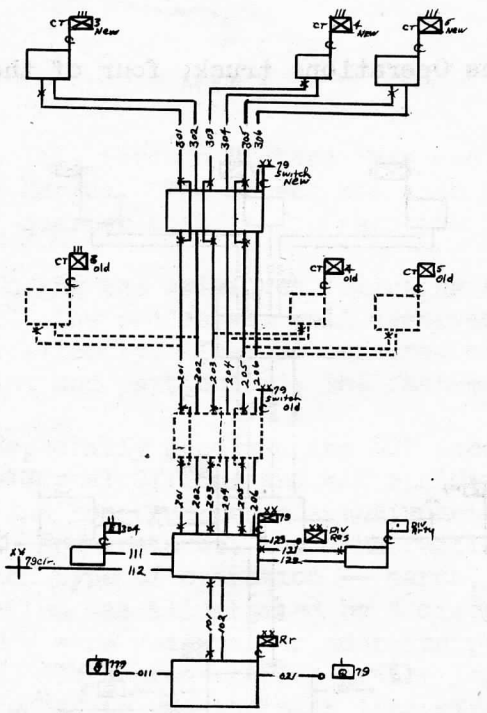
The instant the regimental CP's stabilize, a TEST or SWITCH will be installed and the wire teams will fan out and lay two circuits to each combat team. The lower numbered circuit to each CT will be simplexed for TG. Policing and patrolling will be continuous. Special units must stay within one and one half miles of the axis of signal communications to get wire. Teletype will be simplexed on lower numbered circuit between Division and Rear Echelon. The lower numbered circuit between Division and Rear Echelon will be loaded.

PLAN B, DEVELOPMENT

nine lines went to the same place. Thus the CP could be installed in a short time. Even the most stable situation (Plan A) called for only 18 locals. Add to that a maximum of 6 Combat Team trunks, 2 Division Artillery trunks, 2 Rear Echelon lines, 1 Engineer line, and 1 Clearing Station line. Since the 44- drop switchboard had only 30 lines in it, plenty of room was left for attached units and Corps lines. The board was, of course, never full and consequently operators could handle a maximum of traffic. It was extremely successful during the entire maneuver.

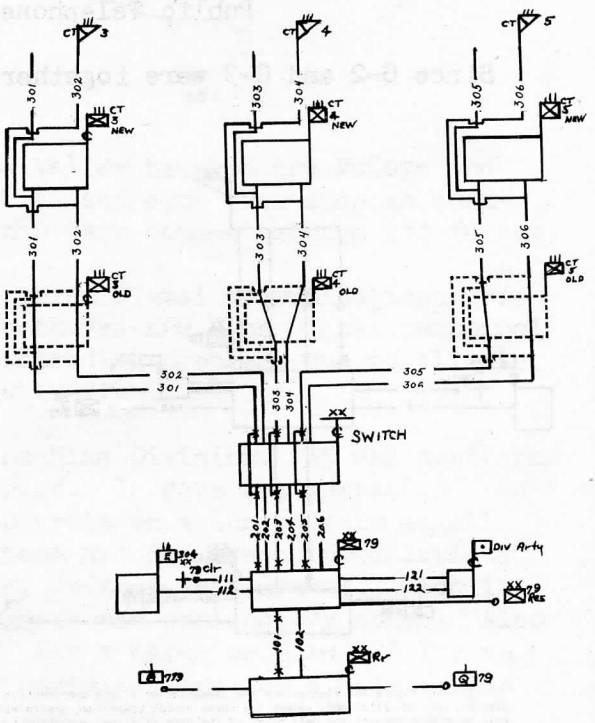
The Radio SOP was also excellent, providing for all units, even including the Medical and Engineer battalion nets. The thoroughness of the instructions and diagrams enabled anyone to follow the systems through. Uses for the task sets of the regiments were recommended. The Artillery and Reconnaissance nets were drawn up and discussed. After reading the entire SOP one factor stood out above all others -- COMPLETENESS.

Radio was effective in the desert as could be expected and it was used extensively to good advantage. However, it was used improperly in many cases. The principal errors were its excessive use for administrative traffic and transmission in the clear. Administrative traffic could have been sent over wire channels, and, if necessary, by messages. Transmission in the clear was



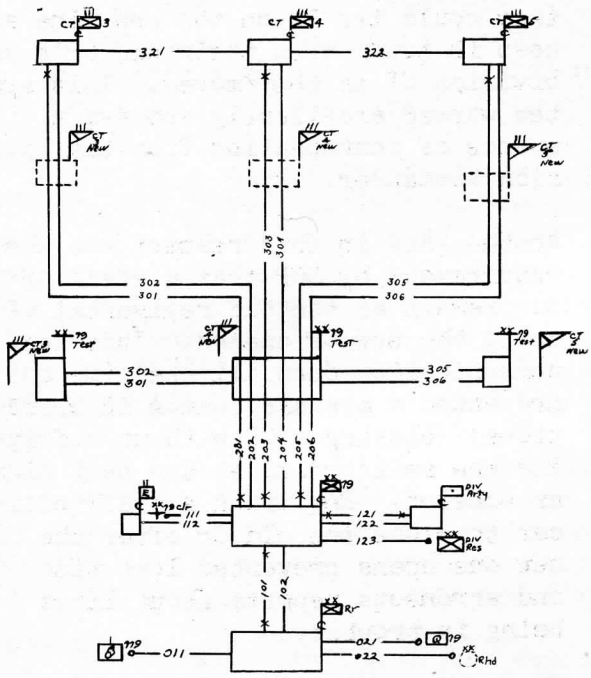
The single axis will be extended and as the CT CP's become stable fan out a new switch. The lines to the old CT CP's will be cut when the last staff officer has left the CP, but not before communications have been established with the new CP. At least a staff officer and a switchboard should remain at the old CP until communications are established with the new GP. The old switch, when cut out, will be changed to a test by strapping the lines through on a terminal strip. When the division CP moves two lines will be spliced through to Rear Echelon and two lines will be cut.

PLAN C 1, ATTACK-DIVISION CP MOVE IMMINENT



When a division CP move is not imminent the multiple axis will be employed. Division wire teams will T-splice on to existing circuits and extend forward to new CT CP. As soon as communications are established with the new CP the old CP may be closed. But the old CP must never be abandoned until wire communications are established to the new CP. At least a staff officer should remain. Two CT switchboards will be in use during a move.

PLAN C 2, ATTACK



A defensive situation is more extensive and complete than any other. Six circuits are laid to a test (approximately half way to the CT) and then fanned out to the CT's. The multiple axis will be followed for the remaining distance so the CT may withdraw along those lines if necessary. Laterals are installed from right to left between CT's by Division wire teams.

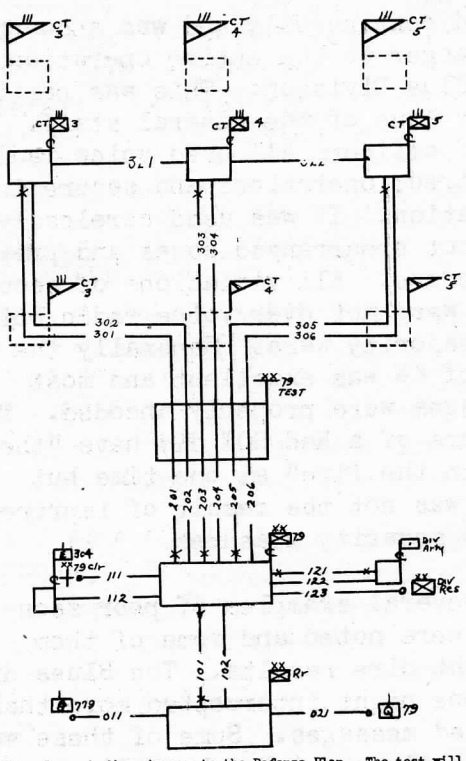
PLAN D, DEFENSE

noted continuously and was a source of danger to the entire operation of the Blue Division. This was particularly true of the general staff. Staff officers all used voice radio to direct operations and secure information. It was used carelessly, without prearranged codes and proper procedure. All violations of security were not over voice radio but the majority were. Generally the use of CW was excellent and most messages were properly encoded. The capture of a Red SOI did have "the fat in the fire" at one time but that was not the result of improper radio security measures.

Several examples of poor security were noted and some of them brought dire results. The Blues during one night intercepted more than 100 Red messages. Some of these were in the clear. A Red battalion was practically annihilated because of this clear message on voice radio: "Am now at 725-1076 what shall I do." Aerial reconnaissance showed a large body of troops near the coordinates given. The Blue Reconnaissance Troop moved in quickly and held the Reds in position until Blue reinforcements arrived. The result was a loss of a battalion to the Red Commander. This was the worst instance of its kind but many other clear messages gave valuable information to the Blues.

Moreover, the use of radio could have been limited very successfully because of the excellent wire nets in operation. Wire was laid off the road and flat on the ground. It was laid rapidly and was easy to maintain generally, and it was used for distances far exceeding the limits in the Field Manuals. At one time Division Rear Echelon was able to talk to Division CP over about 70 miles of Wire W-110-B, loaded. The Engineer Battalion, Clearing Station, Ordnance Company and Quartermaster Company were very often put on a simplex circuit even when they were 6 and 8 miles away. Everyone had wire communications almost all the time and usually very soon after a move.

Furthermore the wire teams were able to have wire waiting for the combat teams when they reached their new CP locations in most cases. The three CT's each had a Division wire team attached and the team chief was always taken on the reconnaissance for the new CP. He returned directly to the old CP, started his team out and generally had enough lead to get the wire in ahead of the CP installations. Also the Regimental commanders were provided



This plan embodies changes to the Defense Plan. The test will be further located to the rear than normally. It is anticipated that the first move to the rear by the CT's will be along existing wire lines. That is why the multiple axis is employed for approximately half the distance. Two circuits are then laid out from the test on the axis and the withdrawal awaited. As the CT's make successive moves, successive tests are established to the rear and as the CT's withdraw short lines are cut in to the side lines and run to the actual location of the CT CP.

PLAN E, WITHDRAWAL

with test clips and a phone so that they could tap in on the new line and keep in touch with their old CP's and Division CP as they moved. This system worked excellently and was a source of commendation from the Division Commander.

Another aid in this respect was the requirement by SOP that a staff officer remain at the old regimental CP until the new CP opened. This kept communication open all the time and prevented a mistake common in operations: closing a CP without nofifying the switchboard at the next higher echelon. Requiring a staff officer to close the old CP after the new one opens prevented lost time and erroneous reports about lines being in trouble.

When a line actually had trouble on it, trouble-shooting was not too good. It was done from the switchboard and Test Set EE-65-B was used. However, the test set did not prove very accurate and the actual trouble-shooting was a very slow process — the process of testing every few miles along the line. This took time and in a fast moving situation the loss of time is dangerous. Often lines were no longer of use by the time they were repaired. The time taken by the actual trouble-shooting was of course unavoidable since the EE-65-B test set has never been entirely satisfactory. But there was an additional time delay -- a lag between the time the switchboard discovered the trouble and the time the trouble-shooters went out. The condition was never clarified completely but it was improved by the Signal Officer in conjunction with the T&T and Construction officers.

An excellent problem arose when the Red switchboard at Division CP was bombed and declared "out" for one hour. The T&T officer designed a temporary setup by putting a telephone on the end of each incoming trunk line and employing runners to relay messages. The telephone operators copied messages down on blanks and sent them to the addressee. It resembled a large message center and was successful to a certain extent though traffic was slowed up considerably.

Supply personnel found themselves faced with a serious problem when an entire artillery battalion CP and FDC was wiped out by the Reds. All sig-

nal equipment was declared out of action and had to be replaced. The requisition proceeded through channels to the Signal Supply Office at Rear Echelon. Simulated materiel was quickly sent forward and was in operation within 20 hours. There were exceptional handicaps involved in this case -- extremely bad roads, dust storms, great distances, and extreme heat.

During maneuvers in the desert the Message Center was vulnerable. Messengers had to be excellent map readers and land navigators to get their job done. Furthermore, they were in constant danger of capture by enemy personnel which the fast advances bypassed. They had to be ready to destroy their messages and documents quickly and thoroughly. In this respect it is a credit to the Blue Division Message Center that not a single document carrying a classification higher than "restricted" was captured. Several messengers were lost, but they managed to get rid of their classified material every time.

However, with respect to map reading, some of the messengers were below the requirements for desert operations. They were relatively few in number however, and those few were taken in hand by the Message Center officer. They improved noticeably after the first week.

The actual operation of the Message Center was excellent throughout the exercises. Standard procedure was used and men were efficient as individuals and had a section chief who coordinated them perfectly.

Also under the Message Center officer was another means of communication. A detachment from a pigeon company was attached to each force, Red and Blue. The pigeons were brought to the attention of the division signal officers, and it was requested that they be used extensively. In the first week Red used them much more than Blue. Then Blue started using them more than they previously had and sent more than 100 messages by pigeon during the next week. Overlays of positions were reaching G-3 by pigeon quickly. The only drawback was the delay between the time the loft got the message and the time G-3 got it. The loft was 25 miles from Division CP and had no wire; the messages came from the loft by jeep. Messages were reaching the loft in 25 minutes and reaching G-3 one-and-one-half to two hours later. Wire from Division CP to the loft would have relieved the situation to a large extent.

In conclusion communications were generally good throughout maneuvers. Radio was overloaded and voice procedure was often violated as was radio security. Wire conditions were perfect and was ahead of the Combat Team CP most of the time. Message Center functioned in a well-coordinated manner. The rapid advances and quick moves required extra alertness on the part of all members of the Signal Company. Speed was essential in this type of operation and communications stood up excellently during this rehearsal for battle in the desert of Arizona.

RUBBER AND THE SIGNAL CORPS

One of the reasons troops are being drilled continually in conservation and reclamation measures is that so much of their equipment contains materials that are scarce and critical. Rubber, which is vital in communications equipment, is one of the critical materials, and the following article gives some idea of what the Signal Corps has done in meeting this shortage.

Before the war, the electrical industry was geared to free access to a rubber supply. The technical requirement of practically every insulation application (rigid as well as flexible) was conditioned upon the use of rubber. It is not strange, therefore, that as a result of the enemy's early successes in the South Pacific, there should develop many problems regarding the production of Signal Corps equipments due to the ensuing shortage of rubber and rubber latex.

The shortage (indicated by dwindling stock piles) compelled an abrupt conversion to alternate materials to meet the insatiable and immediate war demands. It was recognized that essential civilian as well as military requirements for rubber products were equally important to the proper prosecution of the war.

Signal Corps requirements for thousands of products of the rubber industry necessary to the fabrication of approximately 70,000 items increased with extending military operations.

Wires, cables, cordages, handsets and headsets, terminal and connecting blocks, shockmounts, vibration dampers, lineman's testing gloves, jacks, battery jars, microporous separators, meteorological and other balloons, electrical tape, rubberized fabrics, hose, belts — these and thousands of other applications of manufacture by the hard and soft rubber trade immediately became the subject of study.

The primary problem was to simulate, maintain, and, if possible, enhance the electrical, mechanical and physical properties of crude rubber in the end item — to do it with a substitute, with existing facilities, and in the face of a tremendous and constantly expanding production.

This made mandatory (1) the conduct of intensive research both in laboratories and in the products industries; (2) the acquisition of new techniques and possible facilities; and (3) the improvement of techniques for mixing, grinding, milling, extruding, and vulcanizing various compounds. It dictated the immediate discovery and application of critical temperatures, pressures, catalysts, accelerators, retarders, and anti-oxidants. Moreover, it required the selection of new reenforcing fillers that when used as extenders would reflect high dielectric values, low capacitance, high insula-

tion resistance, low hygroscopic properties, and be found equally pacific to heat and to cold.

One of the most difficult of the tasks was to fabricate into the equipment, components, etc., the ability to withstand temperatures down to minus 70 degrees F, and elevated temperatures as high as 165 degrees F.

Many developments awaited the wartime urgency to bring them out of the laboratory stage and permit field testing before final approval and initiation of production. The Signal Corps laboratories and industrial facilities jointly and actively pursued a consistent program of improvement of quality and changeover to alternates for critical and strategic materials.

It was believed at the beginning of the program that some of the alternate materials would not prove as highly satisfactory in actual field use as had crude rubber. But in some instances the substitute material not only proved equally suited to the use intended, but developments in application and improved technique of fabrication while reducing labor and material costs actually enhanced the military characteristics of certain equipment. As the tempo of production increased, further shortages with respect to fillers, accelerators, plasticizers and anti-oxidants were met and solved.

The Signal Corps' work with respect to the conservation of rubber was projected, reviewed, piloted, and conversion from crude rubber to suitable substitutes effected in the last eight months -- this at a time of increasing tempo and the most critical period of Signal Corps equipment production.

Later and newer Army Service Forces requirement programs rated by higher echelons as more vital to the war effort, have in some instances already caused further conversions of one rubber substitute for another.

As of June 1943 the monthly Signal Corps requirements for crude rubber were approximately 2,626,000 pounds with approximately 18,700 pounds of synthetics and other substitutes employed. Currently, however, synthetics and alternate materials have been substituted for crude rubber in thousands of procurement items, among which approximate savings have been obtained during the first four-months of 1944 as follows:

Field Wire	6,002,344 lbs.
5 and 10 pair and Spiral Four telephone cable assemblies	6,137,152 lbs.
DR-Tape	150,000 lbs.
Shock Mounts	45,000 lbs.

As of today Signal Corps requirements for crude rubber have been decreased from 2,626,000 pounds in June of 1943 to a new low of approximately 800,000 pounds in April of 1944.

This tremendous savings is of great assistance in our war effort. Further changes in design and production techniques are expected to result in the further elimination of rubber in Signal Corps equipment.

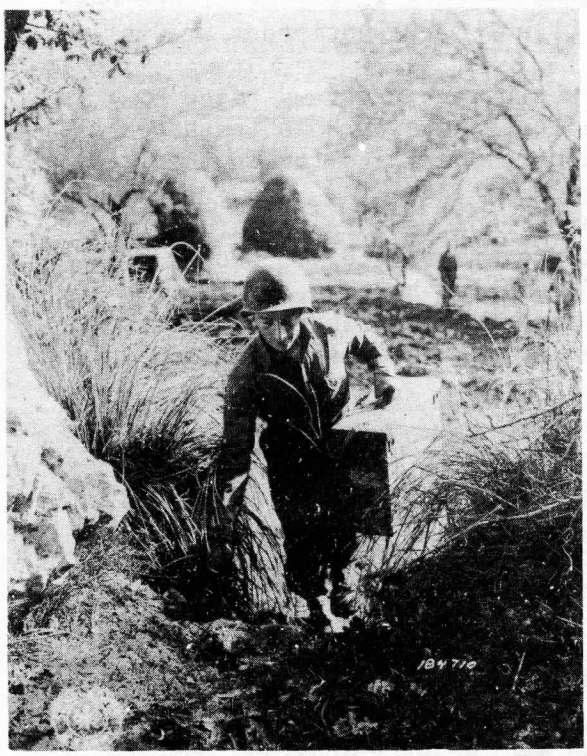
PIGEONS IN COMBAT

ITALY

The following report stems from a statement that "pigeons cannot be used as Corps communication, because the Corps CP's usually move too often" which appeared in the January "Monthly Bulletin," issued by Allied Force Headquarters. This answer was written by a member of a Signal Pigeon Company now in Italy and was published in the April issue of the "Bulletin."

There have been settled pigeon lofts (capable of carrying message traffic) available to all Corps and Divisions during the entire Italian campaign. If the Signal officers of the respective Corps or Divisions will let the pigeon officers know the approximate demands and possible locations several days in advance pigeon lofts can be resettled in a few days. However, if new or fresh pigeons are being committed more time (up to 10 days) may be required for settling.

In every case where a pigeon loft is attached to a headquarters, either Corps, Division, or other unit, messages received by pigeons at these lofts are always delivered directly to the Message Center that they are serving, except under certain conditions where they are used on special missions. It is <u>not</u> necessary to have any staff sections transmit messages, received by pigeon to a third party as they are and should be handled directly by Message Center. Signal officers are responsible for connecting a telephone to pigeon lofts assigned to their unit and their Message Centers are responsible for delivering messages from pigeon lofts to Message Center.



BIRDS BEING CARRIED UPTRAIL IN ITALY

Pigeon lofts have served all Corps and all U.S. Divisions in Italy.

At one location several pigeon lofts are being used exclusively for carrying reports from engineer water points relative to demands and availability of water. This same engineer unit has found pigeons very useful to carry on water reconnaissance, so that locations of new possible points may be sent back and work started on establishment of new points without reconnaissance party returning. This same unit keeps birds at water points to report any breakdown,

MESSAGE BEING FITTED INTO CAPSULE FOR PIGEON DELIVERY

PIGEON IS AIRBORNE AFTER BEING TOSSED BY SIGNAL PIGEONEER

which has expedited repairs on several occasions.

At two isolated locations, veterinary hospitals transmit morning reports to headquarters daily by pigeon. Those reports have always arrived in time. For a period of one week just recently passed, there were 258 messages carried by pigeons, this current week 312. A large percentage of them tactical messages. This large increase was noticed when American units were replaced by French or British. Both the French and British are large users of pigeon messengers.

Although rigid instructions are given when birds are sent out with units, there is still a tendency to retain the birds in the combat boxes or crates too long. In combat boxes birds should not be kept more than 48 hours except under "extreme" conditions, at the end of which time they should be released. When releasing birds at such times a test message should be sent or a request for additional pigeons. Four days may be allowed if birds are in a crate.

The --- Signal Pigeon Company (Prov.) is equipped to drop a supply of pigeons by parachute to isolated or cut-off units. Parachute baskets on hand are of four- or eight-bird capacity.

Recently, pigeon relay service was initiated between Corps and Army pigeon lofts. There are pigeons available at each Corps Headquarters loft that will fly directly back to Army Headquarters.

NORTH AFRICA

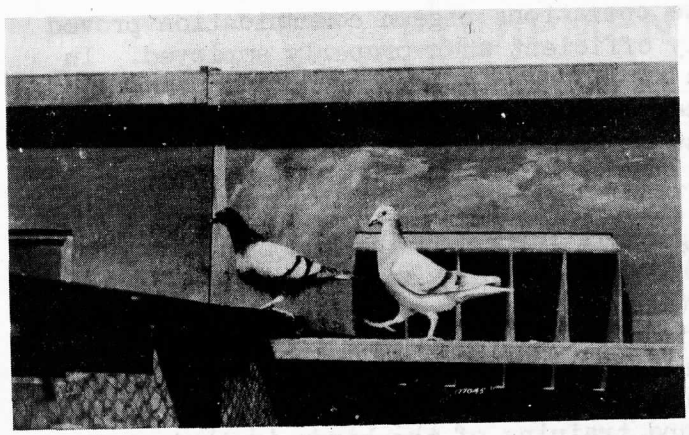
The North African pigeon platoon, which was organized at Camp Claiborne, Louisiana from the --- Signal Pigeon Company, arrived in French Morocco the latter part of 1942 and participated in the final phase of the North African operations.

In general, the use of homing pigeons in the North African Operations proved to be of extreme value as a supplemental as well as an emergency means of signal communication. Many uses were found for pigeons during the operations. They were used when radio silence was maintained; to carry messages, including map overlays, from scouting and reconnaissance units; when troops were isolated from their headquarters; to deliver secret and urgent G-2 messages; to deliver G-1-2-3-4 reports to higher headquarters when message center traffic was heavy, and proved to be of extreme value in delivering orders for critically needed ammunition from front line ammunition dumps to the rear depot; to deliver messages from Field Artillery observation posts; for carrying messages from airplane to ground installations, and when other means of communication failed.

The platoon commander, working in close conjunction with the Signal Officer, selected loft locations according to the status of operations. Lofts were established as near as practicable to the headquarters to be served, but outside of shelled areas. Care was taken, however, not to locate the loft too close to the headquarters in view of the fact that a flock of pigeons on exercise flights might attract attention to the location. The lofts were never located near road intersections, firing batteries, ammunition dumps, or similar installations. It was found impossible to maintain lofts with a division or smaller unit unless the line remained more or less stable so that the headquarters could remain stationary for periods of not less than fifteen to twenty days. The establishment of lofts at Corps' Forward and Rear Echelon was found satisfactory. Mobile lofts were found to be invaluable due to the necessity for the immediate installation of pigeon communication. The lofts not in actual use were kept continuously mobile; special care being taken to move the loft daily for short distances so that the birds did not become accustomed to the surrounding territory.

Training

The effectiveness of pigeon communication during tactical operations depends materially on the state of training of the birds and thoroughness of instruction given to personnel who are to use the birds. The majority of personnel of this unit had received excellent field training, including participation in large scale maneuvers in the States. This training proved invaluable to all personnel. Very few of the combat units, however, had received instruction in the use of pigeon communication. Due to the immediate demands for pigeon communication, it was impossible to conduct courses of instruction to all using units. The Pigeoneers gave full instructions, however, to message center and other signal personnel, who, in turn, instructed the using agencies.



"YANK", THE PIGEON WHO FLEW 98 MILES IN 112 MINUTES TO FIRST REPORT THE RETAKING OF GAFSA BY OUR TROOPS, IS SHOWN ON THE RIGHT

The pigeon unit was very fortunate during the early stages of operations in being authorized to take over several well established French military lofts which proved to be a real asset. The unit was thus enabled to conduct an extensive breeding program with the birds transported from the States. This enabled the unit to have youngsters between the ages of eight to fourteen weeks for tactical use during the rest of the operations which added much to the success of the unit. During training, the birds were group tossed up to a distance of twenty-five miles, after which they were double tossed from shorter and longer distances as required. The pigeons were normally released two at a time when being used as message carriers.

The average distance flown was approximately thirty-five miles, although some birds were flown as far as ninety miles. The majority of speeds varied from thirty-five to forty-five miles per hour. Every effort was made to have birds delivered daily to the using personnel. By this method it was seldom necessary for the birds to be away from the loft in excess of thirty-six hours.

Messages received at the loft were delivered to the nearest message center, or directly to the addressee when directed by competent authority, by the most expeditious means of communication available. All messages relayed by telephone were verified in writing. A receipt was received for every message delivered as it was occasionally necessary to refer to the receipt at a later date.

The equipment authorized on the T/O&E 11-39, 6 September 1943, was found very satisfactory with the following exceptions:

Loft PG-46-A was found satisfactory as a breeding loft, however, it was advisable to house only eighteen pairs of breeders rather than the full capacity of thirty-six pairs.

Pigeon Equipment PG-60 is believed to be too cumbersome as experienced by using personnel. The need for a light, expendable two or four-bird container was quite evident.

The percentage of sick birds was extremely low although difficulty was experienced with one eye colds (conjunctivitis). All young birds between the ages of five to seven weeks were vaccinated with pigeon pox vaccine.

Summary During these operations pigeon communication proved to be highly efficient when properly employed. In general, difficulties encountered in supplying pigeon communication was due to the lack of knowledge in the proper method of utilizing pigeons by using agencies, rather than to any inherent weakness in pigeon equipment and doctrine.

Pigeons can be employed advantageously for communication purposes from front line combat units, small detachments, patrols, and all types of reconnaissance elements to their headquarters or next superior command echelon. To assure satisfactory pigeon communication, close cooperation between the combat platoon commander and the signal officers of the corps and division is essential. Loft location should be anticipated as far in advance as possible to enable the proper settling and training of the birds in their new location prior to the time they are employed for communication purposes. Frequent movement of the lofts tends to reduce the efficiency of pigeon communication. It is advisable, therefore, to maintain the loft in the old location and forward the messages to the message center until such time as pigeon communication can be established at the new location by the use of another loft.

The unit's success in delivering 100 percent of the messages in the North African Operations was attributed, not only to the technical training received by the personnel, but also to the excellent quality of pigeons supplied by the breeding bases and civilian fanciers in the United States.

EQUIPMENT NOTES

SIGNAL CORPS BOARD

Case No.553 - Service Test of Cargo Carrier M-29C. Approved by the Chief Signal Officer, 8 April 1944.

The Cargo Carrier M-29C is an amphibious version of Cargo Carrier, Light, T-24, a low silhouette full track-laying vehicle designed for use over difficult terrain and in combat zones. Previous service tests by other arms have indicated that it is particularly adapted to traversing swampy terrain and bayous impassable to standard vehicles or other special amphibious craft.

The Cargo Carrier M-29C is the model T-24 modified by the addition of a bow cell, a stern cell, two side aprons and a pair of rudders. The bow cell is intended to hold the vehicle tools, all curtains and the seats which may be removed when cargo only is to be transported. The standards supporting the top and side curtains can be stowed in the brackets provided in the bottom of the cargo compartment.

The Signal Corps Board devised a mounting for Reel Unit RL-31 which was welded to the deck of the stern cell to facilitate wire laying operations. This mounting consists of two stirrups and two brackets as illustrated in

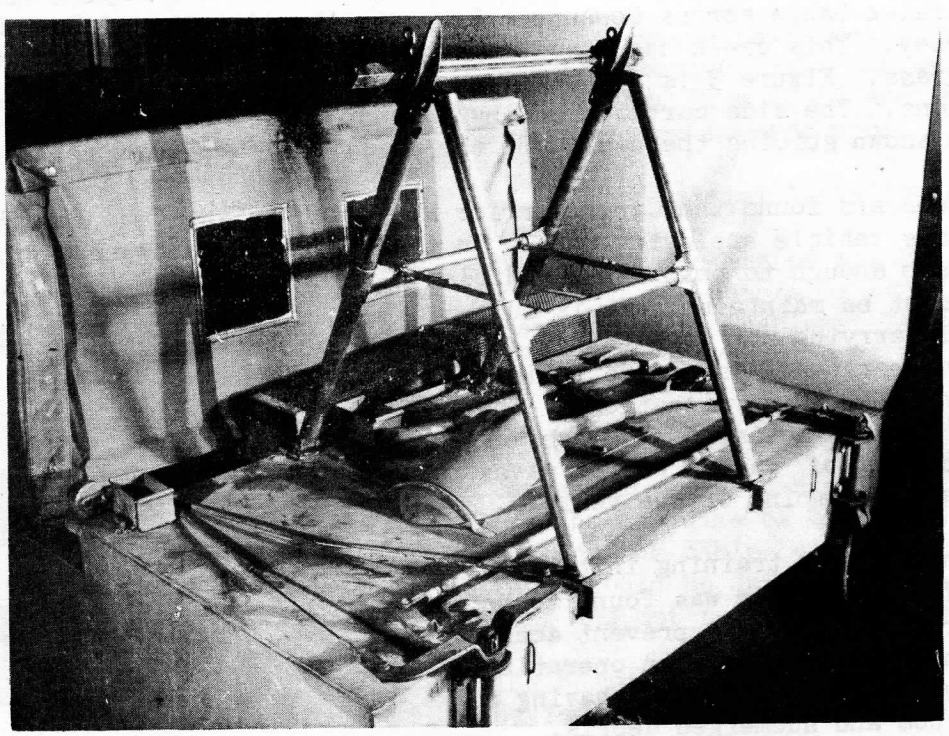


FIG. 1 - DETAIL OF REEL MOUNTING

FIG. 2 - THE CARGO CARRIER WITH WIRE AND CREW

Figure 1. The Reel Unit RL-31 is also shown set in these mountings. Figure 2 shows the Cargo Carrier M-29C with the curtains removed and the cargo compartment occupied by the wire laying crew and reels of wire.

The Signal Corps Board tested the cargo carrier for laying Wire W-110-B and Spiral-4 Cable across Oceanport Creek in the vicinity of Fort Monmouth, New Jersey. This creek has a soft muddy botton and banks covered with tall marsh grass. Figure 3 is a photograph taken during one of these wire laying operations. The side curtains during this operation were in place with the lineman shown guiding the cable off the reel.

The Board found the Cargo Carrier M-29C Amphibian to be superior to an amphibious vehicle employing wheels in traversing flooded territory not quite deep enough to permit the vehicle to float and where continuous traction cannot be maintained. It is suitable for carrying not more than 1,200 pounds of personnel and cargo to isolated units in swampy locations. The carrier is not suitable for use on large bodies of water where waves might cause swamping of the vehicle.

FIG. 3 - UNREELING WIRE FOR UNDERWATER LAYING

Considerable training in the handling of the vehicle was found to be necessary in order to prevent accidents and avoid damage when operating on a body of shallow water having a soft bottom and submerged debris.

The Signal Corps Board concluded

that the Cargo Carrier M-29C is not an indispensable item of equipment for signal units but under certain conditions would be an invaluable aid in accomplishing special missions. The Board accordingly recommended the inclusion of the vehicle in theater equipment pools and the initiation of a training program in the operation of the Cargo Carrier M-29C Amphibian in Signal Corps Schools and Training Centers.

Investigation No. 9 Recovery Device for Plow LC-61 (Cable). Approved by the Chief Signal Officer, 18 April 1944.

The techniques of laying field cable by means of Plow LC-61 were tested and revised by the Signal Corps Board in Signal Corps Board Case No. 503, Part B, "The Use of the Plow." The results of that study have been approved by the Chief Signal Officer and published in TM 11-369, "Spiral-4 Cable" and other pertinent technical manuals. However, the methods of recovery of cable buried by the plow were considered unsatisfactory and the development of more efficient equipment for this purpose was recommended by the Board.

Investigation No. 9 covers the field test of a recovery device developed under the supervision of Eatontown Signal Laboratory. Three attachments for Plow LC-61 were submitted to the Board for test: a mold board and two spade points. One of the spade points is 9 inches; the other, 16 inches wide. Either of the spades may be used with or without the mold board which is intended for use in sandy or clay soils overlaid with sod. Figure 1 shows the 16-inch spade and the mold board mounted on Plow LC-61.

The experience of the Signal Corps Board indicates that successful recovery of buried field cables by means of the Plow LC-61 and the recovery device depends upon:

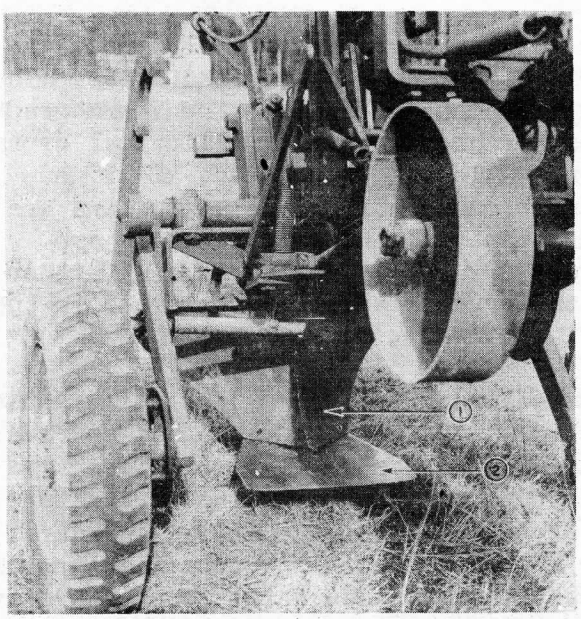


FIG. 1 - MOLD BOARD AND PLATE ATTACHED TO PLOW LC-61

1. Proper initial installation of the cable.
2. Proper marking of the recovery route and the determination of the position of the cable at frequent intervals along the route.
3. Control of the equipment used for the recovery so that the spade approaches no closer than 2 or 3 inches above the cable at any time.
4. The exercise of care in actual pulling the cable out of the ground. This should be done preferably by hand and not by mechanical means.

The Board concluded that the recovery device is not entirely satisfactory in all types of soils, particularly hard-pan and extremely rocky forma-

tions. It cannot be used on cable buried less than 6 inches deep since the plow standard cannot be adjusted to raise the cutting edge of the spade sufficiently high to clear cable buried at that depth.

However, the Signal Corps Board found the recovery device simple and easily attached to and detached from the plow. It weighs less than 50 pounds and can be packed with the plow in such a manner it requires no extra transportation space. No change in the technique of operating the plow is necessary when using the recovery attachments. The device was found satisfactory for recovering cable buried from 6 to 20 inches deep under most of the soil conditions likely to be encountered in the field. In view of these facts the Signal Corps Board concludes that the recovery device would be a valuable addition to Plow LC-61.

The Signal Corps Board recommended the inclusion of the recovery device in the specifications and parts list for Plow LC-61 (Cable) and the procurement of sufficient quantity of the recovery devices to equip each cable plow now in the field or under procurement.

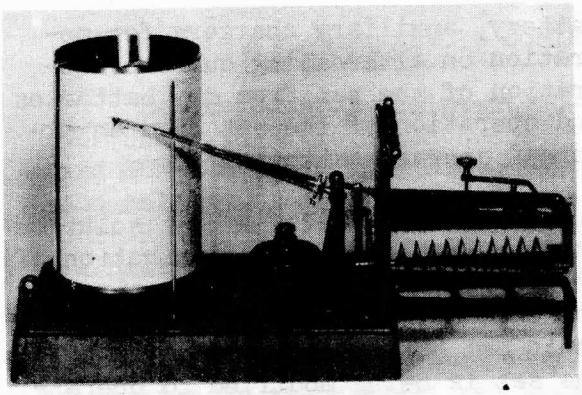
AIRCRAFT RADIO

THERMOGRAPH ML-277

Thermograph ML-277 is an instrument designed to give a continuous record of atmospheric temperatures under the cold climatic conditions usually encountered in Arctic regions. It is capable of measuring temperatures ranging from -80 degrees F. to +80 degrees F.

This thermograph is a modification of Thermograph ML-77-( ), the standard item used to measure temperatures in temperate and tropical areas. They differ mainly in the type of temperature element employed. The Thermograph ML-77-( ) uses the Bourdon Tube, a phosphor bronze tube of elliptical cross section filled with an organic solution, while the Thermograph ML-277 employs a bi-metallic element of invar and bronze. Bright metallic fins are attached to the sides for improved radiation. Bi-metallic elements are more sensitive to temperature changes at very low temperatures and furthermore very low temperatures may freeze the organic solution contained in the Bourdon Tube.

Bending movements of the temperature element caused by the differential expansion and contraction of the metallic strips with increase and decrease of temperature are transmitted by means of a series of links and levers to a pen arm that records the change on a strip chart attached to a rotating cylinder. This cylinder is driven by a clock mechanism that can be geared to revolve once in either 176 hours or 29 hours, depending upon the type of record desired. Adjustment of this instrument to record the temperature as measured by a standard thermometer can easily be made by means of an adjusting screw.



THERMOGRAPH ML-277 WITHOUT COVER

Because of the low maximum temperatures for which this instrument was designed, the pen arm mechanism could possibly be damaged, especially during shipment if those maximum temperatures were exceeded. To prevent this from occurring, the lever arm extending from the pen arm to the temperature element bar fits into a slot in that bar. When the pen arm reaches its maximum upward movement, the lever arm is stopped by a pin attached to the bottom plate, the component parts disengage and no further movement of the pen arm in a direction to strain the assembly is possible.

Certain precautions are necessary for the successful operation of this instrument at the low temperatures for which it was designed. Before being used, the clock mechanism must be tested at temperatures below those expected to be encountered in the field. This is done in order to make certain that the unequal thermal expansion of various parts of the clock will not cause it to cease functioning. Parts must be cleaned of ordinary oils and lubricated with oils that will not congeal at the low temperatures encountered in Arctic regions. Meteorological Instrument Oil HO-38 or similar oils procured by the Signal Corps, or a low temperature oil furnished by the manufacturer will meet the requirements. Ink especially designed for low temperatures and charts that are calibrated for the low temperature ranges are necessary. All the necessary adjustments are made prior to the issue of this instrument.

It is expected that this instrument will prove of great value in obtaining temperature records in Arctic areas.

GROUND SIGNAL

POWER FOR RADIO SET SCR-593-( )

Radio Set SCR-593-( ) is a light-weight receiver primarily used by gun batteries of the Anti-aircraft Artillery to receive signals from Radio Set SCR-543-( ). The set can be carried by a man or mounted in a vehicle. As produced in accordance with the originally approved Military Characteristics, Radio Set SCR-593-( ) included an integral Battery BB-54-A and vibrator power supply for operating the receiver. Battery BB-54-A which is a 2-volt storage battery can be charged from a 6 or 12 volt system.

This method of operation from a self-contained storage battery has not proved entirely satisfactory, and an investigation was conducted to find a satisfactory solution to the problem. Among the modifications considered were auxiliary charging kits to increase the charging rate of the internal

RADIO RECEIVER BC-728-( ), MAJOR COMPONENT OF THE 593. THE BLAST PROTECTOR IS SHOWN IN CLOSED POSITION

battery, auxiliary chargers for operation on alternating current, operation of the set from dry batteries and operation of the set from an external storage battery.

It was decided that the best solution to this problem is the elimination of the internal storage battery since the need for portable operation of Radio Set SCR-593-( ) no longer exists. The set is being modified to operate directly from a 6-volt storage battery. When mounted in a vehicle the set will be connected to the vehicular ignition system and when the set is not mounted in a vehicle a separate standard 6 volt storage battery will be used.

Elimination of the internal storage battery and operation of the set directly from an external 6 volt battery or a vehicular ignition system requires modification of the set. This modification comprises principally the addition of a large capacity filter condenser and a rewiring of the on-off switch. The filter condenser is designed to fit into the space originally occupied by Battery BB-54-A and serves to reduce voltage peaks. Action is being initiated to have these changes incorporated in current production and in sets in the field. Instructions for field modification are being prepared and will be issued in the form of a Modification Work Order.

For field operation of the modified Radio Set SCR-593-( ) a 6-volt storage battery will be added to the parts list for the set. Procurement of this battery has been initiated. The battery selected is a standard battery as follows: Battery No. 2H Fed Spec. No. W-B-131B, Ordnance Spec AXS-1136 dated 6 December 1943. Suitable means, not yet decided upon, will be provided for charging these 6-volt batteries.

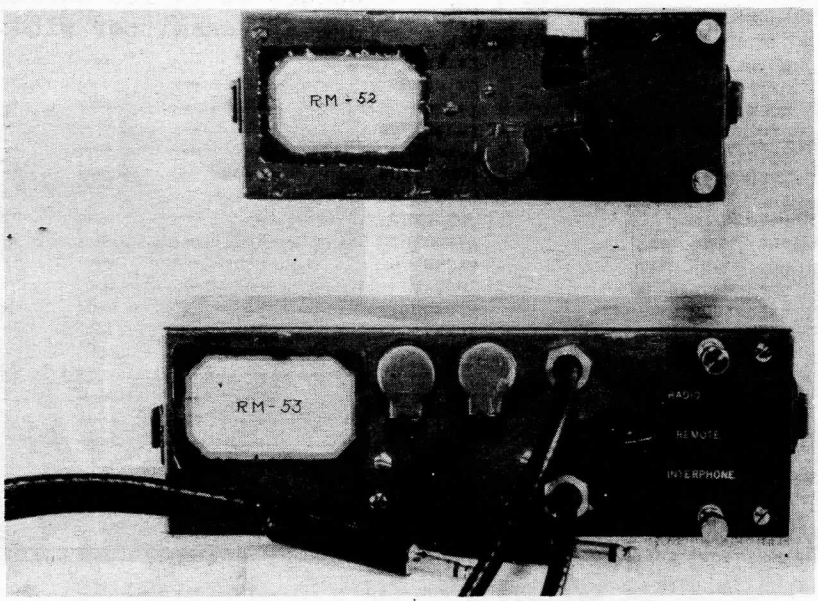
The Military Characteristics for Radio Set SCR-593-( ) were revised in view of the present lack of need for portable operation, and the equipment as modified meets the revised Military Characteristics.

REMOTE CONTROL EQUIPMENT RC-261-( )

Remote Control Equipment RC-261-( ) has been developed and standardized for use with Radio Set SCR-608-( ), SCR-609-( ), SCR-610-( ), SCR-619-( ), and SCR-628-( ). This equipment will replace Remote Control Unit RM-29-( ) and related items. Remote Control Equipment RC-261-( ) includes Control Unit RM-53, Remote Control Unit RM-52, Bag BG-186 for carrying these units, 12 Batteries BA-30 and 2 Technical Manuals. This remote control equipment will provide remote push-to-talk voice operation of the radio set.

The Control Unit RM-53 includes cords with Plug PL-55 and PL-68 for insertion in the headset and microphone jacks of the radio set, jacks to accept Plug PL-55 and PL-68 of the headset and microphone for the operator located at the radio set, terminals for connecting field wire and a three position switch to provide interphone communications between local and remote positions and to allow either the local or remote operator to control the radio. The Remote Control Unit RM-52 includes terminals for connection to the field wire and jacks to receive Plug PL-55 and PL-68 of the handset to be used by the remote operator. Control Unit RM-53 requires 4 Battery BA-30 and Remote Control Unit RM-52 requires 2 Battery BA-30. Space is provided in the units for the batteries.

Remote Control Equipment RC-261-( ) was tested by the Field Artillery Board and found to be satisfactory. The report of these tests stated that the remote control unit provided satisfactory remote control operation with wire lengths up to 10 miles during dry warm weather and with wire lengths up to 6 miles during wet weather. The following extract from this report



REMOTE CONTROL EQUIPMENT RC-261

indicates the advantages of Remote Control Equipment RC-261-( ) over the Remote Control Unit RM-29-( ) and Telephone EE-8 arrangement at present in use:

"Remote Control Equipment RC-261-( ) is ideal for operation with Radio Set SCR-608-( )/ 610-( )/ 619-( ), because no set-position-operator is necessary, and it does not require the use of a Telephone EE-8-A. Under the present basis of issue of remote control equipment, a battalion of light field artillery would require twenty-seven telephones for remote operation of 100 per cent of the SCR-608-( )/610-( ) radio sets (air observation section not included) with remote control equipment other than the RC-261-( ). The weight of Remote Control Equipment RC-261-( ) (both units total 7.25 lbs.) is approximately half that of any other single remote control unit..."

Remote Control Unit RM-29 weighs 13.75 lbs. and requires Telephone EE-8, weighing 10.25 lbs.

Remote Control Equipment RC-261-( ) is being placed on Tables of Equipment for use with Radio Set SCR-608-( ), SCR-609-( ), and SCR-610-( ), SCR-619-( ) and SCR-628-( ) where required. Remote Control Unit RM-29 and related items have been removed from the parts lists of these radio sets.

IMPROVEMENT ON TELETYPE AUTOMATIC TRANSMITTER STOP ARMS

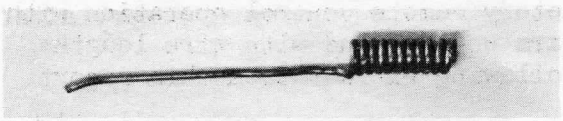


FIG. 1 - THE HOMEMADE COIL

Considerable difficulty has been reported in teletype operation due to the perforated transmitting tape becoming twisted and knotted before it is fed through the automatic transmitter with the result

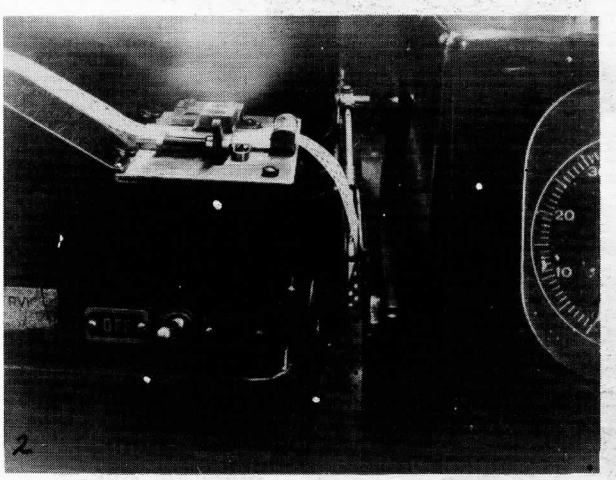


FIG. 2 - FEEDING THE TAPE INTO THE TRANSMITTER THROUGH THE SLOT SMOOTHES OUT THE KINKS

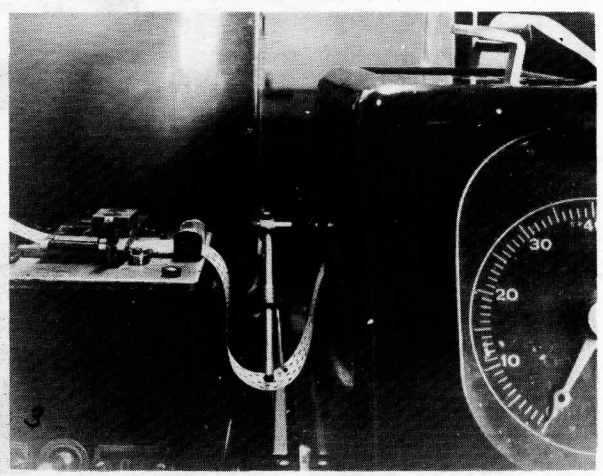


FIG. 3 - WHEN FEEDING THE TRANSMITTER DIRECTLY FROM THE PERFORATOR, NORMAL PRACTICE IS FOLLOWED

that the tape is torn and considerable time and patience are required to correct the trouble.

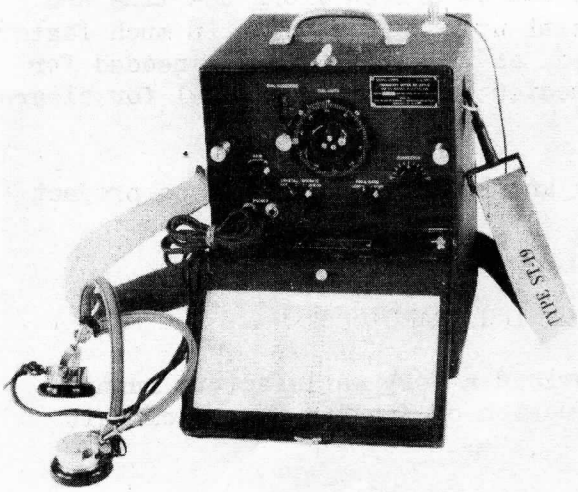
A device which may be used to correct this difficulty is illustrated in Figure 1. It consists of a coil the same diameter as the stop bar on the teletype transmitter with a projection about 3 inches long parallel to the bar and pointing towards the operator or front of the machine. The device may be made from a paper clip or any other piece of wire of suitable length and diameter. The coil should be wound so as to give a slip tight fit on the tape stop arm.

As indicated in Figure 2, if a knot or twist in the tape appears, the stop arm will be raised and the transmitter stopped before the tape is torn. When the tape is perforated and fed through the transmitter at the same time, it can be placed outside the slot formed by the tape arm and wire device, as indicated in Figure 3.

FREQUENCY SHIFT IN RECEIVERS

Reports have been received that Radio Receiver BC-342 and BC-312 cannot be accurately calibrated because of the CW oscillator. Accurate measurements in the field indicate, according to these reports, that the frequency as shown by the Vernier Dial Tuning can be shifted as much as 9.5 KCs by changing the CW oscillator pitch. This has been proved by tuning in a CW signal, then moving the CW oscillator control until the signal fades, after which it can be tuned in again by adjusting the dial tuning.

This apparently can cause some difficulty. Suppose, for example, two air-ground stations were operating on a band five KCs apart. If neither operator would know the Vernier dial setting representing his frequency as correlated with a definite setting of the CW oscillator, each operator can unknowingly cause the aircraft he controlled to shift frequency incorrectly by as much as 5 KCs. It also means that both aircraft might be working the same frequency.



RADIO SET SCR-211-B, FREQUENCY STANDARD FOR AIR AND GROUND EQUIPMENT

One suggestion to overcome this error was to install a knob with a graduated scale on the CW control, similar to the one on the volume control. Another suggestion was to disseminate this information for the guidance of operators.

Use of a receiver to zero-beat a transmitter with another transmitter which is known to be accurately on frequency is, of course, permissible. However, Frequency Meter Set SCR-211-( ), rather than a receiver, is the frequency standard for all ground and airborne stations. Receivers, besides being subject to the difficulties enumerated above are not calibrated with sufficient accuracy nor can the dials be read closely enough to be used as a frequency standard.

REEL RL-17

In order to keep wire run off from Reel RL-17 from kinking badly, especially when the reels were braked, standards became lost, or the wire would not pay off smoothly, sheet metal tubular casings were obtained by an overseas Signal unit from salvage, rewelded to form a "high hat" and bolted on the RL-17 wheels in place of standards.

Present production of Reel RL-17 has been improved in this respect and this trouble is not expected to occur in the new issues.

EXTENSION LADDER FOR EARTH BORER

A Signal unit operating in the Mediterranean area has had occasion to work on the rehabilitation of leads mounted on concrete and tubular steel poles. Lack of ladders of sufficient length has made the job onerous. To overcome this difficulty, a six-foot length of four inch heavy pine was volted to the shaft of earth borer Truck K-44-( ) with a 20-foot removable extension. Both sections have 3/4 inch pipe as pole steps welded on for climbing.

With the shaft raised, the K-44-( ) can be driven along the line and stopped at each pole and a man quickly sent up. This results in much faster operation than when long ladders are used, as it saves the time needed for manhandling ladders into place. The expedient also proves useful for clearing branches in the middle of spans.

For traveling, the two sections are knocked down so as not to project over the cab of the truck.

TRANSPOSITION RUNNING BOARD

Signal men working in Italy have devised a very satisfactory running board which they are using in the construction of Italian type 2 circuit groups.

The running board consists of a circular metal plate, approximately 5 inches in diameter, containing eight equally spaced holes located near the circumference of the plate. Alternate holes are equipped with snaps for at-

tachment of the four conductors. The four remaining alternate holes are used for successive movement of a guide line by means of a snap each time a 90 degree transposition is made.

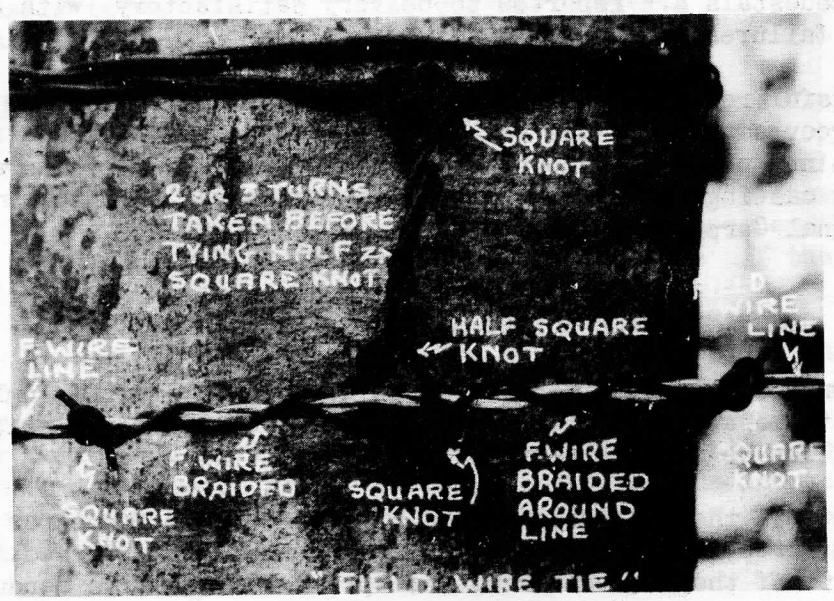
The disk is attached to a 14-inch eye bolt with enough friction to prevent ready rotation of the plate. The bolt passes through a light wooden cone tapering from the size of the eye at one end of the bolt to slightly larger than the diameter of the plate at the other end. The cone minimizes the possibility of the running board becoming caught on cross arms.

WIRE TIE

The field wire tie described below is being used extensively in the Sixth Army and is considered by officers and men serving in the area to be well suited to jungle operations.

This tie has the following advantages and disadvantages:

1. The wire line itself contains no knots which might, under continued pressure and extreme heat, become difficult to untie and cause damage to the insulation.
2. The method of suspension allows for considerable swaying of the tree to which the wire is attached without causing increased strain on the wire line.
3. More time is required for making the tie than for the simple loop knot and square knot ties, but it is often worthwhile for installations which are likely to be semi-permanent.
4. If the wire line rubs against the swaying tree, the insulation may be damaged.
5. To obtain the proper sag in the wire while making the tie, the line-



man must make a temporary bight around the tree or have an assistant adjust the sag.

To make the tie, loop a twisted pair of scrap Wire W-110-B twice around the supporting object and tie a square knot leaving the free ends of the twisted pair about 2-3 feet long for the tie itself. Twist these ends together into a double twisted pair for about six inches, then tie an overhand knot. Insert the field wire line between the two twisted pairs and tie a square knot forming a loop about the wire line. Untwist the remaining length of the two ends of the tie wire, and then braid the untwisted pairs in opposite directions along the wire line (in the same manner as the basket hitch tie) taking care to have one strand of the tie wire on the inside of one cross and on the outside of the next cross. Four or five crossovers with each braided wire pair should be sufficient. Tie the end of each braided pair in a square knot and cut off all excess wire.

MAINTENANCE

The following short cuts and field expedients relating to the maintenance of Signal equipment have been extracted from recent reports.

PEDESTALS FOR RADIO SET SCR-511-( )

The aluminum pedestals holding the guidon staff in SCR-511-( ) have been subject to excessive breakage, resulting in these sets being out of service as much as 50 per cent of the time.

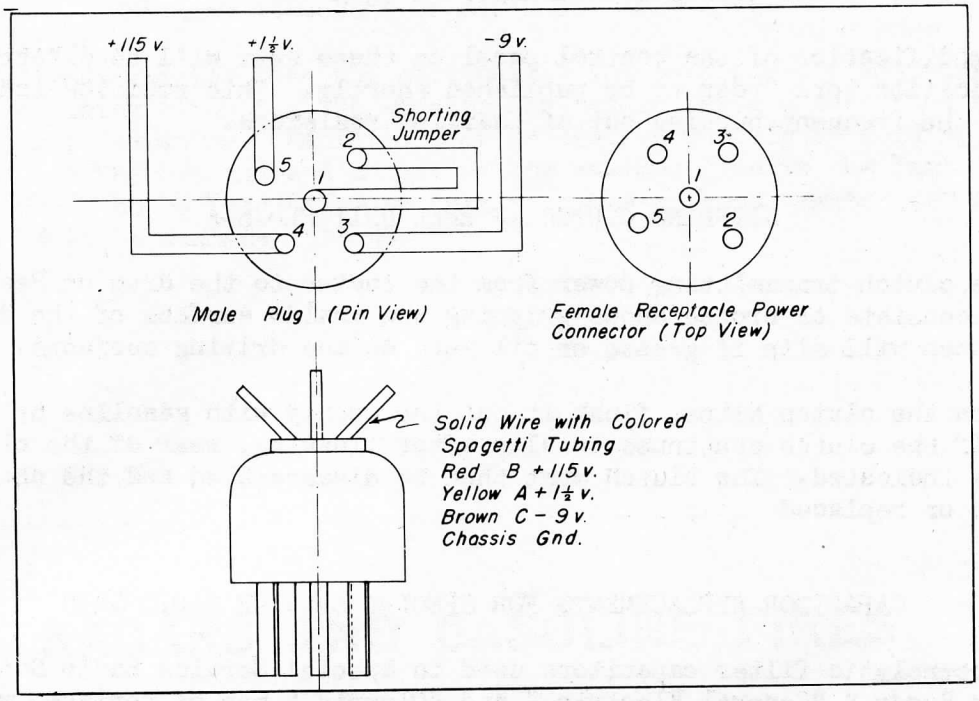
This pedestal has been re-designed with reinforcing ribs. The new design is available in stock and can be requisitioned by Stock No. 2Z1239.1. These new pedestals are reported to be very satisfactory, with a low percentage of failures.

Successful repair of sets with broken pedestals by the use of brass castings procured locally has been reported. The mold is made from an unbroken aluminum pedestal, smoothed up sufficiently to serve as a pattern. These brass castings can then be machined to correct dimensions by a fourth echelon Signal Corps shop.

CHECKING POWER SUPPLY OUTPUT OF RADIO SET SCR-593-( )

The power supply of SCR-593-( ) can be checked directly only by making the proper temporary connections to the power connector receptacle. These connections can be made rapidly as follows:

1. Cut off the male plug from a discarded power connector cord obtained from scrap, leaving about one inch of the cord attached.
2. Cut off the cord covering and spread out the five conductors.



ADAPTER FOR TESTING POWER SUPPLY UNIT BC-728

3. Solder together the conductors from pins Nos. 1 and 2.

4. Put this plug in the power connector receptacle and measure the voltages from chassis to the conductors from pins Nos. 3, 4 and 5. These voltages should be as follows:

Chassis to #3	9 volts, chassis positive
Chassis to #4	115 volts, chassis negative
Chassis to #5	1½ volts, chassis negative

BURNED OUT RESISTORS IN POWER UNIT PE-108-( )

Frequent failures of Power Unit PE-108-( ) occur due to the charging resistor burning out. The unit can be restored to service temporarily by improvising a resistor out of iron baling wire. Measure off the correct length of wire as follows:

1. Fasten one end of the baling wire to one terminal of the burned out resistor.

2. Connect a piece of flexible copper wire from the other terminal of the resistor to the baling wire, making contact by a sliding loop.

3. Connect an ammeter in the circuit, and slide the loop along the baling wire until the ammeter reads about 3.5 amperes.

4. Cut off the measured length of wire and wind it on the old resistor.

form in place of the burned out wiring.

A modification of the control panel on these sets will be directed by a Modification Work Order to be published shortly. This modification will prevent the frequent burning out of charging resistors.

SLIPPING CLUTCH IN REEL UNIT RL-26-A

The clutch transmitting power from the engine to the drum on Reel Unit RL-26-A consists of bronze shoes gripping the inside surface of the drum. This clutch will slip if grease or oil gets on the driving surfaces.

When the clutch slips, flush it out thoroughly with gasoline or kerosene. If the clutch continues to slip after flushing, wear of the clutch shoes is indicated. The clutch must then be disassembled and the shoes be repaired or replaced.

CAPACITOR REPLACEMENTS FOR SPECIAL SERVICE RADIO SETS

Electrolytic filter capacitors used in Special Service Radio Sets, such as "Your Buddy," "General Electric," and "Olympic," may be replaced when defective by the following parts, commonly furnished as replacement parts for Radio Receiver BC-728-A:

30 microfarad, Stock No. 3DB30-3
300 microfarad, Stock No. 3DB-300

TESTING BRIGGS AND STRATTON MAGNETOS

Magneto coils and breaker points can be tested quickly by using a dry battery giving 3 or 4 volts. Proceed as follows:

1. Connect one battery lead to any point on the engine cylinder.
2. Hold the breaker points open and touch the other battery lead to each point. If a spark is obtained, the armature and coil circuits are good.
3. When the breaker points are in contact, no spark should occur. If it does, bad contacts are indicated.

Scale on breaker points can be removed with the point of a knife.

REPAIRS TO SPEAKER CONES

Holes and tears in speaker cones can be repaired by cementing small pieces of paper over the damaged section. Use Duco waterproof household cement, Stock No. 6G199. Paint some of the cement over the patch after it is in place to make it water proof. Be careful to avoid wrinkles in the cone when making repairs.

CHECKING ALIGNMENT OF RADIO SET SCR-543-( )

The antenna ammeter does not necessarily indicate correct adjustment of the antenna tuning circuit. The ammeter may read a maximum even though the antenna is not radiating. Radiation can be checked quickly by holding a neon glow lamp near the antenna and adjusting for maximum glow in the lamp. The tuning should then be readjusted so that both the antenna ammeter and the glow lamp indicate maximum current.

RADARS AND GASOLINE FIRES

Reports have been received of explosions when gasoline is being transferred from one container into another in proximity to an operating Radar set. The high frequency current of the Radar induced into the gasoline containers causes sparks to jump between them and may result in fire.

Present instructions concerning the prevention of such occurrences recommend the shutting down of the Radar. Although this is one way of handling the situation, it is not always practicable since there are many occasions where the Radar must be operative without even momentary cessation.

In order to eliminate the hazard of fire and yet make it unnecessary to cease operating, it is recommended that Radar officers see to it that gasoline containers are properly grounded immediately prior to and during the process of transferring gasoline. This method is as effective as the former suggestion and makes it possible to continue searching without letup.

MILITARY PERSONNEL

MORALE OF MILITARY PERSONNEL

The matter of morale of military personnel at overhead installations has not received, until recently, any great attention. However, it has come to be realized that morale cannot be built by urging men to achieve desirable states of mind; nor can a commander expect his subordinates to build self-confidence merely by urging them to be self-confident. Instead, attitudes must be discovered which can be directly influenced and which, in turn, will tend to create and strengthen the more basic mental attitudes which make for high or low morale. Toward this end, the Commanding General, Army Service Forces, has recently laid stress on the need of devoting more attention to this problem in overhead installations.

The building and maintaining of morale is emphasized in the schools and training centers under the jurisdiction of the Chief Signal Officer by special service officers, public relations officers, and chaplains; in the Chief Signal Officer's other overhead installations, reliance must be placed upon the service command, and since in numerous instances military groups may be small and widely separated it is possible that the subject is not given the attention that it should receive. In such installations, the building of good morale is the special responsibility of the commanding officer.

Some of the more ingenious commanding officers have discharged this responsibility by undertaking the following activities:

1. Establishment of code practice sets in hospitals.
2. Granting of a three-day pass to every enlisted man who recruits a Wac.
3. Encouragement of enlisted men to take the correspondence courses offered by the "Armed Forces Institute."
4. Frequent use of training films and film bulletins.
5. Publication of a local news bulletin or newspaper.
6. Consideration of justifiable cases for commendatory notice or awards.

An indication of low morale is the number of AWOL cases. Based on statistics published by Morale Services Division, Army Service Forces, the Signal Corps as a whole is next to the lowest in comparison with the other technical services. The subject of AWOL is well covered by WD Pamphlet 20-5, dated 30 March 1944, which is recommended for study by all officers exercising supervision over military personnel. Another publication recommended for the reading of all commanding officers is the War Department monthly digest, "What the Soldier Thinks." Methods of discipline, training, and leadership, helpful to officers in command of colored troops, are contained in WD Pamphlet No. 20-6, dated 29 February 1944.

Every commanding officer wants his men to be zealous, disciplined, self-confident, and free from basic personal dissatisfaction; in a word, he wants high morale. It is this mental armor, combined with technical proficiency and physical fitness, that produces the efficient soldier who will battle valiantly and help speed the day of Victory. Realizing the value of sound mental attitudes, no officer can afford to overlook the importance of promoting the morale of troops placed under his command.

PRISONERS OF WAR AT SIGNAL OVERHEAD INSTALLATIONS

Both Italian and German prisoners of war will be used in the near future at Signal Corps overhead installations. Approval has been secured for the shipment of Italian prisoners of war to Fort Monmouth, New Jersey; to the Philadelphia Signal Depot; and to the Chicago Signal Depot. The Italian prisoners will be formed into service units, the size of a normal company, and will be led by Italian officers but supervised and administered by American personnel. Prisoners will be on an ameliorated status and will have somewhat more liberty than the usual prisoners of war.

German prisoners of war have been requisitioned for the Holabird and Lexington Signal Depots. The shipment of prisoners of war to these installations is being delayed because of a need for stockade facilities.

The use of this type of labor will relieve the civilian labor situation at these particular points and will probably result in the release of military personnel for overseas assignment.

NON-DEFERABLE WAR DEPARTMENT EMPLOYEES UNDER 26

In line with the growing emphasis being placed by the War Manpower Commission and Selective Service upon effective utilization of manpower, the Secretary of War has maintained the policy that inasmuch as the Government is reluctant to approve the deferment of personnel of industry, the War Department would refrain from requesting occupational deferment for individuals under twenty-six years of age in its employ. This policy was reiterated on 12 April 1944 with the publication of War Department Memorandum No. W620-44, subject: "War Department Employees under Twenty-six Years of Age." The provisions of this directive are such as to practically eliminate all deferment.

Just as industry has concluded that it is impossible to lose certain key specialists without affecting the output of war materials, so also has the War Department become confronted with the realization that certain of its individuals are vital in their civilian jobs in the furtherance of the war effort. Being cognizant of this fact, the Secretary of War has included in the above-mentioned memorandum a clause which would alleviate the hardship faced by an agency that is about to have an unreplaceable employee drafted. In such an instance the officer in charge of the employing station

may submit the case to the Chief Signal Officer in accordance with OCSigO Memorandum, Serial No. 43-Amendment No. 2, dated 21 April 1944.

The effect of action taken under this directive will be the placement of a small number of enlisted men in overhead activities under the Chief Signal Officer on jobs previously held by these individuals in a civilian capacity. It is expected that the exceptions will be limited primarily to the laboratories and the Signal Corps Inspection Agency. Most of the installations that will be affected are those which do not now have enlisted personnel; as a consequence it will mean that enlisted personnel may be working side by side with civilians on similar jobs. When and as at a later date the jobs can be abolished or the enlisted men can be replaced, reassignment will be made.

ASF TRAINING CENTER AT CAMP CROWDER

Army Service Forces has established in all technical services what are to be known as ASF Training Centers for the purpose of giving pre-activation training for all ASF units. The scheduled procedure is that 105 days in advance of a normal activation order, a pre-activation directive will be issued to the Training Center by The Adjutant General. The Training Center will be furnished the personnel for a unit covered by a pre-activation directive, and the personnel whom it is desired to train in specific specialties will be placed in the proper courses. This means that the personnel will be given its basic training plus its RTC and school training as may be required. By the end of the 105 days, an activation order will be published and the men who have completed basic military and technical training will be combined into a single unit which can be made ready for the field in a minimum of time.

The establishment of ASF Training Centers came about in an effort to improve the training of technical units in the ASF troop basis in lieu of using cadre personnel only. Replacement training centers and unit training centers of the technical services under ASF were converted by ASF Circular 104 into ASF Training Centers, Camp Crowder being the only Signal Corps installation affected. Other Signal training installations were not affected since the Signal Corps had been doing the equivalent of pre-activation training by utilizing RTC and school-trained personnel processed through the training battalions. The purpose of the training battalions is to train specialists for the Signal Corps, required for composite units organized under T/O 11-500.

Under the new arrangement, the ASF Training Center at Camp Crowder, the Eastern Signal Corps Unit Training Center, and the Western Signal Corps Unit Training Center will be responsible for the assignment of personnel to the units in their respective installations. This has the effect of decentralizing a great portion of The Adjutant General's responsibility to these Training Centers.

MILITARY TRAINING

AFHQ SIGNAL SCHOOLS

Switchboard Operation

A Regimental Switchboard Operation School was started in October 1943 at Allied Force Headquarters. Its primary purpose was to serve as a refresher course since all students were either commercial operators or had completed a similar course in the United States. The Class lasted for a period of one month during which four separate courses were held. Twenty students were sent each week from two Signal Service Companies for a total of about eighty trained students at the completion of the course. Lectures were given on cord rotation, the technique of answering calls, priority of messages, etc. In addition, the staff organization in this theater was stressed. Practice switchboards were set up to give the students practical experience in answering calls and general switchboard procedure. At the completion of the course, the students were assigned to various PBS boards as operators for actual "on the job" training.

Subsequent to the completion of this month of training and schooling of the above mentioned students, the school was used mainly for the purpose of giving switchboard operators who had not been working the necessary practice needed to enable them to maintain a sufficient knowledge of their jobs.

Switchboard Maintenance

At the same time that the switchboard operations school was in progress, a switchboard maintenance school was also being held at the same location. This school did not actually start until the middle of November 1943. The personnel of the school consisted of eleven enlisted men of the switchboard maintenance platoon of a Signal Service Company. The primary purpose of this course was to instruct the student on switchboard trouble shooting. Approximately half of the students taking the course had received prior training in Central Office repair; the remainder of the men had little training along these lines.

The majority of the class time was spent in the study of circuit diagrams of various switchboards, including the BD-71, BD-72, TC-4, TC-1, TC-2. By means of different types of tests it was shown how line and switchboard trouble could be located and then repaired. The question of repair was subordinated to the problem of how to locate the actual place of the trouble and the nature of it.

At the end of the second week of schooling, about 25 November 1943, six of the most experienced students were sent to the --- switchboard for "on the job" training. The balance of these students remained in the school and received additional training on switchboard maintenance and repair. They also were given further schooling in principles of telephone transmission. These students remained at the school until about the mid-

dle of December, at which time they were also assigned to work at the various switchboards.

Regimental Radio

For a period of several months a small code school has been operating in the Algiers area by the --- Signal Regiment. This school could handle a total of 24 men at any one time and the code was sent by hand by the instructor. At the end of January, this school was augmented by the addition of three automatic keyers so that three different speeds could be sent at the same time, to different positions in the school.

Requests for trained operators were greater than could be handled by this school, so it was decided to enlarge the capacity. The Regiment had obtained a Code Practice Equipment EE-96 kit, providing sufficient equipment to train more operators, but the existing school room was too small to accommodate the additional positions. It was then decided to move the school out to the bivouac area of the --- Signal Service Company. At the area is a large building which was apparently the main building of the estate. In the rear of the building is a large room which had once apparently been the barn. It required considerable work to clean this room out, patch the roof and walls to make them reasonably waterproof, and paint the walls. After this work was completed, regulation code practice tables were built and set up in the room. The tables were wired and set up to handle sixty men per class. The French electric power that was installed in the building was neither stable enough nor reliable enough to furnish the necessary power for the automatic keyers and the tone source. In order to have sufficient power, a Power Unit PE-95-( ) was installed. This school is now in full operation, using sixty practice positions, five automatic keyers, and one tone source for sending practice. This means that five different speeds can be put on any position that is desired in the school.

The school is now operating at near capacity in both the morning and afternoon classes. At the present time a shortage of typewriters prevents the school from instructing each student to receive code on a "mill."

In addition to this code school, the regiment has been training personnel to operate Boehme high speed radio equipment. The Boehme school has for the past two months been used exclusively for training Wacs in high speed radio operation and procedure. In this time 12 of the students have been graduated and they are now working Boehme circuits at AFHQ. Some of the girls were graduated as fixed station operators after as little as three weeks' training. These Wacs are now handling a heavy circuit in the British radio room.

In the past month, 11 enlisted men have also been graduated from the radio school as high speed operators. In the near future, there will be 10 more men graduated from the course in high speed manual radio operation and will be able to handle circuits. These men are also being trained as typists, using the standard Army model Typewriter MC-88.

This report of training in North Africa is taken from a report of the Chief Signal Officer, AFHQ, dated April 1944.

MINIATURE POLE LINE

In the development of certain topics relating to pole line construction, the student is required to visualize, simultaneously, the entire line and its terminations. This is particularly important when instruction deals with the simplexing of circuits, the development of phantom circuits, the need for and the methods of carrying out transpositions, and similar topics.

To assist the student in obtaining such an integrated view, the Western Signal Corps School uses a visual training aid in the form of a miniature

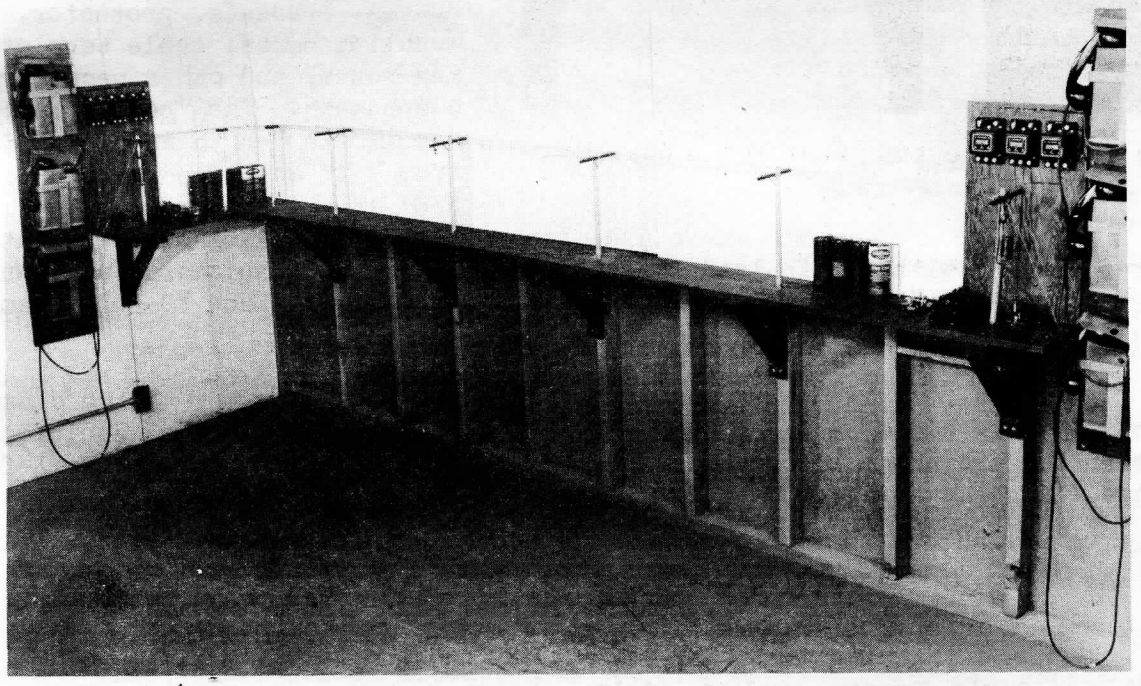


FIG. 1 - COMPLETE MINIATURE POLE LINE

pole line. The distinctive feature of this training aid is its functional use in every important respect. The miniature pole line and its associated terminal equipment is used in lecture demonstrations for training Line Foremen (SSN 238) and Field Wire Chiefs (SSN 595).

This training aid (see Figure 1) consists of a miniature pole line of 8 poles carrying 5 pairs of copper conductors, two pairs of which are terminated at each end in cable terminating boxes and continued in cable. These four conductors are connected through 3 repeating coils at each end to yield the following circuits: 2 physical telephone circuits, 1 phantom telephone

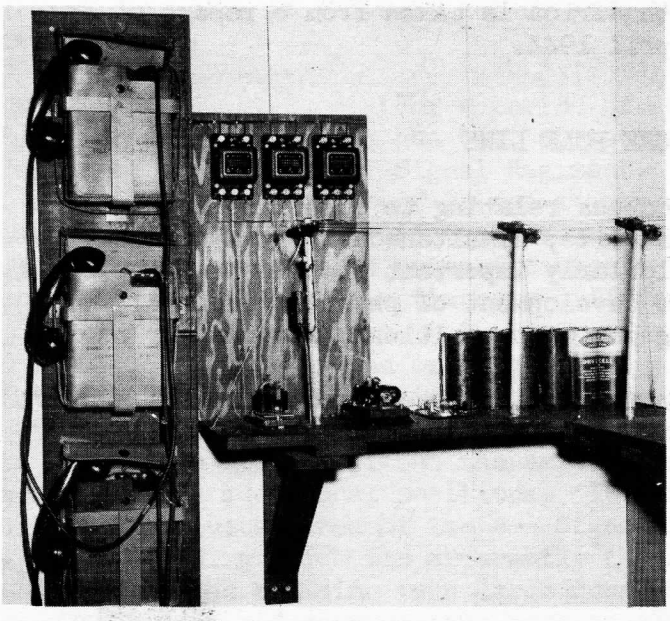


FIG. 2 - TERMINAL EQUIPMENT FOR MIDGET POLE LINE

circuit, and 1 phantom - simplex telegraph circuit.

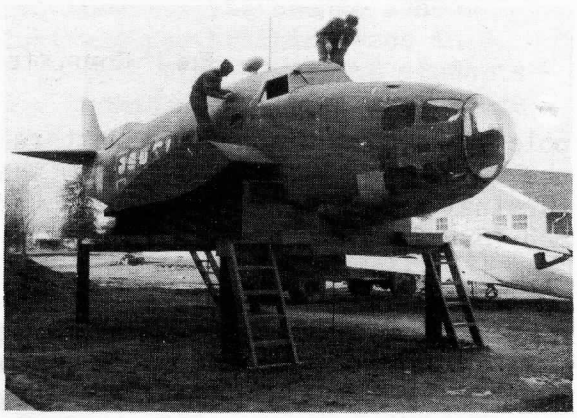
At end of the end poles the following equipment is connected: 3 Telephone EE-8-A, 1 open-circuit telegraph key, 1 telegraph relay 24B, 1 telegraph sounder, and 1 group of Battery BA-23. See Figure 2.

The pole line includes one right angle turn, one physical transposition, one phantom transposition, all necessary guys, braces, brackets, protector mounting boxes, cable terminating boxes, and other necessary components. The "poles" measure 17" in length and are made from 3/4" dowel rod turned to 5/8" at the upper end; the "cable" consists of 4 insulated wires covered with a thin lead sheath and sealed; the "insulators" are "Nu-Way" studs; the "braces," "brackets," "washers," "boxes," and "3-bolt clamps" are fashioned from thin-gauge galvanized sheet iron.

The pole line is mounted on a 10-inch shelf in the corner of the classroom. Panels are mounted at each end to accommodate the terminal equipment. The entire training aid occupies a ten-foot space along one wall and a 4-foot space along the adjacent wall.

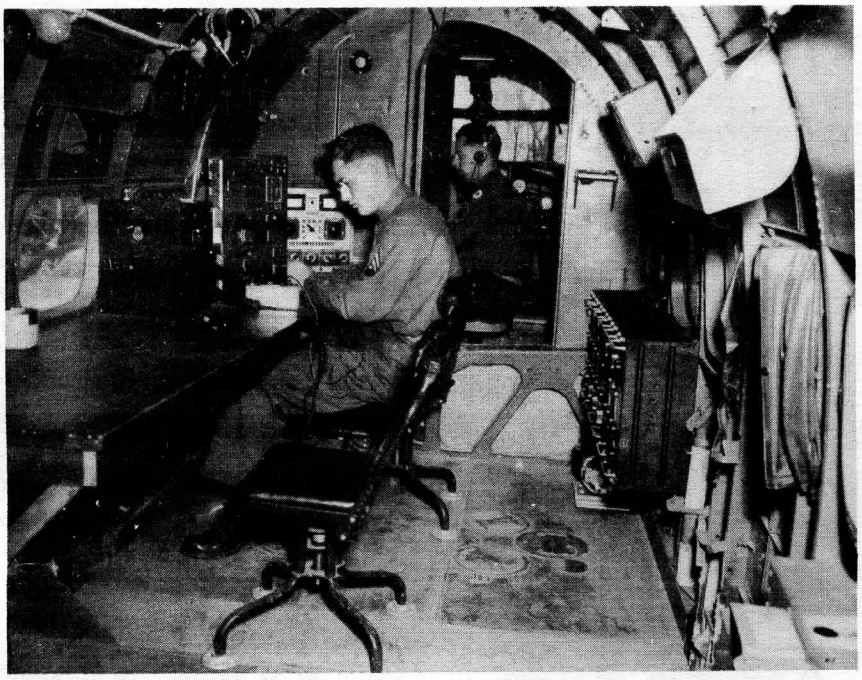
BOMBER AS A TRAINING AID

In order that the newly enrolled Airborne Radio Repair student might have a comprehensive understanding of the interrelated functions of airborne communication equipment and ultimately, some on-the-job experience in maintenance and operation, the fuselage of a bomber was obtained and set up in the Western Signal Corps School instructional area. This fuselage has been rebuilt as closely as possible to the original design, with complete radio equipment installed and in full operation.



WORKING ON THE BOMBER FUSELAGE

The installation of the liaison



WORKBENCH COMPLETE WITH POWER FACILITIES

set, command set, and radio compass antennas are as authentic as possible. Stairs make the antenna installations easily accessible to inspection and repair. A battery compartment is below the fuselage. It contains a 28 volt, 204 ampere-hour supply which is kept at constant level by a tungar charger.

The newly enrolled student is introduced to the airborne radio equipment's navigation, communication and tactical importance in a stage by stage demonstration of the installation and operation of the radio equipment in the bomber.

A simulated tactical situation in which a student takes the part of a bomber crew member during an entire combat mission serves to impress upon him the vital role played by each radio facility.

The Preflight Inspection is a methodical procedure in preventive maintenance performed by the student. Initial instruction on the inspection is obtained from Training Film TF 1-533, Preflight Inspection, B-17E. After the showing of this training film the student makes a timed and supervised preflight inspection of the bomber. In the performance of this inspection he checks all operational and mechanical discrepancies on a Preflight Inspection Sheet.

The Service Check is more thorough. The important point brought to the student's mind while going through the service check is the frequency of

PREFLIGHT INSPECTION OF RADIO COMPASS

"cockpit" troubles. While following the Service Check Sheet, the student will find loose and corroded antenna installations, frayed, shorted and open cords, dirty and loose plugs, bad grounds, loose mountings, faulty control boxes, and other troubles or potential troubles common to much used and exposed components. After the sheet is checked by an instructor, the student repairs the troubles found as a result of the inspection.

From the center portion of the fuselage back, no radio equipment other than interphone control boxes could be installed to advantage. The bunk used by the crew members was removed and a repair bench built. All repair work found as a result of the Service Check is done on this bench. This arrangement makes the bomber a convenient and complete instructional unit to which student reaction has been very favorable. The bench was installed complete with a-c and d-c facilities which are supplied by the battery and an underground 110V line. Other a-c outlets have been installed at advantageous points throughout the bomber to facilitate the use of soldering irons or drop cords when needed.