No. 25

RESTRICTED

SIGNAL CORPS TECHNICAL INFORMATION LETTER

DECEMBER · 1943

ARMY SERVICE FORCES · OFFICE OF THE CHIEF SIGNAL OFFICER

Once more reports from U. S. and overseas indicate that many Sig. C. officers do not see the SCTIL. It is again urged that copies be freely circulated; also that key enlisted men and civilians be included in this circulation if deemed advisable by the OIC. Units receiving too few copies to meet those requirements can obtain an increased number by addressing OCSigO (SPSAY), Washington. It is also recommended that circulation be extended to communication officers of other arms by associated Signal officers; or distribution to can be made direct from Washington at the request of the associated Signal officer.

(SEE PAGE 84)

December 15, 1943.

To: ALL OFFICERS, ENLISTED MEN AND CIVILIAN EMPLOYEES
OF THE SIGNAL CORPS.

The past year has seen a magnificent effort on the part of both our armed and civilian forces which has enabled us to carry the fight to the enemy.

We must realize that the enemy is firmly entrenched on many fronts and that only by supreme effort of all will the armed forces be able to carry the fight to the foe and to a successful conclusion.

With this thought in mind I extend my sincere greetings to all personnel of the Signal Corps, military and civilian, wherever stationed, with the earnest wish that even under these trying circumstances you may enjoy a measure of happiness this Christmas, in the thought that we will continue to march forward toward Victory and peace.

H. C. Ingles,
Major General,
Chief Signal Officer

SIGNAL CORPS TECHNICAL

INFORMATION LETTER

Number 25 December 1943

RESTRICTED

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WAR DEPARTMENT · ARMY SERVICE FORCES

OFFICE OF THE CHIEF SIGNAL OFFICER

OFFICE SERVICE DIVISION · SPECIAL ACTIVITIES BRANCH

SCTIL

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

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

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

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

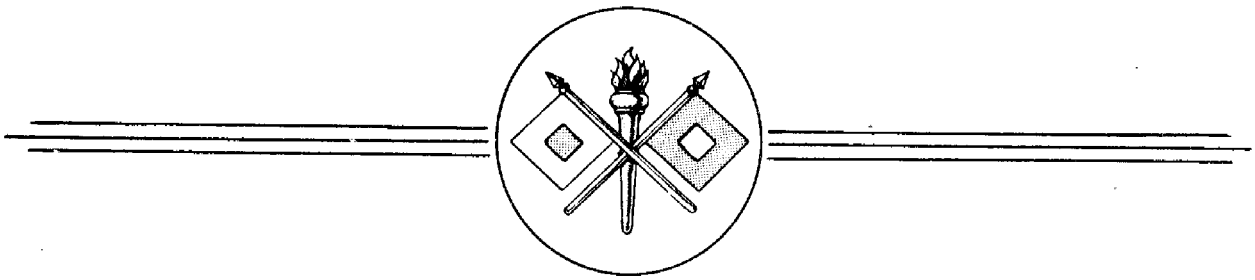
Any organization, installation or other unit mentioned above which does not now receive the SCTIL, or receives too few or too many copies, can rectify the condition by addressing the Chief Signal Officer, SPSAY, Washington.

* * * * *

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

TABLE OF CONTENTS

ENTRANCE TO CAVE IN WHICH WAS INSTALLED THE SWITCHBOARD OF A FRONT LINE INFANTRY BATTALION IN FINAL STAGES OF THE BATTLE OF KASSERINE PASS.



WIRE COMMUNICATIONS IN NORTH AFRICA

Slightly over a year ago, the Allies invaded North Africa, and by 10 May 1943 the theatre had been cleared of all Axis forces. Many reports were received in the United States during, and following, the action. Some of these reports were submitted by signal officers who participated in, or directed, the signal communications during operations, and it is felt that some of the statistics and experiences cited by these officers will prove interesting and beneficial, particularly to men and officers who are now in training.

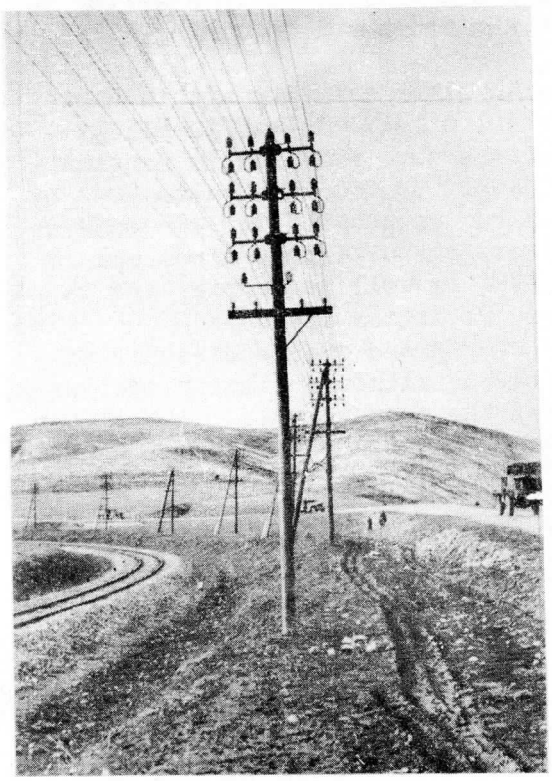
At the time of the invasion the commercial plant existing within North Africa consisted of approximately 40,000 circuit miles. It was in fairly good condition, but the materials for maintenance were practically nonexistent. Of these 40,000 circuit miles, approximately 30,000 were taken over by the Allies for military use. We also assumed the responsibility for maintenance and rehabilitation of all circuits. These circuits have since been supplemented with additional open wire circuits, as well as carrier and repeater equipment, and at the present time the facilities approach 45,000 circuit miles for military use. These circuits are spread over a distance of 1,500 to 2,000 miles, and the maintenance problem, although greatly decreased, is still a herculean task. For the most part, the commandeered plant system was employed for administrative traffic, with a very minor percentage devoted to tactical traffic.

In the Tunisian district, the existing commercial facilities were always employed, and definite areas of responsibility were designated for the maintenance of these circuits. Many circuits were knocked out by bombs and shellfire, while others were destroyed by the retreating Axis forces. The vast network of wire lines which provided communications during the Tunisian Campaign was the result of many months of arduous labor. All sections of destroyed line had to be rebuilt, and many miles of supplementary circuits had to be installed. Once the lines were rehabilitated or installed, constant patrolling and maintenance was necessary.

An excerpt from a report by an Armored Signal Company will more clearly define some of these problems:

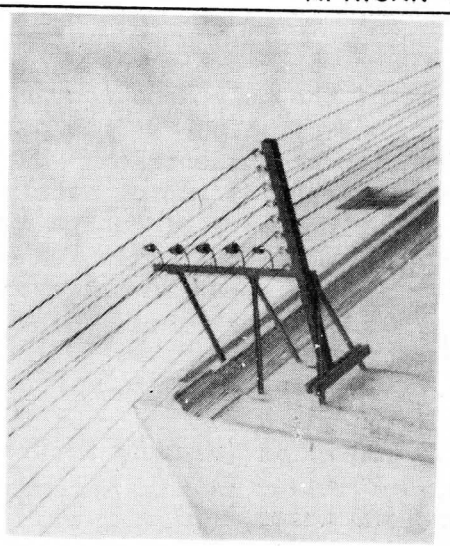
"The Division was operating on a 150-mile front with the closest combat command 25 miles from the Division CP. It became increasingly difficult to get wire communication to the forward elements since all of the open wire facilities in this area were in use by the French forces. However, we finally repaired sufficient open wire circuits to provide communication forward. This was done largely through the use of attached corps personnel. It was necessary on one occasion to go through the French PTT (Postes Telegraphes et Telephones) switchboards to get communications to our own troops and this proved to be quite an experience, especially for our switchboard operators. Soon the Division Rear Echelon moved up to join the forward CP and by this time through the combined efforts of the wire personnel in both echelons, as well as the corps wire team, an elaborate and efficient communication system was in operation. Our main difficulties here seemed to be the continual and regular bombardment from the air which had an annoying habit of knocking out our lines. It finally became necessary to lay alternate lines following different routes and thus we were able to keep the wire communication in working order.

"During the withdrawal of the combat elements from the East, wire communication was maintained, with the exception of short periods when the CP's were moving or the bombs were too accurate.*** Here began the installation of the most elaborate wire network yet used by the division. The open wire had been destroyed in many places by the retreating enemy. It was, therefore, necessary to repair a minimum number of circuits before satisfactory communication could be obtained to the rear areas. This was difficult only because of the shortage of construction personnel.



U. S. CROSS ARMS ADDED TO EXISTING FRENCH OPEN WIRE POLE LINE IN FORWARD AREA IN NORTH AFRICA.

"It became increasingly apparent that in this organization there should be personnel trained to work with open wire as well as the necessary equipment. Maximum use was made of the attached corps wire team. If we had not had open wire available, it would have been impossible to communicate with some of the units since they were beyond the talking range of field wire. The units closer to the Division were linked with a wire network which consisted of alternate lines to the Division switchboard as well as a secondary link to a forward switching central established by the Division, which of course, was in direct contact with the Division. The position of the Division CP at this time was a precarious one, since the enemy held all or most of the surrounding high ground and this provided



UNUSUAL R.P.L. CONSTRUCTION UTILIZING EXISTING FRENCH FIXTURE FOR SUPPORT.

excellent observation posts. It was necessary to establish outposts which were connected directly to the Division by telephone in order that any information could reach this Headquarters with a minimum delay and action could be taken to meet any enemy threat.

"It is impossible to explain all of the difficulties which arose in this location. This was mainly a battle of artillery and a fight for vantage points for observation, since the enemy had had sufficient time in which to organize this defense and dig in his guns. The resultant artillery duel naturally brought both low-level and dive bombing and this combination played havoc with the wire communication. Available personnel from both radio and message center sections were used in addition to the wire personnel for the patrol of lines. Additional personnel and another vehicle arrived for the wire section and this relieved matters somewhat but the whole section was on the go continually. It was the first time that this section, as a whole, had been exposed to so many of these hazards at one time. In addition to the open wire used by the Division, the field wire installed totaled 200 miles. It is unbelievable to most people that an Armored Division could use so much wire. Some of the wire was recovered as the Division prepared to move to its next location. * * * An organization such as this one can expect to use approximately 40 miles of wire per day in a fast moving offensive operation. The only hope to recover wire in offensive operations is in the movement forward of the rear echelon and even then the movement is often too rapid."

The anticipation of requirements is extremely difficult at times, since the signal officer is not always completely informed of plans sufficiently in advance of operations to provide the required communication. The Signal Officer of the II Corps stated that at times it was necessary to anticipate and guess at what the requirements would be, and then to begin installation while the Staff was still planning the operation. In the majority of cases half of the work was completed by the time official orders were issued to do the job. On the subject of anticipating requirements, another big headache for any large operation is the problem of available personnel and supplies. Many jobs are required, consecutively, or sometimes simultaneously, and when such is the case, it is extremely difficult to maintain a sufficiency of supplies and a pool of rested linemen.

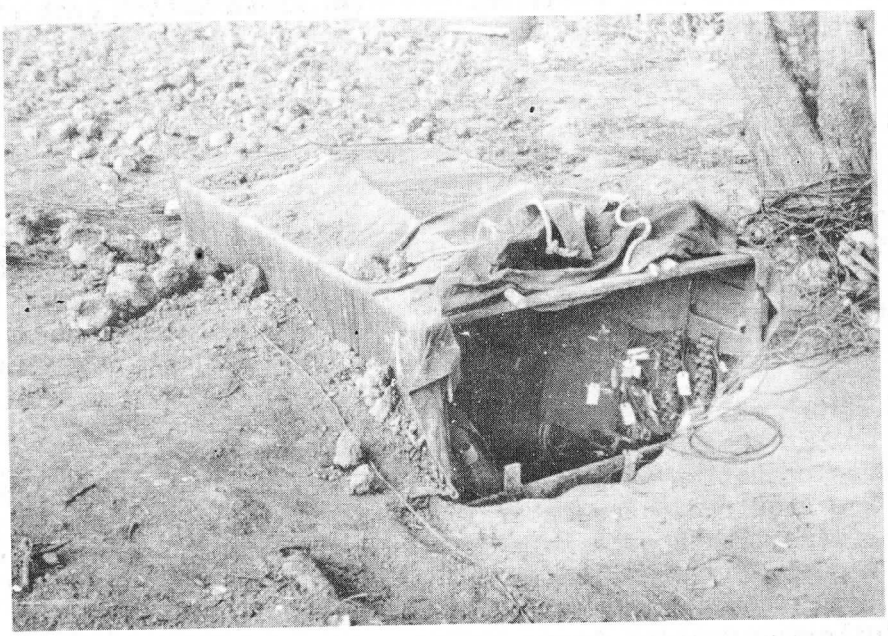
The following excerpt from a report issued by Allied Force Headquarters gives some interesting sidelights on requirements and wire equipment:

"Open Wire: Open wire proved the mainstay of the telephone communication system. Rehabilitation of the civil telephone circuits was the policy and comparatively little new open wire construction was undertaken. During the period 14 April to 10 May, II Corps covered a front of approximately 35 miles wide and 45 miles in depth. Tactical operations were of such a nature that division CP's echeloned forward for distances of 6 to 10 miles on each move while the Corps CP moved 15 miles on one move and about 20 miles on the second. During this period the following construction was completed:

Rapid Pole Line Constructed.....	38 miles	(4 ckts.)
Spiral-four Cable Installed.....	66 miles	
Open Wire Rehabilitated (civil).....100	miles	(usually 2 ckts.)
Open Wire Installed (new on civil poles)..	26 miles	(1 ckt.)
Poles Set (Rehabilitation of civil lines).300	poles	

It is apparent that all signal construction units should receive a reasonable amount of training in rehabilitation and maintenance of commercial circuits.

"Switching Centrals: Switching centrals were used extensively at key points in the wire network, thus providing flexibility for routing of calls and insuring continuity of communication during movement of command posts. At one time the Corps Signal Battalion operated six switching centrals in addition to forward and rear echelon CP switchboards. Division signal companies were also called upon to install and operate switching centrals. This indicates the necessity for the training of additional switchboard operators over and above normal T/O requirements in all units.



DIVISION SWITCHBOARD INSTALLATION JUST AFTER BATTLE OF KASSERINE PASS.

DIVISION C.P. IN A DATE GROVE, EL GUETTAR SECTOR.

"Division Wire Net: Within divisions, double lines are often run from division headquarters to regimental headquarters and to division artillery. It was learned that they should be laid over different routes whenever possible. This entails additional work for wire teams but offers better chance for maintenance of communications under bombing and shelling. Wire maintenance imposes a severe strain on all communication personnel because it goes on 24 hours per day, seven days per week, under all conditions.

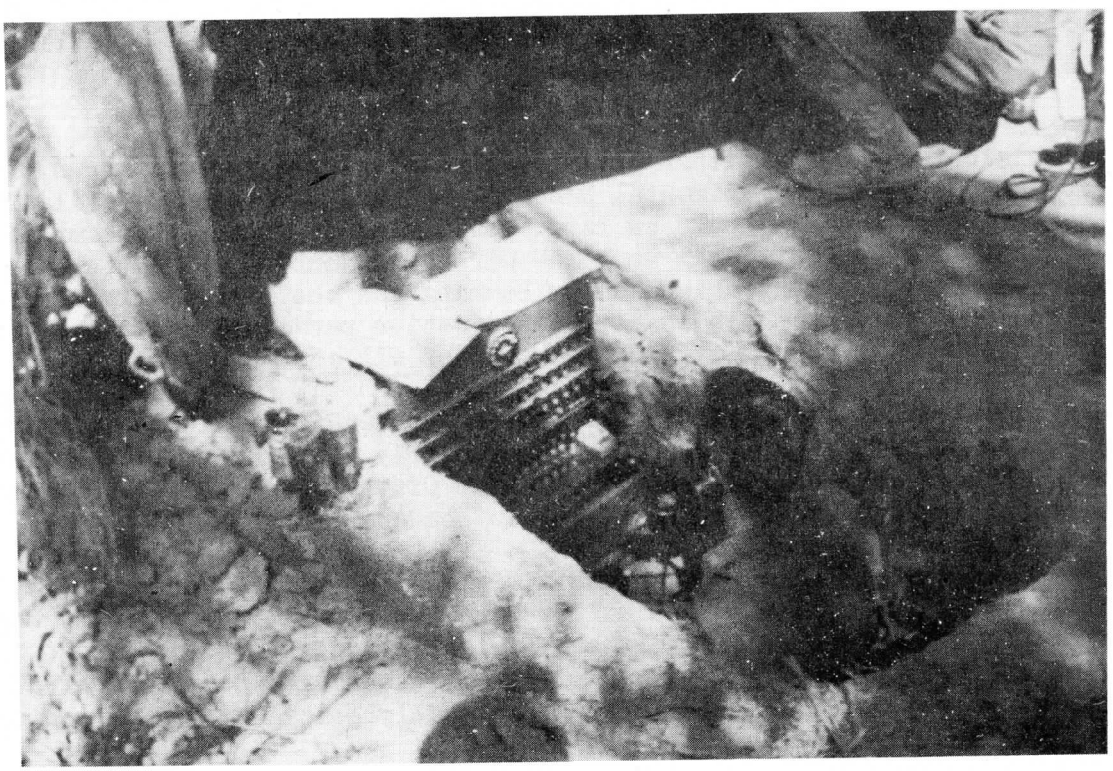
"Field Wire: Field Wire W-110-B was used extensively within infantry divisions down to infantry regiments, particularly in Southern Tunisia due to the distances between these headquarters. Often there were 10 to 12 miles between division and regimental combat team headquarters.

"Assault Wire: In Northern Tunisia Wire W-130 was used extensively, especially for lines to CP's in the hills where the going was difficult, when distances were not too great, and where field lines were not subject to too much damage by vehicles. In Southern Tunisia, where distances were great, the terrain open, and where lines were continually being damaged by vehicles, very little W-130 was used.

"Spiral-four Cable: Spiral-four cable was used in great amounts as the supply increased and signal personnel became more familiar with its use. In

several cases 10 to 20 mile lengths of cable were used as extensions of open wire systems and communications were very satisfactory. Spiral-four cable has definite limitations that should be realized by all Signal personnel who expect to use it. Trouble was frequently experienced when cable was put on the ground because of damage by vehicles. Selection of trouble-free routes was a problem since in the combat zone it was difficult to determine in advance the probable location of bivouacs, armored vehicle routes, and new roads. After spiral-four cable had been installed, rain and wet weather did not seriously affect communications. The joint seal apparently was very satisfactory. However, trouble was experienced when cable was installed during rains. In short, if time permits proper installation of spiral-four, it is highly satisfactory. If time is pressing and the cable is installed hurriedly, recurring trouble usually develops.

"Teletypewriter: Teletypewriter service was normally provided from corps rear echelon to corps CP and from corps to division CP's. On one occasion a teletypewriter circuit 113 miles long, consisting of 75 miles of open wire, 34 miles of spiral-four and 14 miles of British Multi-Airline construction (70-lb. wire) was used to one division and was kept in service 75 percent of the time. In this case the printer was worked on ground return. As a whole the teletypewriter was quite reliable and was used a great deal. Training should include handling teletypewriter traffic over a composite circuit in order that personnel may gain experience on special problems normally found on such circuits.



SWITCHBOARD INSTALLED IN FOX HOLE.

"Telegraph: A TG-5 telegraph circuit was established from division to regiment about 20 percent of the time but, because of the excellent telephone service available during the campaign, very little traffic was passed by this means.

"Installation at CP: Telephone centrals at Corps Headquarters were operated in buildings whenever possible; otherwise in 2½-ton trucks or small wall tents. One expedient found helpful at command post locations, where air raids were expected, was to use engineer bulldozers to 'dig out' shelters in a hillside for the message center, switchboard and teletypewriter installations."

For the benefit of company grade officers, the following quotation is cited: "Teamwork is beginning to develop fast. The younger officers are getting excellent training and it is believed that many of them will pay dividends as good communication officers in the near future. All are learning the importance of initiative and the necessity of following through on the delivery of messages."

COMMUNICATIONS ON ATTU

By a comparison between the following extracts from a recent report dealing with operations on Attu and the reports on Jap signal activities in the South Pacific Theatre, it appears that the little yellow man is somewhat inconsistent.

For example, the article "Jungle Warfare," which appeared in the October 1943 issue of SCTIL, states that: "Not much difficulty was experienced from Jap wire cutting or tapping." Apparently they had not considered such tactics particularly useful, even though quite a few Japs can understand and speak English and occasionally operated behind Allied lines during infiltration movements." Perhaps the wire cutting methods related in the extract given below were due to lessons learned in Guadalcanal and New Guinea.

Reports from the South Pacific area indicate that Jap forces there employed radio for both tactical control and intercept of Allied traffic. On the basis of this information, the lack of evidence that radios were similarly employed on Attu seems inconsistent.

EXTRACTS FROM REPORT ON ATTU

"From the moment our forces set foot on Attu, there was no evidence that the enemy was exercising tactical control or securing tactical intelligence by radio, nor was there any evidence of the existence or use by the enemy of radio sets of our walkie-talkie type. Instead, he appeared to rely chiefly on telephone communications and runners. The enemy field telephones were good, but somewhat heavy, and permitted him both code (buzzer) and voice transmission, while the exceedingly light weight of his single field wire and wire reel permitted him to run lines rapidly over the terrain with a higher intrinsic security against interruption by our forces.

"The enemy placed strong emphasis on the disruption of our communications. Our soldiers could traverse wide areas known to be infested by enemy snipers, without receiving a single shot. Let a single soldier stop, however, and appear to be repairing a break in a telephone line, and enemy snipers' bullets would begin to whine all around him. In the final all-out enemy attack, they cut our wires with bayonets in certain areas, at an average interval of 20 feet, and communications rearward were seriously disrupted for some time. In some cases the enemy scraped the insulation from our wires with bayonets, grounding the circuits. In one case a dead Japanese soldier was found by our linemen — his body stiff — both hands clutching our wire — and a section of wire still gritted between his teeth. He had stripped off six or more inches of insulation cleanly, shorting out the circuit.

"No proof whatever has been found for the battlefield story that the Jap used high pitched bird call whistles to give signals, particularly prior to

the all-out pre-dawn bayonet attack in Chichagof Valley, in which a number of our men were killed in their tents and sleeping bags. (There were many birds on Attu and these supposed signal whistles undoubtedly were the true bird calls heard daily on Attu at places far from both Jap positions and this battlefield.)"

COMMUNICATIONS FLAWS - NORTH AFRICA

A Training Memorandum from Allied Force Headquarters outlining certain deficiencies and practices in radio communication which have been observed in the North African Theatre is reproduced here so that all units may direct their training to anticipate and overcome similar problems in future operations.

ALLIED FORCE HEADQUARTERS
APO 512

8 October 1943

Training Memorandum No. 49

RADIO COMMUNICATION

1. The following common faults in radio communication have been observed in both tactical and administrative nets:

a. Officers responsible for the training of operators and for the proper functioning of communications are not personally supervising the operation of their nets. In many cases there is no attempt at any type of monitoring; in others, merely a show of monitoring.

b. Operators are permitted to recopy their mutilated first copies and to make erasures, both of which practices are prejudicial to speed and accuracy and are the result of inadequate training.

c. There is an excessive use of service messages, most of which could be eliminated if operators would assure themselves that they had the complete message before giving receipt and submitting to the message center.

d. Call signs are sent carelessly and excessively fast.

e. Letter suffixes are frequently omitted on date time groups.

f. Double and triple sending of call-ups is being made, although an R4 or R5 signal has been reported.

g. Message centers in some instances are requiring the operators to put the headings on outgoing messages. This duty belongs to the message center.

h. Officers with no previous experience or training are assigned to this duty due to changes in officer personnel.

i. Operators are not sufficiently trained in "zero-beating" their receivers and transmitters and keeping them "zero-beated" during operation. Failure to do this causes spreading of the net and wastes much time recollecting it.

j. Operators are not making immediate response to an invitation to transmit, thus leaving the other end of the circuit wondering if the transmission has been received. Much additional unnecessary transmission is the result.

k. In Plaindress relayed messages the call sign of the originating station is often dropped. This causes much confusion, particularly when service messages are necessary. In Codress messages the originating enciphering office should be indicated following procedure signal QXR.

l. Many lower units give no thought to radio and cryptographic security, since no individual has been given or has assumed this responsibility.

m. Unauthorized, though well-meaning, deviations from prescribed procedure by individuals or units interfere with the clearing of traffic and aid the enemy in identifying those units.

2. All signal officers in the Allied Forces will institute without delay an active and continuous program among their communications personnel to clear up these and any other deficiencies that may appear. Such programs are to include the following steps:

a. The distribution of paragraph 1 of this memorandum to all concerned.

b. Frequent inspections by the signal officer, or a qualified representative, of unit communications agencies.

c. Institution of as thorough monitoring of radio communications as circumstances permit.

d. Arrangements for training a junior officer of each unit to take over the position of communications officer in case the present communications officer is assigned to other duties.

e. Encouragement of all communications personnel to make recommendations and bring to light any problems or deficiencies they may encounter in the performance of their duties.

f. Continual emphasis on the necessity for exact conformance to prescribed signal procedure.

By Command of General EISENHOWER:

W. B. SMITH,
Major General, G.S.C.,
Chief of Staff.

OFFICIAL:

LOWELL W. ROOKS,
Major General, G.S.C.,
Assistant Chief of Staff, G-3.

STATISTICS ON SIGNAL COMMUNICATIONS

The following data obtained from the senior U. S. Signal Corps Officer, AFHQ, is based on operations in North Africa, Sicily, and Italy:

CRYPTOGRAPHING OF MESSAGES

UNIT	Percentage of Messages Transmitted in Cryptographed Form				
	Radio	Teletype	Telephone	Messenger	Pigeon
Army	100	60	None	None	None
Corps	95	50-60	None	None	———
Division	90	25	None	None	100 (except press notices)
Regiment	75	—	None	None	100

MOVEMENT OF COMMAND POSTS

UNIT	Frequency of Moves	Miles per Move	Distance in miles to CP of next higher Hq.
Corps	1 per 3 moves by division	25-30	30 - Minimum 100 - Maximum
Division		25 (exceptional cases)	12 - Minimum 60 - Maximum
Regiment			3 - Minimum 20 - Maximum

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CONFIDENTIAL TM's AND FM's

Confidential field and technical manuals, including those pertaining to radar equipment, are now available from The Adjutant General, and requests for such manuals should be made through local Adjutant General channels.

ENEMY EQUIPMENT

NEW GERMAN EMERGENCY TRANSMITTER (NS-4)

The German Emergency Transmitter NS-4 is a two-tube, self-contained, battery operated, air sea rescue transmitter, apparently replacing the NS-2 prototype of the "Gibson Girl" transmitter. The apparatus is colored bright yellow, is buoyant and water-tight. A length of cord and a hook enable the instrument to be secured to a small boat or person.

The estimated life of the battery on intermittent use is about four hours. The instrument is preset in the frequency band of 53.5 to 61.0 megacycles and radiates a modified continuous wave note of approximately 400 c.p.s.

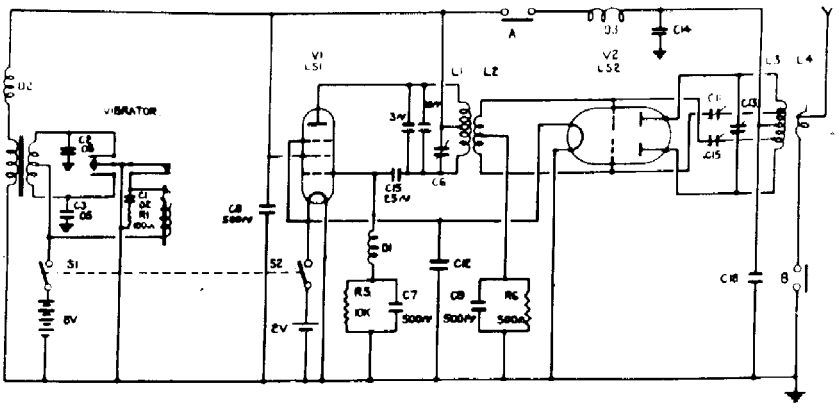
The equipment is well designed, its special features being its compactness and light weight. It gives evidence that it was designed to replace the NS-2 which uses far more critical materials. One drawback is the limitation of useful life imposed by dependence on battery power.

Construction — The equipment is housed in an aluminum box measuring $6\frac{1}{4}$" x $6\frac{1}{4}$" x 3" and weighs 3.5 pounds. The base and lid of the box are stiffened by two ribs made diagonally in the material and the lid is secured by four screw fittings which are riveted on the outside of the box. A rubber gasket insures a watertight joint. The chassis is not of the usual die cast construction but is of aluminum sheet spot welded together. No tube sockets are used, the connection being made by soldering directly to the pins of the tubes. The coils and condensers are of ceramic material with the exception of paper smoothing condensers in the vibrator pack.

The schematic circuit is a simple and straightforward one and is shown in the accompanying diagram. A pentode master oscillator drives a double triode as a push-pull power amplifier. Preset ceramic capacitors (C6 and C13) are used to tune coils L1 and L3. The coils are grooved ceramic tubes with electro-deposited windings. The double triode tube LS2 requires neutralizing, which is accomplished by preset capacitors C11 and C15. The tuning capacitors C6 and C13 are adjustable when the cover of the transmitter is removed. Two links and shorting bars, marked "A" and "B", permit meters or other indicators to be inserted in the circuit for checking and test purposes.

Antenna — The antenna is of particular interest. It is a 3 ft. 5 in. strip of copper plated steel tape similar to that used in self-stiffening, roll-up type pocket rules, and is wound around the box when not in use.

The antenna tape is 1 inch wide at the base, tapering to 3/16 inch, and has been sheathed in rubber for 10 inches at the lower end to avoid shorting to the case in heavy rain or spray.



The antenna may be swiveled in one plane and is wrapped round the instrument and held in position by two clips when not in use. Two press switches fitted with rubber covers are located under one of the antenna retaining clips. When the antenna is unwound, the transmitter is automatically switched on. In the sample examined, one press stud marked K was not used, the contacts of the switch not being fitted. This is probably used to key the transmitter for sending morse and to conserve the battery life.

Vibrator Unit — The vibrator is of the non-synchronous variety and is particularly interesting as the frequency is approximately 210 c.p.s. The armature is of unusual design, being a light flat strip at right angles to the reed. The magnetic circuit is smaller than in the conventional vibrator, although the driving coil is a good deal larger. A separate driving contact is used and the whole contact assembly is considerably smaller than usual.

No rectifier is used, the raw a.c. being applied to the transmitter so that the carrier will be modulated at the frequency of the vibrator and its harmonics. So rich is the output in harmonics that the tone appears to have maximum energy at about 400 c.p.s.

Batteries — The two-volt lead acid cells used for power supplies are $1\frac{1}{4}$" x $\frac{1}{2}$" x 1-3/4" and weigh approximately $1\frac{1}{2}$ ounces each. Eleven are used in all, three in parallel for the 2 volt filament supply and eight in series parallel for the 8-volt vibrator supplies. These make up one pound of the $3\frac{1}{2}$ pounds weight of the equipment. These batteries were originally developed for the meteorological balloon transmitters.

A discharge test was carried out and the 2-volt output fell to 1.7 volts in 2 hours 40 minutes. The 8 volts fell to 6 volts in the same time. A captured enemy document indicated that the batteries last 4 hours if switched on for three minutes and off for one minute.

Range — Under test between one of these transmitters close to the ground and a plane, the transmitting range proved to be 9 miles at plane elevation of 200 feet; 14 miles at elevation of 1,000 feet; and 40 miles with the plane at 4,000 feet. These tests were made over land.

ITALIAN SIGNAL EQUIPMENT USABLE BY ALLIES

The following data is provided by Intelligence Branch, OCSigO, to facilitate utilization of large stocks of Italian signal equipment which are becoming available to the Allied Nations.

Other sources of information on enemy equipment are manuals TM-E-30-451 (German), TM-E-30-420 (Italian), and TM-E-30-480 (Japanese).

TABLE I - DATA BASED ON STUDY OF SAMPLES IN POSSESSION OF E.E.I.S.

TYPE OF EQUIPMENT KIND	NOMENCLATURE	PROBABLE TACTICAL USE	COMPARABLE U. S. Sig.C. EQUIPMENT	SUGGESTIONS FOR UTILIZATION OF EQUIPMENT	POWER SUPPLY	REMARKS
Telephone	Type G.A.31	Standard Field Set	Telephone EE-8-A	Test Hand Generator (50-60V) Operate Test Buttons for Set.	Use 3 volt tap of a U.S. Battery BA-27	May Be Operated on CB and Automatic Systems by Using Connector Box (Listed Below)
Telephone	Type 1933 "F" Model	Testing for Line Efficiency and Continuity of Wire on Reels. "Linemen's Test Set."	Telephone EE-8-A When Used by Linemen	Test Hand Generator (50-60V) Operate Test Buttons for Set.	"	Has two Special Connections for Piercing Insulation, also a Lamp for Use at Night.
Telephone	Type 1931	Standard Set for Selective Telephony. Possible to Connect One Set to All Others or with Individual Set Without Calling Others	Telephone EE-8-A with Switchboard BD-72	Maximum of 20 of these sets may be connected to the line.	"	Can be used for Common Battery Working.
6 Line Cordless Switchboard	Magneto Type	By Artillery Battery for Telephone Control. Permits Simultaneous Connection of Five Incoming Lines.	Switchboard BD-71	Limited to Units not Requiring more than 6 Lines. Test Hand Generator, (80-90V)	Use Battery BA-27	No provision for Mounting Repeating Coils to Permit Simplexing. Not Practical for "Team Working."
10 Line Cordless Switchboard	Magneto Type	By Infantry Battalion for Telephone Central Permits Simultaneous Connection of all Incoming 10 Lines (I.E. Pairs)	Switchboard BD-72	Limited to Units not Requiring More Than 10 Lines.	Use Battery BA-27	"
Connector Box for Field Telephone Type GA (1931)	?	This device Permits the Use of the Civil Telephone System.	None	Connection is Made to the Top of the Type G.A. (1931) Set by a Cord Having 2 Plugs. Calls made by Dialing.	Use Battery BA-9 or Equivalent.	Receiver Rests on the Hook and the Two Line Wires are Connected to the Terminals on the Box.
"A" Battery (Wet Type"	NIFE Mfgr.	In Telephone and Radio Equipments	No Comparable Equipment	Used Where Battery Rated 1.45-1.85 Volts and 48 A.H. Would Be Used.		Non-chargeable Type
"B" Battery (Dry Type)	O.G.N. (Pavia)	"	No Comparable Equipment	Used Wherever a Battery, Double Rated at 3.5V AND 50V can be Used.		Non-chargeable Type

TYPE OF EQUIPMENT KIND	NOMENCLATURE	PROBABLE TACTICAL USE	COMPARABLE U. S. Sig.C. EQUIPMENT	SUGGESTIONS FOR UTILIZATION OF EQUIPMENT	POWER SUPPLY	REMARKS
Hand Generator	?	Used with 80 MM. Optical Signalling Apparatus, or for Battery Charging 1-12 Volts.	None Available			Turned at Such a Rate so as to Provide 8 Volts to 80 MM. Optical Device.
80 MM. Optical Signalling Device	?	Visual Signalling by Infantry Companies.	Signal Lamp Equipment SE-11	Use 8 (1½ Volt) BA-9 Batteries if Hand Generator is not Available. Use of Heliograph Doubtful.	8 - Battery BA-9 or Hand Generator 8-12 Volts.	Comprised of 3 Boxes Containing 80 MM Diopter Instrument, 4 W Lamp, and Heliograph with Mirrors.
Accessories Including: Earphones, Throat Mikes, Telegraph Keys, Hand Pieces, Cord and Plugs, Repeating Coils, Cables.			Used with Field Telephone and Switchboard; also Radio Sets.	Not Determined.	Obvious by Description.	
Radio Set (Tg and Tp)	R.F. 1	Pack Set Within Infantry Regiment.	Not Operable with Any Signal Corps Sets But for Same Tactical Use as Radio Sets SCR-511-( ) and SCR-300	See TM-30-420 for Details. Range Tg-10 KM Tp- 3 KM	Battery Type 1	Frequency - 2-3 MC. Power - 6 Watts One Man Pack Set.
Radio Set	R.F. 2	Pack Set with Artillery Units	Probably Operable With Radio Set SCR-203 and for Same Tactical Use as Radio Set SCR-203, SCR-583 and SCR-628-( )	See TM-30-420 for Details	Batteries: Types 63A3, 4.5C3, 15A2, or Pedal Generator	Frequency - 2.79-4.29 MC Power - 10 Watts Animal Pack, Cart, or 2 Man Pack Set
Radio Set (Tg and Tp)	R.F. 3C	Pack Set for Motorized "Blitz" or Celeri Units	Probably Operable With Radio Set SCR-203 and for Same Tactical Use as Radio Set SCR-203 and SCR-284-( )	See TM-30-420 for Details	Batteries: Types 1.5C8, 63A2, 63A5, 4.5C3, 63A3	Frequency - 1.35 - 2.5 Power - 3.5 watts(Output) Motor Tricycle or Animal (2) Pack Range - 4 Miles (Phone)
Power Supply (Dynamotor)	Type BT	For Tank Sets		12 V Input (Storage Battery) 360 V Output at 130 M.A.		Mfgr., Marelli, Milan.
Pedal Generator	Type GR-60	For Large Ground Signal Sets Like R4		12 Volts Output put at 5 Amps. (Filament); Output - 400.0/440.0	Mfgr. Except for Generator is E. Bianchi, Milan	Lawn Chair (Mark-1) with Low Silhouette, Noisy but Comfortable.

TABLE II - DATA BASED ON AVAILABLE INFORMATION BUT SAMPLES NOT IN POSSESSION OF E.E.I.S.

TYPE OF EQUIPMENT KIND	NOMENCLATURE	PROBABLE TACTICAL USE	COMPARABLE U.S. Sig.C. EQUIPMENT	SUGGESTIONS FOR UTILIZATION OF EQUIPMENT	POWER SUPPLY	REMARKS
Telephone Wire	5.2 MM	By Artillery. Maximum Effective Length With Insulated Supports 80 Kilometers of Field line. (Spool Contains 500 Meters)	Wire WS-1/TS (Wire W-110 -B Except Single Conductor)	Wherever 7 Strand Copper Wire With Cotton Lacquered Rubber Insulation Can Be Used. (Tensile Str.= 65)		Resistance at 150 Ohms per KM = 12.5 Ohms
Telephone Wire	4 MM	By Artillery. Maximum Effective Length with Insulated Supports - 60 KM.	"	Wherever 7 Strand Tinned Copper Wire With Cotton Lacquered and Rubber Insulation Can Be Used. (Tensile Str. - 60)		Resistance at 150 Ohms per KM = 21.5 Ohms
Telephone Wire	2.5 MM	By Infantry. Maximum Effective Length with Insulated Supports - 15 KM	Wire W-130 or W-130-A Except Single Conductor	Wherever Wire Composed of 1 Strand Copper and 6 Strands of Phosphor Bronze Can Be Used. (Tensile Str. = 40)		Resistance at 150 ohms per KM = 55
30 Line Plug Switch-board		By Infantry Division for Telephone Control	Switchboard BD-91 or BD-96	Limited to Units not Requiring More than 30 Lines. Ordinary Field Telephone Set Must Be Used with It.	Battery BA-9 or Equivalent	Permits Interconnection by Pairs of All Lines Terminating in the Board.
Phototelephonic (Light beam tp and tg)		Used by Signal Troops for Line of Sight Transmission in Forward Echelon.	None	Requires Equipment in Pairs with Comparable Cells.	Battery BA-9 and Battery BA-30	This equipment Permits Telephonic and Telegraphic Communication Between 2 Points, Each of Which is Visible Via Infra-red Radiation. This Equipment Used Where It is Not Possible to Lay Field Lines or Where Security is Important.
Storage Battery	T10	Used with Type G.A. 1931	Suggest Using as Spares. No Comparable Signal Corps Equipment.	Each Set Uses Two Batteries in Series.		Voltage 1.5; Wt. - 0.3KG.
Storage Battery	T40	Used with Telegraph Set.	"	Each Set Uses Eight Batteries in Series.		Voltage 1.5; Wt. - 1.0 KG.
Storage Battery	N3/0/60	Used with Phototelegraphic Set.	"	Each Set Uses Three Batteries and One in Reserve		Voltage 3; Wt. - 2.5 KG.
Storage Battery	63A5	Used with Radio Sets as "B" Battery	"	Number of Batteries Used Depends on Type of Set.		Voltage 60; Wt. 5½ KG. Capacity In Ampere Hours - 3½
Storage Battery	63A3	Used with Radio Sets as "B" Battery	"	Number of Batteries Used Depends on Type of Set		Voltage 60; Wt. 3KG. Capacity (A/H) 1.66
Storage Battery	63A2	"	"	"		Voltage 60; Wt. 2KG. Capacity 1 A/H.
Storage Battery	45A2	"	"	"		Voltage 45; Wt. 1.5 KG. Capacity 1.5 A/H
Storage Battery	15A2	"	None Available.	"		Voltage 15; Wt. 0.5 KG. Capacity 1.2 A/H
Storage Battery	15C8	Used with Radio Sets as "A" Battery	Suggest Using as Spares. No Comparable Signal Corps Equipment.	"		Voltage 1.5; Wt. 4KG. Capacity 3 A/H.
Storage Battery	4.5C3	"	Battery BA-9 Nearest Equivalent.	"		Voltage 4.5; Wt. 5.5 KG. Capacity 1 A/H.
Storage Battery	4.5C1	"	Battery BA-28 Nearest Equivalent.	"		Voltage 4.5; Wt. 2.1 KG. Capacity 10 A/H.
Storage Battery	MI (4.5) (Single Unit)	"	Suggest Using as Spares. No Comparable Signal Corps Equipment.	"		Voltage 4.5
Storage Battery	MI (128) (Single Unit)	Used with Radio Sets as "B" Battery	None Available	"		Voltage 128
Storage Battery	MI (80)	"	None Available	"		Voltage 80

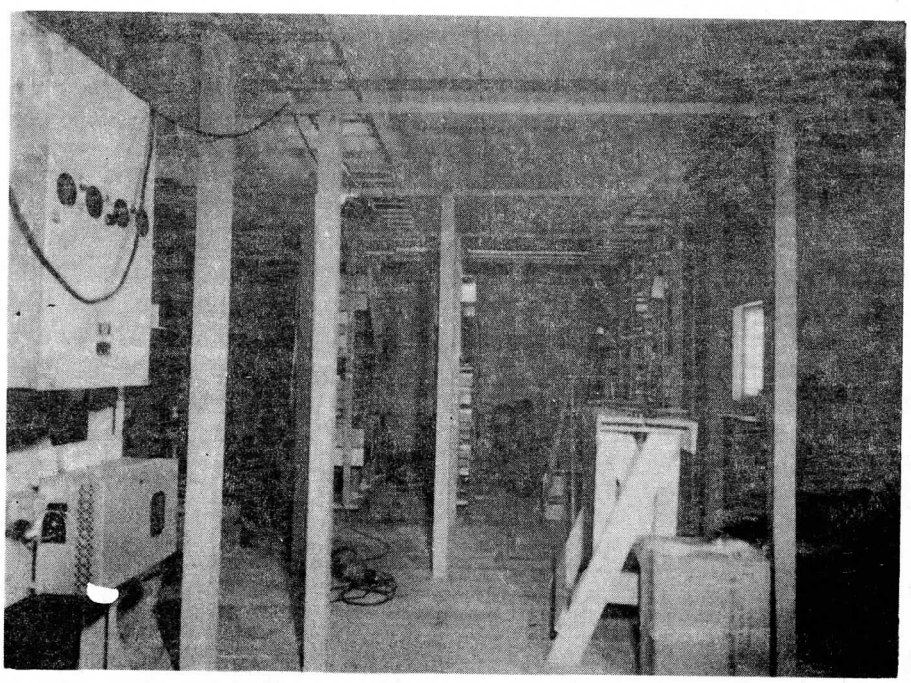
TYPE OF EQUIPMENT KIND	NOMENCLATURE	PROBABLE TACTICAL USE	COMPARABLE U. S. Sig.C. EQUIPMENT	SUGGESTIONS FOR UTILIZATION OF EQUIPMENT	POWER SUPPLY	REMARKS
Storage Battery	MI (9)	Used with Radio Sets as "B" Battery	None Available	Number of Batteries Used Depends on Type of Set		Voltage 9
Pigeon Equipment	Loft - Mod. 1930	Used by Headquarters of Large Units.	Loft PG-46-A (Portable)	Mechanical Checking and Repair. Electrical Checking and Repair.	Gas Engine	Capacity - 120 Birds. Can be Transported on RR. car Without Being Dismantled.
Pigeon Equipment	Anti-Gas Loft (Trailer)	"	"	"	Lorry Pulling Trailer	Capacity - 80-100 Birds. Radius of Action - 25-30 KM. Uses Gas-Tight Chamber.
Pigeon Knapsack	"Rest Net" Type	Used by Liaison Officers, Assault Troops, and Patrols.	Pigeon Equipment PG-60	Re-provision and Repair	Man Pack	Carries 2 Birds. Has Eating, Drinking Trough, Also Sack of Grain. Pigeon Baskets Also are Available.
Radio Set (Tg)	R-2	By Infantry and Artillery Companies	Not Operable with Any Signal Corps Sets but for Same Tactical Use as Radio Sets SCR-609-( ) and SCR-300	See TM-30-420 for Details. Range 8-10 KM.	Dry Batteries. 2 Type - 63A3 or 145C3	Frequency - 1.43-2.05 MC. Power - 4 Watts Can Be Sidecar, Man, or Animal Pack.
Radio Set (Tg)	R-3	By Infantry and Artillery Regiments	Not Operable with Any Signal Corps Sets But for Same Tactical Use as Radio Set SCR-284-( )	See TM-30-420 for Details. Range 20-25 KM.	Batteries Types 63A3 and 45C3 or Pedal Generator	Frequency - 1.87 - 2.5 Power - 12 Watts Can Be Sidecar, Man or Animal Pack.
Radio Set (Tg and Tp)	R-4	By Army Corps and Div. Hq., Also Air Force Hq.	Probably Operable With Radio Set SCR-177-B and For Same Tactical Use as Radio Set SCR-177-B and SCR-499-( )	See TM-30-420 for Details Range 120 KM. (Tg) 60 KM (Tp)	Batteries: Type 63A3 and 4.5C3 Pedal Generator	Frequency - .2-.3 MC .5-.857 Power - 40 Watts Animal Pack, Motorcycle, or Truck
Radio Set (Tg and Tp)	R-4A	By Ron. Units for Ground to Air Liaison	Not Operable with Any Signal Corps Sets, but for Same Tactical Use as Radio Set SCR-188-A	See TM-30-420 for Details Range 70-100 KM (Tg) 40-60 KM (Tp)	Batteries: Types 63A5, 63A3, and 4.5C3	Frequency - .75-1.5 MC Power - 40 Watts Same as R-4 for Transport
Radio Set (Tg and Tp)	R-5	By G.H.Q. and Laterally	Not Operable with Any Signal Corps Sets but for Same Tactical Use as Radio Set SCR-299-( ) and SCR-399-( )	See TM-30-420 for Details Range 500 KM (Tg) 300 KM (Tp)	Gas Engine Generator or Civil Power Lines. Storage Battery for Filaments and RCVR Plate Supply	Frequency - .16-.45 MC. Power - 300 Watts Mounted on Special Truck
Radio Set (Tg and Tp)	R-6	Long Distance Com. Set Between HQ for Liaison, Warning, Etc. Also Available for Propaganda	Probably Operable with Radio Set SCR-696-( ) and SCR-698-( ) and Same Tactical Use as Radio Set SCR-696-( ) and SCR-698-( )	Practically Unlimited Range in Any One Theatre. See TM-30-420 for Details	M.G. Set or Civil Power. Mercury Rectifiers and 2-125 V Batteries for Filters.	Frequency - Broadcast Band and 1-2 MC. Power - 3 K.W. Use 25 Special Trucks.
Radio Set (Tg and Tp)	R.F. 3A	Pack Set Within Alpine Divisions.	Not Operable with Any Signal Corps Sets But for Same Tactical Use as Radio Set SCR-284-( ) and SCR-694-( )	See TM-30-420 for Details. Range 100 KM (Tg) 80 KM (Tp)	Batteries: Types 1.5C8, 63A3, 4.5C3, 63A5	Frequency - .75-1.6 MC Power - 15 Watts. Animal Pack.
Radio Set (Tg and Tp)	R.F.O.C.	Mobile Set Used by Colonial Engineers	Probably Operable with Radio Set SCR-284-( ) and for Same Tactical Use as Radio Set SCR-284-( )	See TM-30-420 for Details. Range 500 KM (Tg) 100 KM (Tp)	Batteries: Types 63A2, 4.5C3, (RCVR), Pedal Generator for XMTR.	Frequency - 3.8-8.5 MC. Power - 15 Watts Camel Pack or Truck
Radio Set (Tg and Tp)	A350-1	Mobile Set Used by Air Forces at GHQ for Ground-Air Liaison	Probably Operable With Radio Set SCR-177-B and for Same Tactical Use as Radio Set SCR-177-B	See TM-30-420 for Details. Range 200 KM and Up, Depending on Frequency.	Batteries: Types 63A3 and Storage (RCVR), Type R "Marelli" Gas Engine Generator.	Frequency - .208-8.57 MC Power - 100 Watts Truck (300 KG) Mounted.
Radio Set (Tg and Tp)	R4D	"Walkie-Talkie" for Line of Sight Transmission in Forward Echelon (Nearest Equivalent)	None	See TM-30-420 for Details. Range: 3-6 KM (Tg) 2-3 KM (Tp)	Batteries: Types 63A5, 63A2, 4.5C3	Frequency - 2-3 MC Power - 20 Watts Man Pack or any Available Means.

TYPE OF EQUIPMENT KIND	NOMENCLATURE	PROBABLE TACTICAL USE	COMPARABLE U. S. Sig.C. EQUIPMENT	SUGGESTIONS FOR UTILIZATION OF EQUIPMENT	POWER SUPPLY	REMARKS
Radio Set (Tp)	R.F.C.R.	By Tank Battalions and Companies	Probably Operable With Radio Set SCR-245-( ) and for Same Tactical Use as Radio Set SCR-245-( ), SCR-508-( ) and SCR-538-( )	See TM-30-420 for Details. Range: 1 KM in Motion (Tp) 4 KM Stationary (Tp)	Storage Battery	Frequency - 2.45 - 3.06 Power - 10 Watts Probably Superceded by R.F. 1 CA
Radio Set (Tp)	R.F.C.A.	"	"	See TM 30-420 for Details Range: 2KM in Motion (Tp) 6 KM Stationary (Tp)	"	"
Radio Set (Tg and Tp)	R.F.I.C.A. (TR-7)	"	Not Operable With Any Signal Corps Sets But For Same Tactical Use as Radio Set SCR-508-( ), SCR-528-( ) and SCR-538-( )	See TM 30-420 for Details Range: 2-4 KM in Motion (Tp) 8-10 KM Stationary (Tp)	Storage Battery and Dynamotors, Type ALI XMTR (360V, 130M.A.)	Frequency - 27.2 - 33.3 Power - 10 Watts. Copy of German Tank Set 10 WSC - UKWEd.
Radio Set (Tg)	R.F.C.V.	By Tank Battalion and Company Commanders to Tank Regiments	Probably Operable with Radio Set SCR-245-( ) and for Same Tactical Use as Radio Set SCR-245-( ) and SCR-506-( )	See TM 30-420 for Details. Range: 20-25 KM Moving (Tg)	Storage Battery and Dynamotor.	Frequency - 1.87 - 2.5 Power - 12 Watts Same as R-3 Set.
Radio Receiver	I.T.	For Telephonic Interception	None	Insert in Telephone Line, Use - As Amplifier, Can Be Used at Distance of 200-300 Meters.	Battery Type 63A3	Carried in Truck, Motorcycle or Animal Pack (4 Packs)
Radio Receiver	R.A.2	By Air Corps for Monitoring Air-Ground Communications		See TM-30-420 for Details Range: Depends on XMTR and Antenna Used (Varies from 40 - 60 KM)	Batteries; Types 63A3 and 4.503.	Frequency - 2.0 - 12.0 MC Animal Pack or Motorcycle.
Radio Receiver (Tg and Tp)	R. 1.2.	Radio Intercept Purposes	None	See TM-30-420 for Details Range Depends on Power of XMTR and Antenna Used.	Batteries: Types 4.503, 63A3, and 29A2.	Frequency - .085 - 24 MC Animal Pack or Motorcycle
Radio Receiver	R. 1.3. (R.1.5 same)	"	None	See TM-30-420 for Details Range Depends on Power of XMTR and Antenna Used.	Plate Supply; Dry Battery. Cathode Supply-Storage Battery. Can Also Use A.C.	Frequency - .085 - 24 MC. One Receiver for H.F., One for L.F. with Over lap. Special Truck Mtg.
Radio-Goniometry (Tg and Tp)	R.G.A.	Radio Direction Finder for Medium and Long Waves	With Item on next line, as Radio Set SCR-206-( )	See TM-30-420 For Details Range Depends on Power and Antenna of XMTR D.F.'s	Batteries; Types 63A5, 15A2, 1.508	Rotatable Loop Antenna .7 Sq. Meters .15 Meter Wire Antenna Spa. 25, C.10, R.E. Truck
Radio-Goniometry (Tg and Tp)	R.G.P.	Radio Direction Finder for Short Waves	With Item on line above, as Radio Set SCR-206-( )	See TM-30-420 for Details Range Depends on Power and Antenna of XMTR D.F's	Batteries; Types 72A3, 13A2, and 4.503	Antennae: 2 Loops for Different Bands; 1 Single Wire Antenna - 7 Meters Long. Truck or Portable (Short Distance)
Radio Set (Tg and Tp)	T.P.A.	Ground Set Suitable for Infantry Battalions over Shore to Ship Operation.		Commercial Using Tubes Exactly Equivalent to U.S. Need 12 V Storage Battery. Range: Tg - 50 Miles Tp - 20 Miles.	12 Volt Battery Separate Dynamotors XMTR - 340 V. RCVR - 210 V.	Frequency - 3 - 6 M.C. Power - 12 Watts Semi-Portable in Two Chests Total 117 lbs.

THE ALASKA HIGHWAY LINE

The Alaska Military Highway, running from the railhead at Dawson Creek, B. C., to Fairbanks, Alaska, is now paralleled (see accompanying map) by a pole line carrying four strands of wire which not only increases the value of the highway, but fills a long felt need for a land-line communication link to supplement radio between the United States and Alaska. Engineering and supervision for this project were carried out by Army Communications Service. This line follows the highway throughout its 1500-mile length and is extended 440 miles beyond the southern end of the highway to Edmonton, Alberta, the nearest point which provides access to commercial telephone and telegraph facilities with connections to the United States.

Construction had started in late summer of 1942 and was progressing slowly when, in October, it was decided that telephone service from Edmonton to Dawson Creek should be available for the opening of the road on 1 December. Although this portion of the line follows railroads and public highways, winter presented unexpected problems. On 15 November the worst blizzard in 40 years hit western Canada, the temperature at times dropping to 70 below zero. November 22 saw only 50 miles of wire strung and over 90 miles of poles yet to be set. Construction was pushed ahead by dint of temporary expedients, such as placing crossarms only on alternate poles, stringing wire on the ground after dark, to be fastened to crossarms later, and nailing temporary wire to telegraph poles along a railroad right-of-way where poles for the



ONE OF THE NUMEROUS REPEATER STATIONS THAT HAD TO BE INSTALLED.

SEPARATE RIGHT-OF-WAY IS CLEARED FOR THE LINE WHERE DISTANCE CAN BE SHORTENED.

line were not yet set. The railroad telegraph line was used for daily progress reports sent in to the officer in charge. Work trains were provided for shelter and bases of operation for the construction parties.

The line was completed and tested through to Dawson Creek on 1 December. At 7:45 that evening, the line was officially opened by a call from General Stoner in Washington to Colonel Twitchell at Dawson Creek, B.C. (SCTIL, January 1943).

The next month was devoted to clearing up this section of the line and replacing with permanent construction the temporary expedients that had been adopted in meeting the December 1st deadline. At the same time, construction went ahead on other sections of the line. From Dawson Creek north the rail line used for transportation to that point was replaced by trucks and air transport to points along the road.

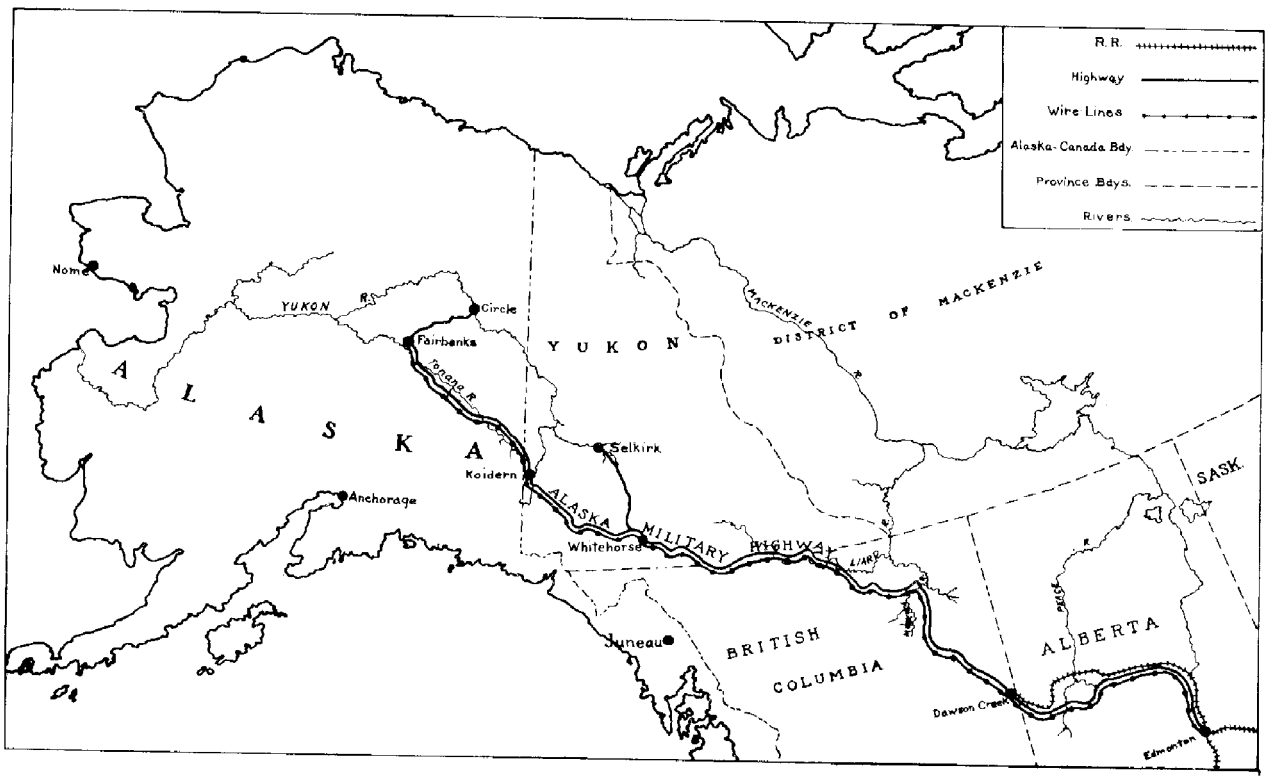
The right-of-way for the pioneer road had been cleared, but the wider right-of-way for the final road had not, making it necessary in siting poles to try to outguess the road builders so as not to find poles in the middle of the final roadway. At the same time, the tangle of brush and trees left beside the right-of-way as it was cleared further complicated the siting of poles.

During the winter months a battery left overnight in a parked truck was a battery frozen and burst. A truck, stopped for more than a few minutes, froze solid and needed a pre-heater of a type used for airplanes to start it. In sagging wire, corrections sometimes had to be made for temperatures 70° below zero. Frozen hands and feet, and, in at least one instance, frozen eyelids, were among the discomforts suffered by construction personnel. Smokers had the additional discomfort of being unable to take more than a few puffs before their cigarettes froze. Many of them quit smoking.

One of the largest contributions to the scenic beauty of the country is furnished by the innumerable lakes. The lakes, however, also furnish excellent breeding places for the famous "tri-motor" mosquitoes about which so many Alaskan tall stories are heard. During the spring, it is necessary for all workers to wear mosquito head nets, as these mosquitoes proved to be more than mere legend. Even nets were no protection against the "No-see-ums," biting insects so

named by the Indians because of their almost microscopic size.

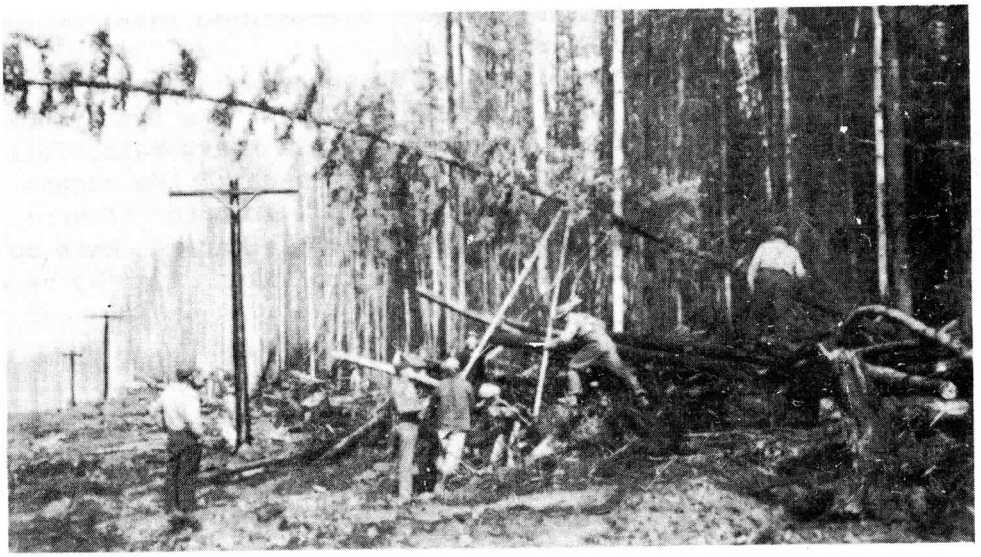
In May 1943 the line was completed to Whitehorse, Yukon Territory, and service was initiated 24 May. But now summer brought its own troubles. Construction north of Whitehorse had just begun when a heavy rain, followed by land slides, completely obliterated a 60-mile stretch of the pioneer road near Koidern, about 120 miles northwest of Whitehorse. In order to continue construction of the line, some of the materials for the far end were moved by truck north to Selkirk, Yukon Territory, down the Yukon River by barge to Circle, Alaska, by motor from Circle to Fairbanks and down the pioneer road to



the other side of the impassable section — a loop of over 600 miles. At the same time, the Musqua River, normally 300 feet wide and 10 to 12 inches deep, rose until it was 2 miles wide and 12 feet deep, washing out the bridge and the H-fixtures used for the wire crossing.

One of the repeater stations was to be located on a strip of perpetually frozen ground in the middle of the impassable area near Koidern. By 5 September, freezing of the washed-out section had progressed to the point where the material for the station could be moved in and a temporary twisted pair line could be run. Construction of the repeater station started 15 September and the station was tested through and placed in operation 5 October.

Service to Fairbanks was initiated on 14 October and has continued since. Four river crossings are yet to be changed to permanent construction when the

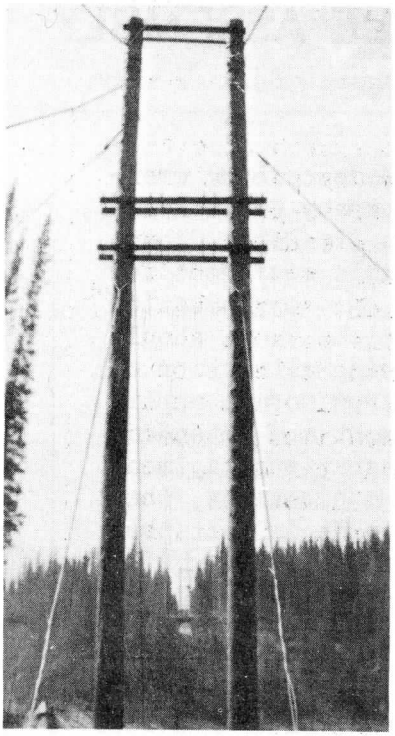


TREES FALLING ACROSS THE LINE CONSTITUTE A SERIOUS MAINTENANCE PROBLEM.

permanent bridges are built, and the temporary line near Koidern has only recently been replaced.

Maintenance has its difficulties. The shallow-rooted trees robbed of the support and protection of their neighbors when the right-of-way was cleared fall across the line with little or no provocation and present a constant source of trouble. One September day found over 150 trees across the line at various points. Falling trees, besides causing grounds, shorts and crosses, change the sag of the wire and thus lead to other troubles later. Occasionally the wires are found twisted together by the wind. In spite of generally excellent fire discipline, forest fires, at least during the late summer, present still another source of trouble. On one occasion 25 poles in one section of the line had to be replaced because of forest fire, while other sections were similarly affected to a lesser extent. In establishing firebreaks by the simple expedient of pushing trees over with bulldozers, poles are sometimes pushed over along with the trees being cleared.

The total length of the four-wire line is close to 2000 miles. Over 70,000 poles were used, nearly all being cut and trimmed at the scene. About 8,000 miles of wire was used. The line consists of two metallic circuits of copperweld wire having only 30 percent copper. Use of this wire necessitated spacing repeater stations at an average of 85 miles apart. Three of the 22 repeater stations provide switching points with access to various channels of the line. The transposition system is a modified J type, to provide currently for C type carriers and for possible later use of J type carriers. One pair is used with a CS-5 carrier system providing one physical voice circuit, one d.c. telegraph and three-voice carrier channels. The other uses a CU-5 system, which provides the same channels except that one of the voice carrier channels is replaced by 12 v.f. telegraph carrier channels. Thus a total of 7 voice



H-FIXTURES (USED IN CATENARY CROSSINGS) UNDER CONSTRUCTION.

and 14 telegraph channels exist over the 4 wire.

The buildings which house the repeater stations are complete with living quarters for the maintenance crews. At some of the repeater stations the nearest neighbors are the crews at the adjacent repeater stations seventy to ninety miles away.

Since certain through connections exist at all the switching points, it was necessary to follow a consistent scheme in designating the "east" and "west" terminals of each section of the line; and, since the commercial system to which connection is made follows standard practice in designating the line running south from Edmonton as "line west," Edmonton is the "West" terminal of the highway line, and Fairbanks, two time zones west of Edmonton, is the "East" terminal. At Fairbanks connection is made to another Army Communications Service project, the Fairbanks-Anchorage military telephone line. So Anchorage, 250 miles southwest of Fairbanks, is now the "East" terminal for that link.

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CAMP KOHLER DISMANTLES P. A. SYSTEM

Commendable though the initiative and technical planning displayed in the revision and enlargement of Camp Kohler's P.A. system may be (it was described in some detail in SCTIL No. 24, November issue), it has been found that the existance of the system as presently installed and the uses to which the system is being put are contrary to outstanding directives.

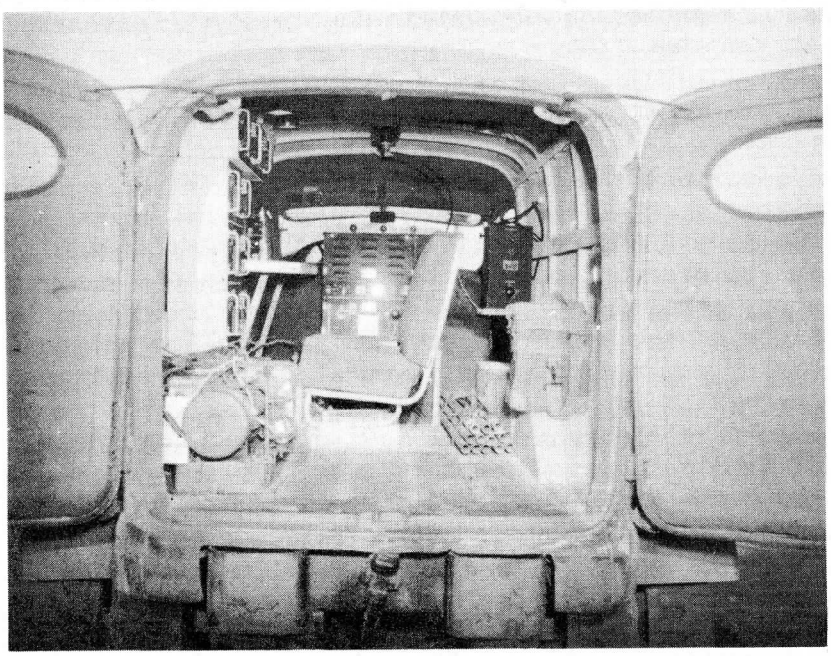
A letter from The Adjutant General, 21 July 1942, subject "Permanent Installation of Public Address Systems," prohibits such installation for administrative and recreational purposes. A letter from the Chief Signal Officer 31 July 1943, subject "Public Address Systems," amplifies and explains in greater detail the uses of such systems which are considered to be under the ban of The Adjutant General's letter.

The above directives have been brought to the attention of Camp Kohler and action has been taken to dismantle this fixed P.A. installation. There will be retained at Camp Kohler only such parts of the system as are comparable to the P.A. system authorized for Replacement Training Centers under current T/A's.

EMERGENCY AIR-GROUND MOBILE ASSEMBLY

Presented herewith is an illustrated article describing emergency measures adopted by the 903rd Signal Company Depot Aviation in its overseas assignment as part of an Air Depot Group. The emergency in this case arose when suitable equipment for specific communications requirements of the air organization was not available. Presentation of the article here should not be interpreted as a recommendation favoring alteration of Signal equipment in the field or deviation from normal applications for which individual items of equipment are intended. But in instances where such deviations or alterations may mean the difference between effective and poor communications, then emergency measures may be entirely justified. It is felt that the information presented here as to how one unit solved its problem will prove useful to others.

A scarcity of mobile radio sets for air-to-ground control and liaison work led to the development by this organization of the mobile units illus-



strated in the accompanying photographs and drawings. Their specific purpose is to provide low-power radio control of aircraft for advance operation, or to provide control for emergency landing fields.

4 x 4 PANEL TRUCK ASSEMBLY

The assembly mounted in a Dodge Panel Truck, 4 x 4, includes the following equipment:

2 Ea. Telephone EE-8-A
1 Rl. Wire W-110-B (on DR-5)
1 Ea. Mast Base MP-47
1 Ea. Mast Base MP-22
1 Ea. Mast Section MS-49, 50, 51, 52, 53 & 54
1 Ea. Radio Transmitter BC-191 or subsequent issue of the item
1 Ea. Antenna Tuning Unit BC-306-A
6 Ea. Tuning Unit TU-( )-B
12 Ea. Mast Section MS-44 (with Bases)
1 Ea. Radio Receiver BC-224-( ) or BC-312
1 Ea. Frequency Meter SCR-211-( )
1 Ea. Key J-37
1 Ea. Headset HS-23
1 Ea. Microphone T-17
1 Ea. Dynamotor BD-77-C
3 Ea. Battery, 12 volt, BB-( )
1 Ea. Generator, Tiny Tim, Charger
(Also necessary Batteries, Plugs, Mountings, Spare Tube Sets, Cordage and Plugs)

As will be noted from attached photographs, both Mast Base MP-47 and Mast Base MP-22 and Antenna Tuning Unit BC-306-A have been installed for mobile operation, while Mast Section MS-44 has been included for stationary operation.

The six Tuning Unit TU-( )-B have been arranged along the panel by welded rack hangers made from $1\frac{1}{4}$" angle iron.

The seat for the operating table was a discarded rear seat from a Dodge one-half ton carry-all.

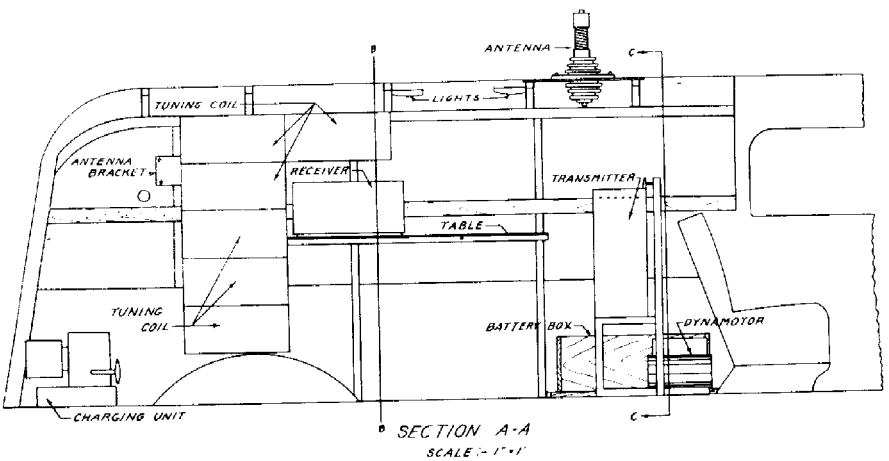
Lighting is by means of 12-volt lamps recovered from salvaged aircraft.

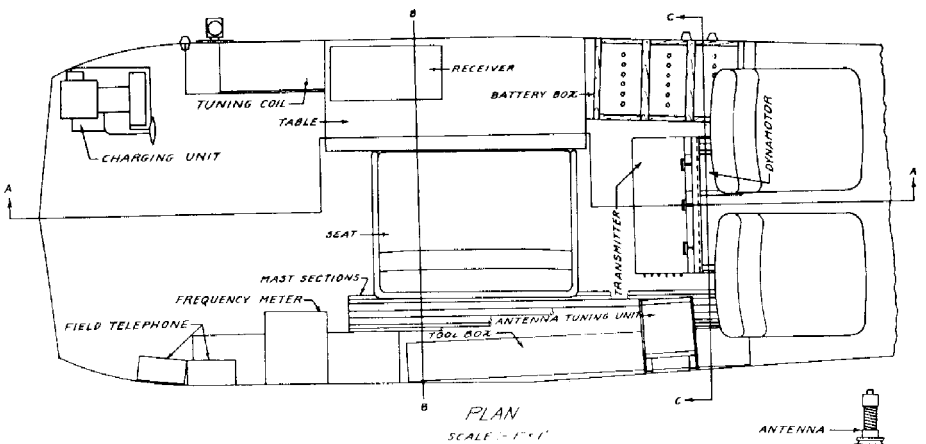
Tools have been removed and placed under the co-driver's seat and spare parts have been arranged in the regular tool box, located to the right of the transmitter and just to the rear of the Frequency Meter SCR-211-( ).

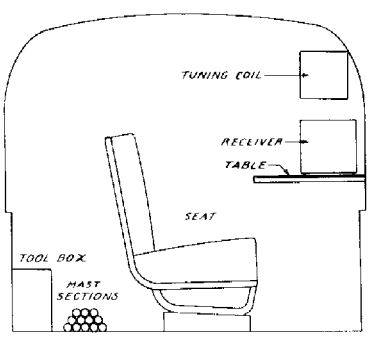
An extra power cord provides the lead in from the charger, which can be removed and mounted outside of the truck.

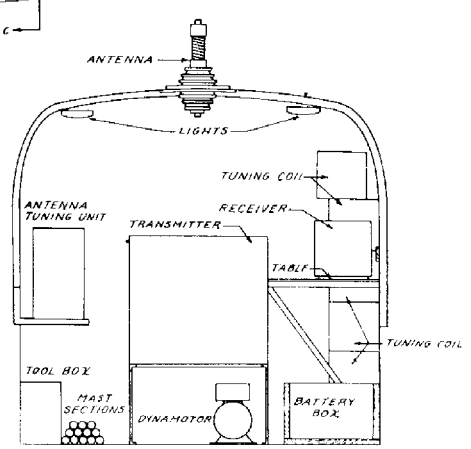
The batteries are located at the rear of the driver's seat with "breather" outlet of rubber hose to under side of truck.

If Radio Receiver BC-224-( ) is used, a relay is placed in the plate circuit for receiver interruption during transmission.









RADIO INSTALLATION
IN 1½ TON 4X4 PANEL TRUCK
INSTALLED BY
RADIO AND GENERAL REPAIR SECTIONS
903rd SIGNAL COMPANY DEPOT (AVN).
SCALES:- AS SHOWN
DESIGNED BY:- R LAMPMAN (1ST LT SC)
DRAWN BY:-
OCTOBER 24, 1943

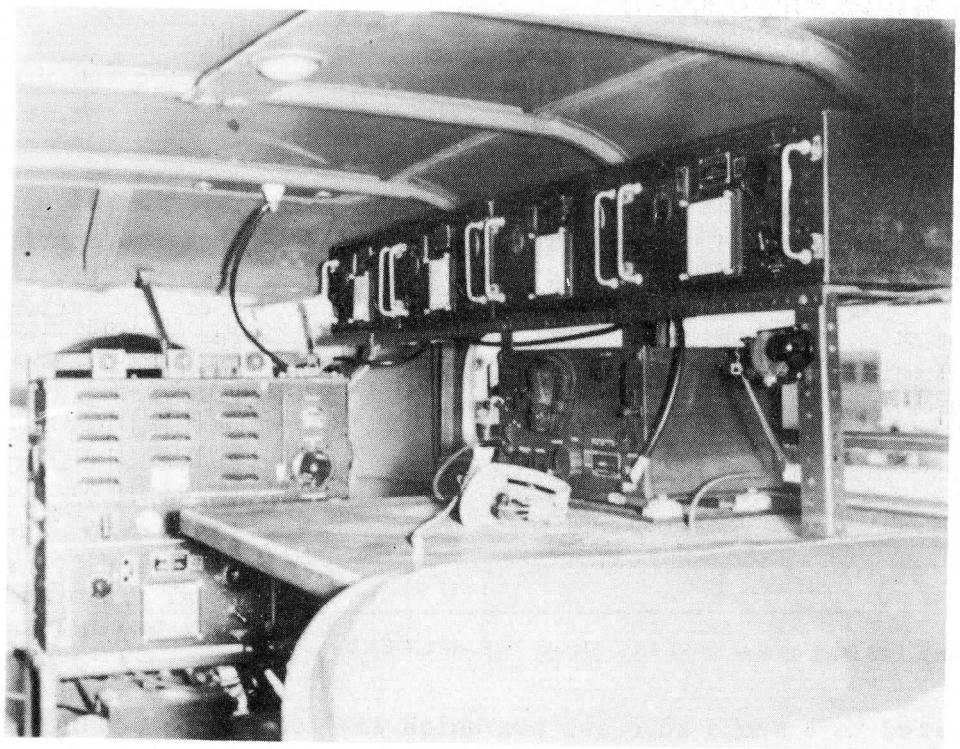
Dynamotor Unit BD-77-C is located under the Radio Transmitter BC-191-( ), the transmitter being mounted on $1\frac{1}{4}$" angle iron and braced on an angle iron back.

Rubber cushions are used throughout the installation. These cushions are cut from salvaged rubber from the Fuel Cell Department of the Depot.

ASSEMBLY IN ONE-HALF TON CARRYALL

The other Radio Set SCR-187-( ) installation employs a Dodge one-half ton carry-all in which the rear seat was removed completely and the center seat was remounted with its back to the right side of the truck. A metal table with a masonite top was mounted in back of the driver's seat. It was secured to the left side of the truck and the front legs angled back to the rear of the table and bolted to the floor. A Radio Receiver BC-224-( ) was mounted on top of the table near the left end.

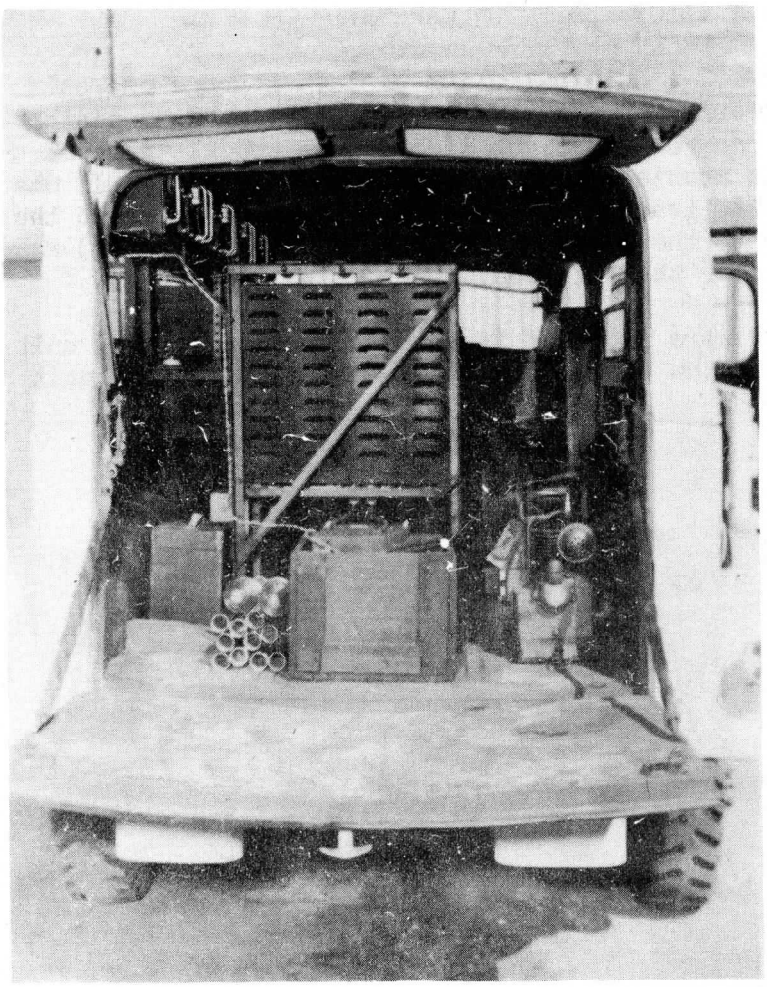
Six Tuning Unit TU-( )-B were included in this truck. One tuning unit was mounted horizontally under the table in a Case CS-48. One tuning unit



LOOKING AT INTERIOR FROM FRONT END OF CARRY-ALL.

was installed in the transmitter and four were mounted in Case CS-48. These four cases were mounted upon a frame that ran from the rear of the truck to a point just in back of the driver's seat. The frame was supported by legs that were bolted to the end of the table top and also by bolts between the windows. The frame was mounted so that the cases were as high as possible allowing light and air to enter the truck.

A Radio Transmitter BC-191-( ) was mounted on a frame 24" from the back doors, so that the base was thirteen inches off of the floor. This left ample space to mount the Dynamotor Unit PE-73-( ). The transmitter faced the front of the truck and was within easy reach of the operator.



AS THE INSTALLATION APPEARS FROM THE REAR END.

The antenna binding post assembly was put in the auxiliary position on the top of the transmitter so that the lead in went vertically to an insulator in the roof.

A battery box for two twelve-volt batteries was installed just to the rear of the dynamotor so that the leads were as short as possible.

To the right of the battery box, a tiny tim battery "C" charger was mounted on a removable slip-bolt arrangement so that the charger could be removed from the truck for charging purposes. Leads for the charger were included.

Twelve sections of Mast Section MS-44 were employed for the two masts. These were stowed under the table and transmitter in a metal frame and held down by a web belt and buckle.

A spare set of tubes was carried in a spare tube set box which was mounted on the floor to the left of the transmitter.

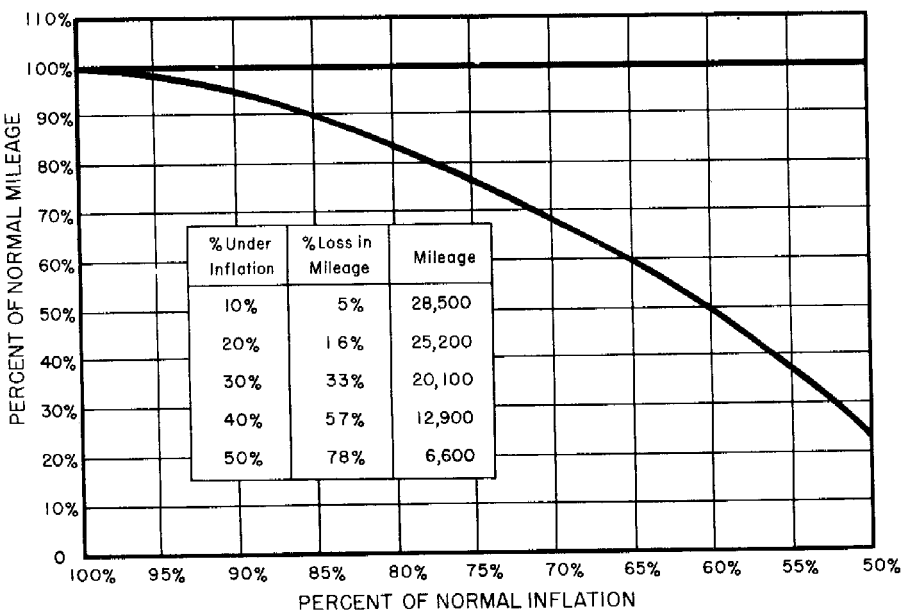
The dome light on the carry-all was moved so that it furnished light over the operator's table.

The large rear doors on the carry-all give easy access to the rear of the transmitter, dynamotor, mast storage, and battery charger.

Design and assembly of this mobile radio set was a combined project of the Radio and General Repair Sections of this organization.

ARMY FACES GROWING TIRE SHORTAGE

In spite of the fact that the output of synthetic rubber is adequate, the tire shortage is becoming more critical every day. Inventories of pre-war tires are now exhausted, and those in service have little or no mileage remaining. There is a serious shortage of manpower and facilities for producing tires, particularly large-size truck, artillery, construction and airplane tires. This, coupled with a heavily increasing demand for tires from combat zones, plus an imperative need for more tires for trucks engaged in vital war transportation, have made it necessary for the army to "ration" tires in the zone of the interior.

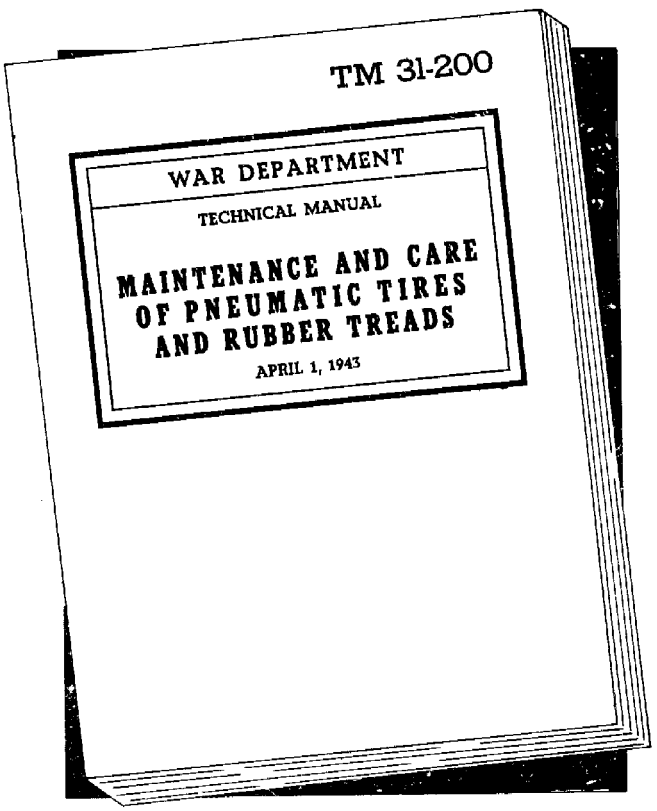


% Under Inflation	% Loss in Mileage	Mileage
10%	5%	28,500
20%	16%	25,200
30%	33%	20,100
40%	57%	12,900
50%	78%	6,600

TIRE PRESSURE VERSUS MILEAGE.

Sufficient synthetic rubber is being produced for recapping tires. The problem is to conserve the tire casings now on hand. So long as these casings are not seriously damaged or destroyed, they can be recapped, and army vehicles in the zone of the interior can continue to operate. The responsibility for protecting tire casings rests squarely on the shoulders of every officer responsible for the operation of motor vehicles.

Officers can do at least three specific things immediately to help alleviate the tire shortage: (1) They can point out the facts of the situation to enlisted men; (2) they can review TM 31-200, Maintenance and Care of Pneumatic Tires and Rubber Treads, to assure that both they and their men are fully informed on tire care; (3) they can exercise the utmost diligence in the inspection of tires, and in the supervision of motor vehicle operators.



102 PAGES OF USEFUL INFORMATION AVAILABLE THROUGH A.G. CHANNELS.

A number of points on the care of tires that must be emphasized again and again are:

Over inflation must be avoided. Over inflation will cause a tire to blow out upon contact with an obstruction and will destroy the CASING.

Under inflation must be avoided. Under inflation will cause a tire to flex excessively. This will cause it to overheat, will break the sidewall and will destroy the CASING.

Drivers must be cautioned to be careful. Hitting rocks, stumps, ruts and curbs will break and ruin a tire CASING.

Tires must not be worn down to a point where the breaker or cord is showing. Inspections must be thorough. Tires must be removed and recapped before the tread design if worn off in the center. Small cuts, breaks and bruises must be watched and repaired as required.

These, and other instructions in TM 31-200 must be emphasized, studied and applied. Close supervision by officers, the willing cooperation of every enlisted man, careful driving, and the diligent application of preventive maintenance procedures are required to cope with the growing tire emergency.

PICTURES THAT COUNT

The following is the subject matter of a lecture prepared and delivered by Lt. Erwin G. Marquardt of Army Pictorial Service, ETOUSA. It represents one step in the training program carried on in this Theatre of Operations to insure not only good pictures but complete and accurate information upon which interesting and instructive captions may be based.

To fill an ever-increasing need to "tell" our people at home, our allies and the remaining neutral countries, about America's army in England, the Army Pictorial Service has organized, in conjunction with the Public Relations Office, a special News Photo Section to concentrate on getting the best pictures available for publication. You have been selected for duty in this section and will be part of a team of editors, still photographers, movie cameramen and caption writers all concentrating on telling the world, via pictures, about the United States Army, its many men, its many machines, and its many activities.

Out on the job, you will be a team of news photographer, motion picture cameraman and caption writer.* We believe that this organization will be the most effective working arrangement in that it allows each man to concentrate on doing one specific job. The cameraman will not have to miss another picture because he was busy taking captions for the previous one and the caption man has an opportunity to obtain much more complete and detailed information that the photographer would not have time to find. In so far as possible, we will allow you to choose your friends for these teams so that you are really working together. The caption writer is in reality a news reporter. He must go out and see, find, hear, and know; and then he must write so that the

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* The following note is suggested by the Chief, Army Pictorial Service, Washington: "This is not typical of all theatres of operation. It is the usual plan to have the caption writer assist the cameraman by making notes, by obtaining correct spelling of names, and by getting an accurate left to right when persons are included in a picture. The caption writer also assists in handling of equipment, changing of film, etc. This leaves the cameraman free for more picture shooting, but he is still responsible for the final captions turned in with his negatives. The idea behind this fixing of responsibility in the photographer is that frequently he will shoot a picture with a definite idea in mind, which the caption writer will not anticipate and may fail to note. Lack of such notes in the captions might mean the passing up of a good picture. Inspection of captions by the cameraman will serve to avoid overlooking any possible bet which may make the picture more effective."

reader may go - in fancy - where he has gone, hear what he has heard, find what he has found and know what he has known. The photographers, too, must be reporters, conveying the same thoughts through the eyes of their cameras to the minds of those unable to be present.

You must cultivate a "news nose." A great help in this is to read every newspaper available, see every newsreel you can, examine every picture you see printed and try to figure out why that picture was selected. You must be able to recognize a news picture at a glance and know it will tell your story. Cultivation of that "news nose" will most likely lead you to the selection of the live subject. As a rule, a photographer has only a fraction of a second in which to decide when he should take the picture. When the moment arrives, he must be prepared to seize the opportunity. The opportunity in a large percentage of news stories is available but once. There is no second helping.

It hurts to see your stuff in the morgue, unused, or in the basket, unwanted. Poor pictures never make the page... unless they're exclusive and the only ones to be found. Good pictures don't need good editors -- they speak for themselves.

Nowadays newspapers cancel advertising contracts, throw away good income, to print the news. They don't use pictures unless they tell a better story than words. Most of the junk they used to use to fill space is banned for the duration. The editor is against you today, simply on space requirements, and there is your challenge. But he will always make room for a good war picture. War is the business of the day.

Avoid the trite and usual in your pictures. War is never dull, but the people illustrating it can be. Try for new pictures and, if you must make an old one, try to give it a new angle. Don't be afraid to shoot privates; they have just as many friends and families as generals have. Try for long shots and closeups along with the regular stuff. Editors don't like pictorial shots because they break up and lose their snap on newsprint. But "war scenery," if it's new, fresh and dramatic, will get a big play. Editors do like closeups. Emotion photographed is better than emotion written on paper. The guy showing his teeth and tonsils, or the soldier beside his wounded buddy, is a natural.

Don't be scared of policy and censorship. Your job is to get the picture. Let the censor worry about whether the picture should be published or not. But you should know what the censor will pass. Avoid distinguishing marks on trucks and tanks, division patches and squadron insignia on flying jackets, unless you're sure the censor will pass them. Lists will be published from time to time as to what will pass and what won't. But if you're in doubt, get the picture and worry when you get back to the office.

Your photographer's badge and pass should get you cooperation on assignments, but you'll get the most cooperation by just observing the ordinary rules of good military and social behavior. A snappy salute with a smiling

"please, sir" will get you more than any pass. Don't be overawed by rank; generals like having their pictures, too, and they want flattering pictures like anybody else of themselves, their camps and units. By being respectful and tactful, you can accomplish wonders. But when you do run into trouble, call the office or report it as soon as you return. We'll do our darndest to straighten things out. That's part of our job. Sharpshoot — don't keep generals waiting around. If you miss, skip it and try again later.

When on a team assignment with a photographer, the caption writer can be most useful. In addition to collecting the necessary facts for his captions, he can be of great assistance to the cameraman in setting up a picture. If an idea strikes the caption writer, pass it along to the photographer. Discuss the subject with the cameraman while en route to the site of the event. Nearly every subject has been photographed in some form; therefore, a new twist or idea is of paramount importance in putting across the picture. Be an active reporter while on the job. Strike up a conversation with the subject; or, if it's a ceremony, don't be afraid to ask questions of the spectators — they very often know all about the people involved. In this manner it will be possible to obtain new and valuable information for your captions.

It is generally known that the five basic principals in caption writing are: who, what, when, where and why. The first requisite of reporting is to get names — and get them correct. Nothing annoys a man more or causes more complaints from his family than to find his name wrongly spelled or to have incorrect initials assigned to him in a caption. All the facts connected with the captions MUST be accurate. The picture is of little use if the facts are wrong. It might just as well be fogged or out of focus to start with.

Only in an emergency does a reporter write his captions in advance of seeing the print or negative. Don't rely on your memory to recall each incident in the picture. Often interesting items are included on the negative which were not noticeable when the picture was taken. However, there is a danger attached to this method, in that a reporter will usually be gone on another story when the prints are ready for caption. Therefore, he should make literate, accurate, and complete caption notes on each picture, using a separate caption card for each and turn them into the desk men who will write the final caption.

If possible, in covering a P.R.O. assignment, the following information is desired in the captions. Date, time, place, event, name, rank, branch, age, home town address, name of parents and occupation as a civilian. If he is an athlete, it would be wise to name the college he attended. This, plus a brief account of the event or action, is the basic P.R.O. caption to which, for military purposes, should be added the actual location and unit designation (this is never published but accompanies the negative to Washington). P.R.O. insists on residential addresses, not postal, and welcomes long and detailed captions. Captions with the above information, P.R.O. claims, appeal to the home town picture editor who frowns on a photograph with limited news value. Often the home town editor, if the information is available,

will rewrite the caption into a story feature form that will run a half column or more.

A general rule for caption men to remember is that it is impossible to get too much information. Always err on the side of too much information rather than too little. And remember always to have two or three well sharpened pencils and plenty of caption cards whenever you leave on a job.

Remember that you must always adapt yourself to local conditions. The climate of England is much different from what you will find in most parts of the United States. During nine months of the year you can expect a good deal of rain over here and you'll usually have to work right through it. Always take your raincoat with you on a job and stick a pair of clean socks in your camera case. You'll often have wet feet and a pair of clean dry socks to put on when you have the chance will do a lot to prevent colds. For the same reason, if you know you're going to be gone overnight, always carry a change of underclothes with you in addition to your toilet articles. And whatever you do, don't forget your inseparable companions, mess kit and canteen cup. There are no "Claridge Brasseries" in the field. Often what you eat depends on what you've got to eat it out of.

Don't forget to take all your camera equipment with you — tripod, filters, extra film, batteries, exposure meter, changing bag and all. They're a damn nuisance to lug around and by the end of the day they'll weigh a ton, but if you don't have them, sure as shooting, you'll want them for that extra shot which means the difference between a real story and one that's just so-so. Remember too — that you are responsible for seeing that all your equipment is in perfect working order, and that we have an excellent repair department. Don't wait till you blow up on a job to change batteries, have your synchronizer checked, or take your camera into the shop for an overhaul. The repairman will gladly inspect and check your camera every week. Make a point to do this.

Also, for gosh sakes, remember the little things that should be routine by now but still slip up on the best of us. Watch focus, definition, exposure and shoot fast enough to stop the motion in the picture. Don't try to get too much in one picture. If you're on an Eyemo, clean your gate every time you change film and, at the slightest sign of a scratch, bring it into the shop. Clean your magazines every time you load up and never leave your spring wound up longer than necessary. If you're a still man, remember that you've got two shutters and can only use one at a time, that no one has yet been able to develop a slide, that your exposure meter will double check your eye, and that it's not a $2\frac{1}{4}$ x $3\frac{1}{4}$ you're using. Fill up your negative whenever possible.

But above all, ride your story and ride it for all it's worth. Be ahead of the news, never just abreast of it, and certainly not behind it. And be on the lookout for new stories. You are the eyes and ears of the whole department and should come back loaded with facts, not only about the present story, but about future ones or picture features we should do. We shall probably have to work like hell — but we should have a hell of a lot of fun, too.

EQUIPMENT NOTES

SIGNAL CORPS BOARD

RECENTLY ESTABLISHED SIGNAL CORPS BOARD CASES

Signal Corps Board Case No. 543

Service Test of Trailers, 1-Ton, 2-Wheel, with Wood Bodies, Solid and Dual Tires. 19 October 1943

At the request of the Commanding General, Army Service Forces, the Signal Corps Board has been directed to service test two special Trailers, 1-Ton Cargo, 2-Wheel with Dual Tires. These trailers are especially light in weight. One is fitted with a solid wood body, and the other with a plywood body. The trailers are to be compared with a standard Trailer, 1-Ton Cargo, for ease of handling, durability, and utility.

Signal Corps Board Case No. 544

Service Test of Engineer 55 CFM Air Compressor Unit with 35-Pound Drill. 4 November 1943

The Signal Corps Board has been directed to make comparative tests on Tool Equipment TE-59 (Gasoline Hammer) and Engineer 55 CFM Air Compressor Unit with 35-Pound Drill. Reports from the field have indicated that the TE-59 is inadequate for use in especially difficult soils. This test will determine whether the small, trailer mounted, 55 CFM Air Compressor Unit, which was developed by the Engineers for airborne troops, is a satisfactory replacement for the TE-59 when used in rocky soils.

AIRCRAFT RADIO

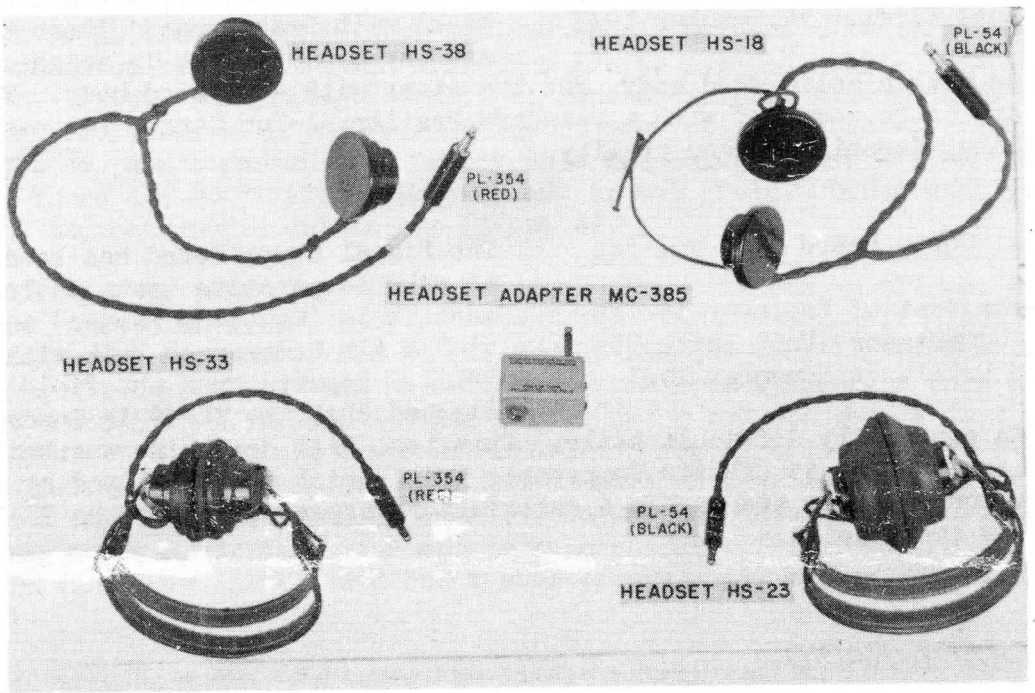
PROBLEMS OF HIGH ALTITUDE COMMUNICATION

The use by the Army Air Forces of high-altitudes for daylight bombing missions, one of the peculiarly American contributions to the tactics of the present war, has made the long-standing and complex problem of communication at high altitudes a matter of considerable urgency. Since effective plane-to-plane and plane-to-base radio communication and clear and uninterrupted intercommunication between all the members of a bomber's crew are basic needs for the teamwork and coordination essential to a successful bombing mission, the importance of high-grade communication is of the first order.

As the problem has been presented by Army Air Forces operations in the European Theatre, all imposed conditions have added to the natural difficulties inherent in high-altitude communication. Briefly, the decrease in the

density of the atmosphere from 15,000 feet upward causes deterioration in acoustical and electrical fidelity as well as in the speaking and listening abilities of the crew.

At high altitudes it not only requires the exercise of a great deal of physical effort to speak clearly and at a sound level above that of a whisper, but, at best, the resultant energy levels are very low. This is because the columns of air which are modulated to transmit sound waves between lips and microphone, or between headphones and ear, have become reduced in density



in a degree proportionate to the altitude, and therefore less effective as conductors of sound. Add the difficulty in breathing and reduced human energy at high altitudes to the need for increased human effort in speaking — then add human tension, the electrical and acoustical deterioration in the performance of equipment and the extremely high levels of noise encountered in large, multi-engine aircraft, and it is not difficult to see why this type of communication differs considerably from all other forms of speech communication.

Solution of the problems involved requires intensive research into possible methods of improving each component of the aircraft communication system. A great deal of flight-test work at high altitudes, as well as extensive laboratory work, is involved. To date much progress has been made and,

while all the equipment necessary to obtain the maximum of performance at high altitudes is not yet in production, much of it is in the advanced stages of design.

It is intended, in the present and succeeding issues, to describe the improved communication equipment by treating in detail each major equipment component of the system; also to give some information on the progress being made in the developmental stages where the equipment is not yet in production.

Headsets and Headset Accessories — Headset HS-33 and Headset HS-38 are the new standard headsets developed for the Army Air Forces by the Signal Corps for use with aircraft radio and interphone equipments. These headsets replace Headset HS-23 and HS-18. Headset HS-33 is used with Headband HB-7, while Headset HS-38 is for use with the Air Corps helmet.

The new headsets employ the Receiver Unit ANB-H-1 (Army-Navy-British). These receiver units compare in electrical characteristics with the R-14 units of the old type Headset HS-23 and HS-18 as follows:

Electrical Characteristics	ANB-H-1	R-14
Impedance per Unit (1000 c.p.s.)	300 ohms	4000 ohms
D.C. Resistance	100 ohms	1000 ohms
Response	(Equalized) Flat 100 - 3500 c.p.s.	(Peaked) Resonant at approx. 1000 c.p.s.

Due to the resonant characteristics of the old HS-23 and HS-18 in the range of 800 to 1000 cycles, painful "blasting" of the ears of the user was frequently experienced in the presence of extremely loud signals. This effect is considerably reduced in the new flat response headsets. At the same time a high degree of sensitivity and greatly increased naturalness of reproduction are obtained.

The superiority of the new headsets over the old from the viewpoint of speech intelligibility is especially evident under high noise level conditions and at high altitudes. Carefully controlled tests, both in flight and in the laboratory, in which the more severe service conditions were simulated, show increases of approximately twenty percent in the intelligibility of speech heard over the equalized high-fidelity headsets as compared to Headset HS-23 and HS-18. In practical terms, this means that under conditions where the probable loss using the old design headsets would be an average of five words out of ten, the loss would be reduced to only two or three words out of ten when the new headsets are used.

Aircraft radio receivers and interphone systems, as now installed in Army planes, are wired for high impedance outputs to match the HS-18 and HS-23. In order to adapt the low impedance headsets for use in these equipments, an impedance matching transformer, known as Headset Adapter MC-385,

is employed. The adapter consists of a box which includes the transformer, a jack and a plug shank. Headset Adapter MC-385 will adapt any receiver or interphone amplifier now using the HS-23 or HS-18 to low impedance, but it is commonly inserted in the headphone jack of the interphone jack box of multi-place aircraft. In single place aircraft, the low impedance tap provided on the output transformer of all radio receivers now being delivered is sometimes used in place of the Headset Adapter MC-385. When the receiver is wired for low impedance, this condition is indicated by a red marker at the headset jack. Likewise, low impedance is indicated on Headset HS-33 and HS-38 by the color red, where the red shell of Plug PL-354 attached to the headset cord distinguishes the headsets from the old high impedance types HS-23 and HS-18, which employ the black-shelled Plug PL-54.

A headset Cushion MC-162-A, which is a considerable improvement over the old Cushion MC-162, with which the HS-23 was equipped, is used with the headband type Headset HS-33. This cushion is particularly superior in performance to the MC-162 with respect to noise exclusion and in the acoustic coupling effected between the receiver and the ear. A still better cushion, which will afford greater comfort to the wearer as well as improved insulation from external noise, is now about to go into production. The increased comfort and noise excluding effect are both accomplished by the use of a sponge neoprene rubber cap which enables it to mold itself to the particular shape of the wearer's ear. The new cushion, when issued, will bear the nomenclature Headset Cushion MX-41/AR. For the helmet type Headset HS-38, the Signal Corps has supplied to the Army Air Forces the necessary specifications and design information for an improved type of "doughnut" cushion. This cushion, which is sewn into the helmet, is one of the most comfortable of earphone cushions and has excellent noise exclusion characteristics. For best performance, the cushions must be positioned in the helmet and sewn in to fit the head of the individual wearer.

A noteworthy fact about the new headsets is that they are strictly precision instruments. Defective receiver units of the old R-14 type were frequently repaired in the field by the replacement of diaphragms, magnets, and other parts. This practice, however, is not possible with the new ANB-H-1 units and the defective unit must be wholly replaced. This is because the strictest controls are maintained over the units in production, including rigid requirements with respect to the dust, humidity and temperature conditions under which the units are constructed and assembled. The receiver units, when assembled, must conform to very narrow limits of deviation in electrical and acoustical performance and in general serviceability. The result of these careful procedures is a receiver unit of more uniform excellence, eliminating the need to "match" receiver units in order to obtain a satisfactory headset assembly.

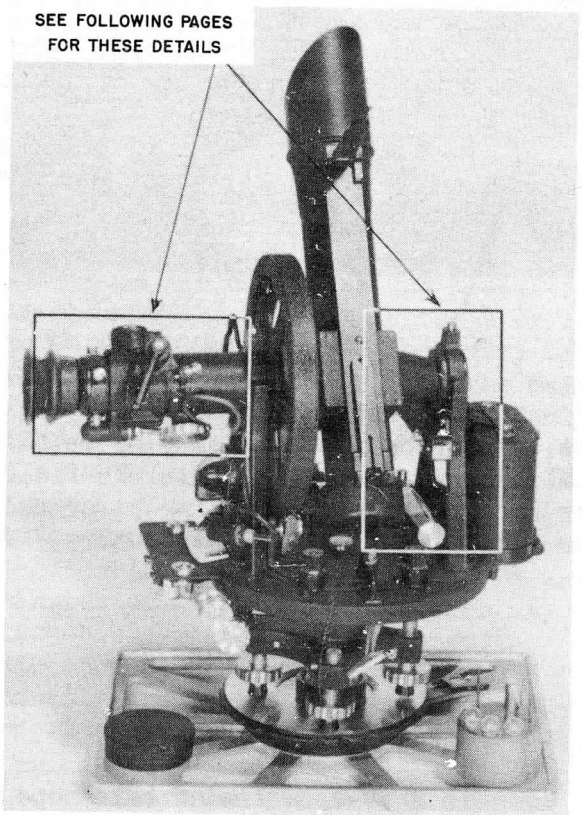
NEW ACCESSORIES FOR THEODOLITE ML-47-( )

Theodolite ML-47-( ) is widely used in the meteorological services of the Army in determining the direction and velocity of winds above the surface of the earth.

The instrument consists essentially of a right angle telescope, so mounted as to be capable of rotation in both a horizontal and a vertical plane. Cross hairs are provided near the eyepiece lens to indicate the center of the field of vision. Both the vertical and horizontal circles are graduated in degrees, and verniers are provided by means of which the angles may be read to tenths of degrees. The telescope is rotated by thumb screws, the left hand controlling the movement in a vertical direction, the right hand controlling movement in a horizontal plane.

In field use, the instrument is mounted on Tripod ML-78-( ). Since one function of the instrument is the measurement of horizontal (or azimuth) angles, it is necessary that, having established the instrument and tripod on the ground or roof, it be oriented in such a manner that when the instrument points to true north, the azimuth angle reads 0°.

SEE FOLLOWING PAGES FOR THESE DETAILS

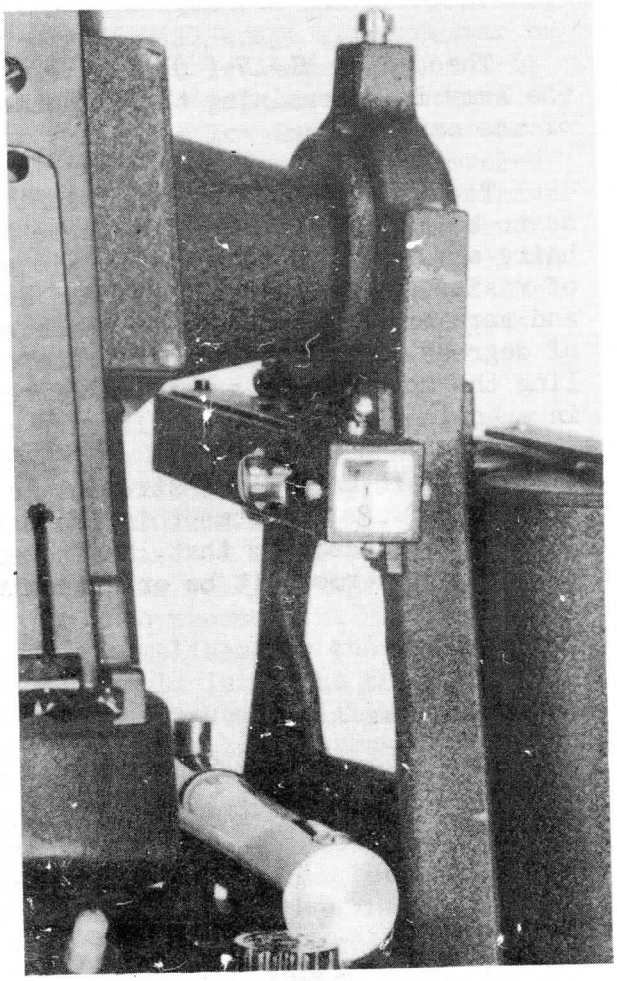


THEODOLITE ML-47. FOR USE WITH METEOROLOGICAL OBSERVATION SET.

The process of orientation on a fixed station is usually very simple. In the process of establishing such a station, measurements are made on Polaris or the Sun, and by application of suitable corrections, the instrument is pointed to true north and the horizontal circle is adjusted until it reads 0°. Bearings are then taken on various objects and lights, such as the peak of a water tank, the top of antenna masts, smoke stacks, boundary lights, etc. These bearings are recorded and made available for quick reference. Each time the theodolite is set up and oriented thereafter, it is necessary only to train the telescope on an object whose bearing is known and to rotate the azimuth circle until its reading agrees with that bearing.

Military use of the instrument, however, frequently does not permit orientation by means of the Sun or other star, and it is necessary to resort to more expeditious, if somewhat less accurate, means. Compass

ML-197 was recently developed to fill this need. It consists of a small tubular casing enclosing a magnetic needle. The casing is attached to one of the standards of the theodolite either by means of screws into previously tapped holes or by means of a clamp which is furnished for the purpose. When mounted, a small window is visible at one end of the compass, through which the indicator may be seen. Obviously the compass needle is not free to rotate through a complete circle, but rather through only a few degrees. Since its purpose is merely to indicate magnetic north, this slight rotation is sufficient. In use, it is necessary merely to set up and level the theodolite, to rotate the telescope until the reading of the azimuth scale is 0° (± the compass variation at the locality), than to rotate the horizontal circle until the indicating needle of the compass points to the fiducial mark representing north.

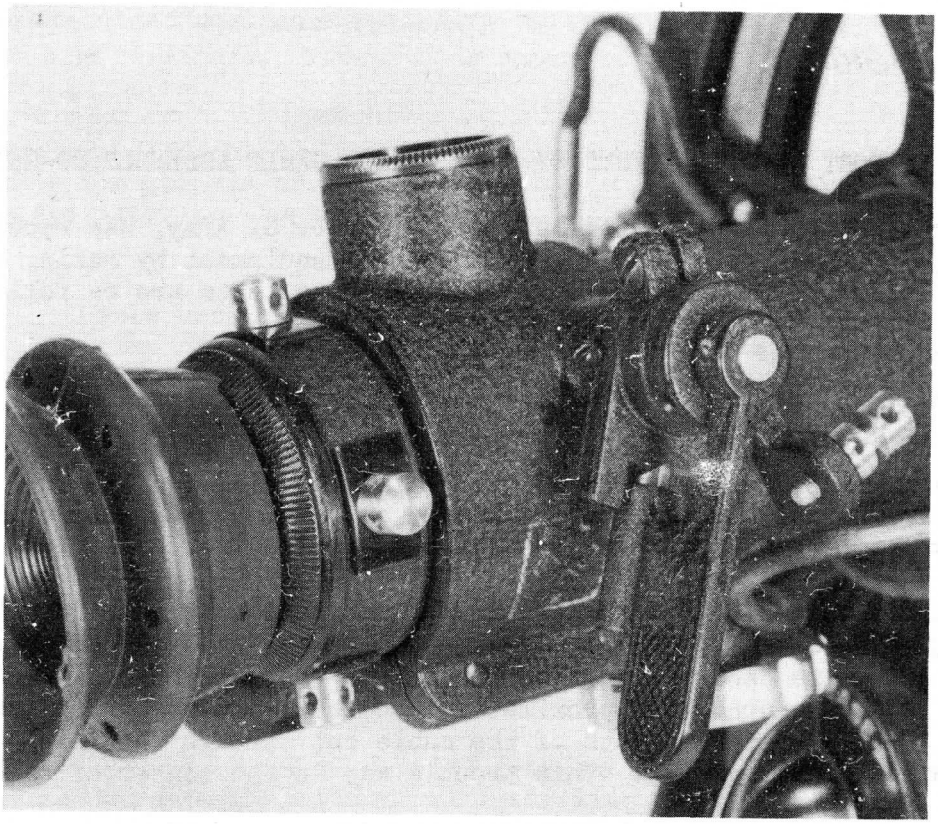


DETAIL VIEW OF COMPASS ML-197.

While this compass is expected to fill a definite need in the mobile Weather Units and of other field activities requiring the use of a theodolite, it is not expected to supersede the earlier method of orientation by means of Polaris or the Sun in fixed stations. Observers making use of the instrument in mobile installations must be constantly reminded of the possible error caused by deflection of the compass by the proximity of metallic objects. It is anticipated that Compass ML-197 can be installed in the field on any Theodolite ML-47-( ) (suffix letter E or later) by operating personnel. The compass and clamp will be available on requisition in the near future, as follows:

Stock Number	Item
7A750	Compass ML-197
7A750/1	Compass Clamp

Concurrently with the development of Compass ML-197, a finder telescope was produced. The principal telescope on Theodolite ML-47-( ) is approximately twenty-power, necessarily therefore permitting only a very narrow angle of vision. During the first few minutes following release of the balloon, it is fre-



DETAIL VIEW OF FINDER TELESCOPE ML-146

quently difficult, sometimes impossible, to get or keep the balloon in the telescope field. Telescope ML-146 is designed for attachment to any Theodolite ML-47-( ) (suffix letter E or later). During an observation the observer may, without the necessity of removing his eye from the eyepiece, direct the line of vision from the main telescope to the "finder telescope" or vice versa, at will, by means of a lever. The finder telescope, being only four-power, embraces a much wider field of vision, so that even in cases of excessively turbulent air, the balloon can usually be kept within the telescope field. The fact that the magnification is relatively low does not detract from the usefulness of the device, since difficulty in keeping the balloon in the field of vision is usually encountered only during the early minutes of the observation when the balloon is not sufficiently distant from the observer to require a high degree of magnification. Similarly, when the distance out is such that the higher magnification is required, conditions usually are such that the image can be kept in the narrower field of vision provided by the main telescope of the instrument.

While Telescope ML-146 will be available in the near future, it is pointed out that the installation of this accessory can be accomplished only by experienced instrument makers with suitable shop facilities. Theodolites now being delivered by the manufacturer are equipped with the compass and finder telescope at the factory.

GROUND SIGNAL

REPORT ON FIELD TESTS OF SPIRAL-FOUR CABLE ASSEMBLY CC-358

Headquarters 56th Signal Battalion, SPO #305, U. S. Army, has recently experimented with spiral-four cable and carrier equipment by making a series of field tests. The nature and results of these tests are as follows:

Field Test Number 1 — Spiral-four cable was installed over a distance of fifty-seven roadmiles. Sixty-four wire miles of cable were used, the difference being accounted for in ties, dropping connectors down poles, etc. The cable was elevated on existing poles for the entire distance. Because no standard supporting clips were available, it was necessary to use basket-weave ties, made of marlin or single field wire.

This installation was in service for approximately four days and, during that time, two cases of trouble developed. A marlin tie broke at a corner pole allowing the cable to sag down in a road where traffic soon caused a break. In a long span of approximately 200 feet, the strain on the cable was so great that the steel sheath of the cable cut through the insulation of one conductor causing a ground. This trouble was in the center of the span.

Two repeater stations Repeater CF-3-( ) were installed in the above line at approximately one third and two thirds the length. Carrier terminal equipment Telegraph Terminal CF-1-( ) and CF-2-( ) were installed at the terminals. Three speech and four teletype channels were available although, due to lack of machines, only two of the teletype channels were used.

Results: Service using the carrier equipment was excellent. No difficulty was encountered except those faults in the cable as indicated above.

Field Test Number 2 — This test was made with the cable as it was installed for Field Test No. 1. At a point 38 miles from one end of the cable an installation was made without the use of the carrier equipment. The two metallic circuits of the spiral-four cable were simplexed giving two telephone circuits and two teletype channels.

Results: This installation was in service for approximately 24 hours and gave good service. This test showed that spiral-four cable will give much better service even without the use of the carrier equipment than either rubber cable or field wire with loading coils.

Field Test Number 3 — Spiral-four cable was installed for a distance of 36 miles. This line was elevated except for a distance of approximately two miles where it was laid on the ground. One repeater station Repeater CF-3-( ) was installed approximately 12 miles from one end of

the line and terminal equipment Telegraph Terminal CF-1-( ) and CF-2-( ) were installed at the terminals. Three-voice channels and two teletype channels were used for 24 hours.

Results: No difficulties were encountered and the equipment gave excellent service. The purpose of this test was to give additional personnel experience in installation of the cable and equipment.

Field Test Number 4 — Cable was installed for a distance of 32 road miles and 38 wire miles of cable were used. This cable was again installed on existing poles with the last 5 miles exposed to very high winds. A gale of very high velocity blew for 24 hours while this test was being conducted and no trouble developed in the cable.

A repeater station Repeater CF-3-( ) was installed in the center of the line and terminal equipment Telegraph Terminal CF-1-( ) and CF-2-( ) were installed at the ends.

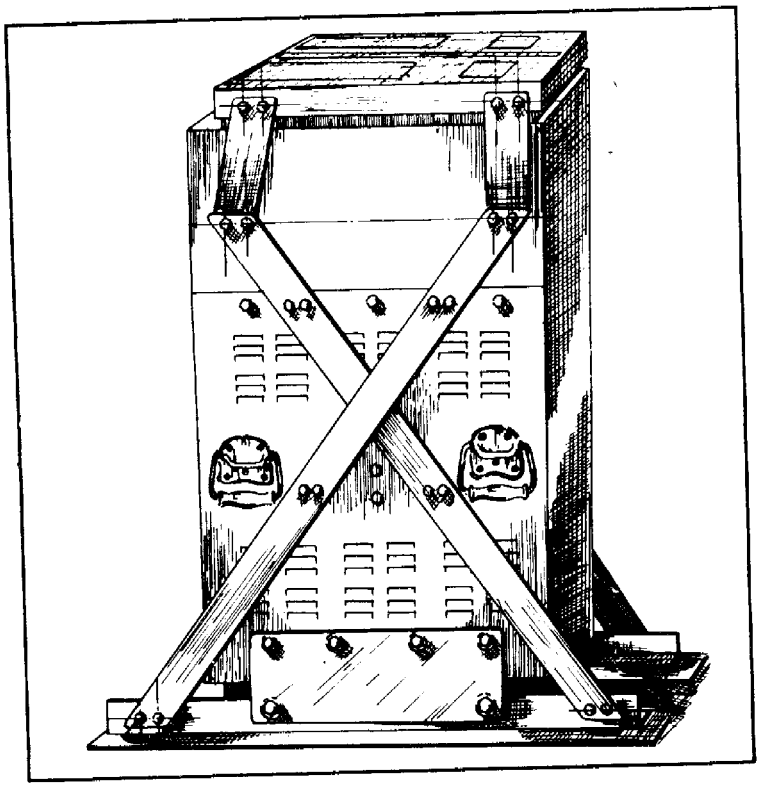
Results: Communication was excellent. The cable will stand strain if erected with care.

Field Test Number 5 — For a distance of 4 miles from one end of the line erected for Test No. 4 a British multi-air-line was constructed. This line was constructed with 100-ft. span lengths and was transposed using a non-phantom L section scheme as a basis. This open wire section was cut into the cable line giving a line consisting of 34 miles of spiral-four cable and 4 miles of open wire.

The carrier equipment already installed for Test No. 4 was realigned and functioned in an excellent manner. No difficulty whatever was encountered. Three voice and two teletype channels were used.

General Observations and Results — Carrier Equipment: After damage due to shipping was corrected, no trouble has been encountered. The part that has been mounted in trucks has been hauled over very rough terrain and seems to be fairly rugged. The time for aligning the equipment after construction is complete is approximately 30 minutes. It is believed that this will be the minimum that can be attained.

Spiral-four Cable: This cable must be handled more carefully than 5-pair rubber cable. However, it has been found that leaving a half filled drum at a connection has no ill effects on operation. This cable can be laid on the ground where it is definitely protected without ill effect on operation. Single-strand marlin is too light for ties. Span lengths of over 150 ft. should be avoided. Spiral-four cable will give two metallic talking circuits for a much greater distance than either field wire or 5-pair rubber cable with loading coils.



ADDITIONAL BRACING REQUIRED ON EARLY MODELS OF SCR-399

It has been found that early models of Radio Set SCR-399 have been damaged in shipment due to various mountings of insufficient strength to withstand shipping abuse. Action has been taken to correct this in current and future procurements. Meanwhile, all SCR-399 with serial numbers from 1 to 1992 should be returned to repair shops or depots for strengthening, whenever using organizations can spare them for a few days.

The weaknesses and their remedies are as follows:

1. Radio Transmitter BC-610 tears from its mounting base due to the relative thinness of the portion of the transmitter housing which is secured to the shock mounting base. The top cover of the transmitter, to which Antenna Tuning Unit BC-939 is mounted, breaks loose from the transmitter housing. This condition has been remedied by strengthening the housing of BC-610 in current and future procurements. For use with the earlier models (Serial Nos. 1 to 1992) steel reinforcing plates and straps have been designed, as shown in the accompanying illustration. They will prevent such damage.

2. The shelf which supports Chest CH-120 and Chest CH-121 in Shelter HO-17 tears loose from its mounting. In order to reduce the strain on the shelf, additional turn-buckles have been designed to hold these chests securely to the wall of the shelter.

The depots and shops are being sent full instructions for the installation of these improvements. In order to guard against damage to early models of SCR-399, users are advised to have the additional braces installed at the earliest possible date.

CERTAIN SIGNAL CORPS EQUIPMENT BAGS TO BE REQUISITIONED DIRECTLY FROM OQMG

Certain special purpose waterproof bags are now to be requisitioned directly from the Office of the Quartermaster General and not through the Signal Corps, although they are used with (though not part of) Signal Corps equipments. The transfer of the present stock of these bags, together with all future procurements, to OQMG, and direct communication with that Office during the period of transfer and subsequently has been authorized by Army Service Forces.

The bags in question, and the equipments with which they are used, are as follows:

Bag BG-159, waterproof, special purpose, size 20½" x 16½" x 11½"; used with but not part of Radio Receiver and Transmitter BC-654-( ), Switchboard BD-71, and Radio Set SCR-509-( ), SCR-510-( ), SCR-609-( ), and SCR-610-( ).

Bag BG-160, waterproof, special purpose, size 12" x 9" x 18"; used with but not part of Radio Set SCR-194, SCR-195 and accessories of Radio Set SCR-284-( ), Frequency Meter Set SCR-211-( ), Detector Set SCR-625-( ), Transmitter Tuning Unit TU-8-B, Telephone EE-8-A (4 per bag), and Signal Lamp Equipment EE-84.

Bag BG-161, waterproof, special purpose, size 16½" x 15½" x 27"; used with but not part of Switchboard BD-72, BD-72-A, BD-72-B, BD-100, and Radio Set SCR-206-( ) and SCR-244.

Bag BG-164, waterproof, special purpose, size 7½" x 7½" x 12"; used with but not part of Generator GN-45-( ), Telegraph Set TG-5 and Converter M-209-( ).

Bag BG-169, waterproof, special purpose, size 12" x 7" x 16"; used with but not part of Radio Set SCR-593-( ), SCR-300, SCR-536-( ) plus batteries, and SCR-694-( ), and Chest Unit T-39-( ).

MODIFICATION KIT IMPROVES RADIO SET SCR-506-A

A ballast resistor for reducing voltage in the filament circuit of Radio Set SCR-506-A is now being incorporated in production of this set. The manufacturer is also supplying Modification Kits including this ballast resistor for issue to all using organizations having Radio Set SCR-506-A not so equipped. Signal Corps Stock No. 2S506A/K1 has been assigned to the kit.

MAINTENANCE NOTES

PREVENTIVE MAINTENANCE FOR SIGNAL CORPS EQUIPMENT

The purpose of this article is to outline the practice of preventive maintenance as applied to Signal Corps equipment used by the Army Ground Forces.

Preventive maintenance is that ordinary everyday care of equipment which will assure its continuous operation and satisfactory performance. Although all echelons perform this maintenance, it is a primary duty of operating and organizational maintenance personnel (first and second echelon).

The aim of preventive maintenance is to avoid breakdown and interruption of operation. If repairs are impractical, under service conditions, the equipment should be replaced and sent back for overhaul before failure. A few minutes spent checking and making adjustments, or making minor repairs and replacements may prevent a complete failure, which will require removal of equipment from service and hours of repair work.

The Practice of Preventive Maintenance

Failures occur most commonly in parts operating at high temperatures, rotating machines, internal combustion engines, and other moving parts. Some preventive maintenance practices which will reduce failures at these points are outlined in the following paragraphs:

Parts operating at high temperatures, such as vacuum tubes, bleeder resistors, ballast resistors and lamps, oven heaters, etc., should be inspected at regular intervals for defects.

a. Tubes should be tested regularly and replaced when they reach the end of their useful life, as indicated by values set up for the tube. Periodic replacement of tubes at the end of a certain number of hours is unnecessary (except in a few special cases) and should not be practiced.

b. Lightly tapping receiver tubes while listening will often reveal noisy tubes and those having loose elements.

c. Resistors which carry sufficient current to heat them should be checked regularly for discoloration and warpage. If these indications of overheating are present, further investigation should be made. If the resistor has changed value or otherwise deteriorated, it should be replaced before complete failure.

d. Parts which operate at high temperatures may damage other parts located near them by softening of insulating compounds, and by prematurely aging plastic parts and insulation on wire. All such items should be examined regularly for indication of impending trouble and corrective action taken.

Rotating machinery requires frequent servicing to obtain long life and

trouble-free operation. All types of generators and dynamotors should be checked regularly. Frequent and thorough cleaning of all equipment to remove accumulations of dirt, dust, sand, grease, carbon, etc., is essential for maximum service performance.

a. Bearings should be checked for lubrication, overheating and noise. Most Signal Corps generators and dynamotors have ball bearings, and the majority of these will operate over long periods without attention, if properly lubricated when installed. Bearings can be over-lubricated, as well as under-lubricated. Too much or too heavy grease will cause heating due to molecular friction which will cause the grease to melt and run out of the bearing. Ball bearings should operate at practically the same temperature as other parts of the machine, while sleeve bearings will operate at a higher temperature. As a practical quick check, sleeve bearings on which the hand can be held, are not too hot. A bearing which is throwing out grease or oil should receive immediate attention.

b. All commutators must be kept dry and free from oil. Carbon brushes wear off when in use and, if commutators are kept dry, most of the carbon dust worn from brushes will be thrown off and will do no harm. Brushes should fit their holders without friction when moved back and forth. Spring tension should be kept as received from the factory wherever possible.

Internal combustion engines, especially the small sizes, are perhaps the most difficult of all Signal Corps equipment to maintain in good operating condition. Small size engines frequently work close to their maximum load and under continuous duty for which they were not designed. As a consequence, they require considerable preventive maintenance. The most frequent cause of failure is overheating. This is usually due either to overloading, operating in closed spaces without sufficient ventilation, retarded spark, too rich fuel mixtures, improper grade of oil, or not enough oil. Oil must be checked regularly.

a. The man operating the engine should familiarize himself with its operating characteristics, such as the normal operating temperature, rate of oil consumption, and amount and characteristics of noise during operation, etc. Any change in these will be an indication that something is wrong.

b. Carburetors and gas strainers should be cleaned periodically. The ignition wiring should be checked for frayed and oil soaked spots which may break down. All moving parts not oiled automatically should be attended to regularly.

All moving parts require attention. Relays especially need to have contacts cleaned and alignment checked, springs and flexible connections inspected for wear, tension, clearance and breakage. If operating dial shafts become dry, they should be given a drop of oil, provided the shaft and its bearing are not employed as an electrical conductor. Gears on dial mechanism often require lubrication at bearing points. When a tuning knob or dial begins to turn with difficulty, it should be thoroughly inspected. Switches, especially those which carry heavy current, should be inspected often. Switch shafts should also be lubricated, but not if they are a part of the electrical circuit.

Preventive Maintenance Check Sheet

Preventive maintenance consists of many small jobs, seemingly unimportant in themselves, performed at regular intervals. A check sheet system is essential for properly performing this work. The required jobs should be listed by the non-commissioned officer in charge of maintenance and the following procedure is recommended:

1. Performance of the jobs on the check sheet should be required at regular intervals (hourly, daily, weekly, etc.), depending upon the type of job and other circumstances.
2. A separate sheet should be prepared for each type of equipment. Columns should be provided for checking off each operation, and for remarks when the check reveals a defect.
3. The sheets should be filled in by the man who makes the check, then noted and initialed by the officer or non-commissioned officer responsible for operation of the equipment. Check sheets should be kept on file in the unit for future reference.
4. Check sheets should be prepared and reproduced locally. A suggested form is given below:

MAINTENANCE CHECK LIST

For _____ Used With _____

Organization _____ Location _____

Instructions: When operation is performed and item is OK, check off. When item is unsatisfactory, explain in remarks column.

NO. ITEM	ITEMS TO BE CHECKED	CHECKED	REMARKS

Above items checked and found in proper operating condtion

By _____ Rank _____ Date _____

Noted and Approved

By _____ Rank _____ Date _____

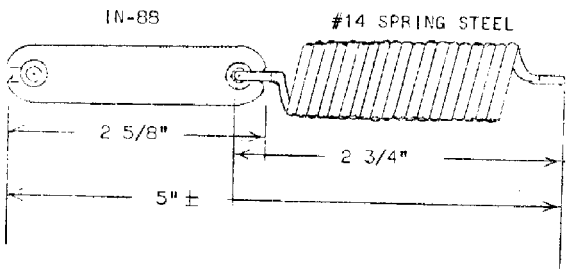
MOISTURE AND FUNGUS PROOFING OF SIGNAL EQUIPMENT

A Moisture and Fungus Proofing Kit having nomenclature MK-(10)/GSM has been developed for treating Signal Corps equipment. This kit is intended for emergency use in areas where moisture and fungus proofing of Signal Corps equipment is urgently needed. The kit contains 60 gallons of moisture and fungus proofing varnish, together with paint brushes, hand sprays, instruction books, paint remover, masking tape, thermometers and paint thinner. The materials are equally divided into six packages for convenience in handling and distribution within an organization. The materials in one kit MK-(10)/GSM are sufficient for treating the Signal Corps equipment in an average division.

These kits are under procurement and deliveries are now being started in limited quantities.

SUBSTITUTE FOR CORD MC-271

The rubber shock and insulator Cord MC-271, for aircraft antennae, was deteriorating rapidly, due to the tropical sunlight and high temperatures. This condition was eliminated by the substitution of the spring and insulator combination illustrated herewith, a development by T/4 Lawrence M. Bowen.



The spring was made from #14 spring steel wire wound on a rod three-eighth inch in diameter, ten inches long. The rod has a one-eighth inch hole drilled in it near one end. The rod is placed in a lathe, wire inserted in the hole, and the lathe turned at a very slow speed. The wire is fed by hand forming a long spring. The spring is then cut into lengths two inches long and the ends bent back to form an eye. An Insulator IN-88 is then put through one of the eyes.

This assembly will stand a sixty-pound tension. The working tension on the aircraft is thirty to forty pounds.

— Contributed from overseas by
903rd Signal Co. Depot, Avn.

CARE IN HANDLING RADIO TRANSMITTER BC-191

Care should be taken in handling Radio Transmitter BC-191 to prevent forward tilting. Because of the high and narrow construction of the equipment, an unbalanced position, particularly forward tilting, may result in damaging the exposed knobs, tubes, and other delicate parts.

The transmitter, when removed from its mounting, should never be allowed

to stand without support, but instead should be firmly held in an upright position. Servicing can then proceed without danger of the set tipping.

It is recommended that one of the regular mounting frames be bolted to the bench top, and that the set be secured to this frame in the same manner as in the transmitter's normal operation.

When being transported, care should be taken to prevent the set from tilting, by the use of suitable blocking or by straps.

MODIFICATION OF RADIO SET SCR-299-A, -B, -C and -D

Radio Set SCR-399-( ) and SCR-499-( ), which are Radio Set SCR-299-E installed in Shelter HO-17, and packed for air transport, respectively, have a modulator bias circuit which is superior to that used in earlier issues of Radio Set SCR-299-( ). The changes are extremely simple and require the installation of only one additional part: a 25,000 ohm, 10 watt resistor, together with terminal strip, terminals, and hook-up wire. They result in the deletion of the capacitor which bears Reference No. C-22 in Figures 50, 51 and 52 of TM 11-280 (22 June 1943), a capacitor which has been reported from the field as a cause of set failure.

The capacitor referenced as C-22 shunts the resistor referenced as R-12 in the schematic diagram of the set as published in the technical manual, and acts as the modulator bias filter in Radio Transmitter BC-610-( ), which is part of Radio Set SCR-299-A, -B, -C and -D. A portion of the side-tone signal in the Radio Transmitter BC-610-( ) is present in the secondary of driver transformer T-8 and is carried to the voltage divider, which consists of the bias-supply bleeder (adjustable tap resistor R-11) and bias voltage-control potentiometer R-12. Capacitor C-22, connected across potentiometer R-12, serves to eliminate tone modulation of the carrier by preventing voltage variations, caused by the side tone, from entering the bias return leads of the tubes designated as V-10, V-11 and V-16.

However, when relay RY-3 is removed from its present position in the positive "B" lead from the center tap on the primary of transformer T-9 to the choke L-4, and instead is connected in series with the modulator grid bias return lead which connects the arm of potentiometer R-12 and the center tap on the secondary of the driver transformer T-8, side tone will not be present at the potentiometer R-12 during CW transmission, because relay RY-3, being in series with the modulator grid-bias return lead, will break this circuit. The portion of the circuit formerly connected by the closed relay is bridged by a wire connection.

A 25,000 ohm, 10 watt resistor, connected between the modulator power supply negative terminal and the modulator tubes' grid return (that is, between the center tap on the secondary of transformer T-8 and the center tap on the secondary of transformer T-7 on the diagram) serves to drive the grids of the modulator tubes sufficiently negative during CW operation to cause cut off.

Thus, with the re-positioning of the relay contacts in respect to the circuit, and the addition of the 25,000 ohm resistor, the use of capacitor C-22 is not required.

PROLONGING LIFE OF DRY BATTERIES

Many dry batteries are arranged so that contact with the negative terminal is made by a brass or copper spring pressing against a portion of the zinc case of one of the cells which make up the battery. Since current flows through this contact while the battery circuit is closed, there is opportunity for electrolytic action to occur at the contact surface. Such electrolytic action is greatly increased by large amounts of moisture in the air. A slight drop in temperature causes the moisture to condense to water, and the wet contact acts exactly like an electrolytic cell. Two damaging conditions result:

1. The electrolytic action causes the zinc to oxidize, forming zinc oxide. This is indicated by a white coating on the zinc surface, powdery when dry, and wet and sticky when damp. The layer of zinc oxide acts as an insulator, and reduces the current which can be drawn from the battery. This means less light from flashlights, less volume from radio and telephone receivers, less range from transmitters.

2. If the battery is still operated while the layer of zinc oxide is damp, holes will be eaten in the zinc and the battery ruined.

When the battery output falls off, as evidenced by the effects noted in paragraph 1 above, the battery is condemned and thrown away, although it may actually have more hours of serviceable life remaining. These service hours can be obtained by cleaning the contact as follows:

1. Scrape the zinc surface with a knife to remove the layer of white material, being careful not to gouge into and remove scraps of the zinc metal itself;

2. Polish the scraped surface with fine sandpaper until it is bright;

3. Wipe dry the batteries, the contact springs, and the inside of the battery compartment.

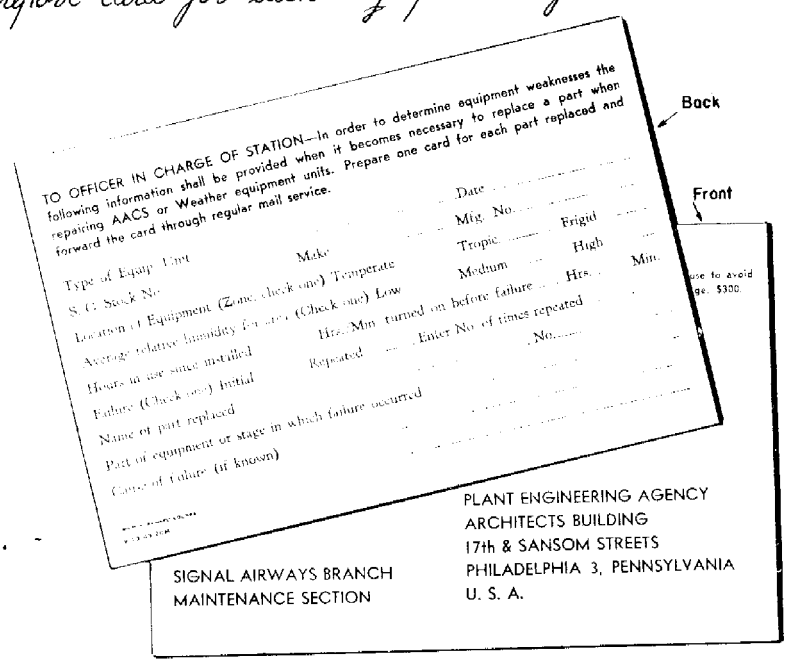
All troops using dry batteries should examine them daily, paying particular attention to the contacts, and clean them as necessary. This precaution will increase the service obtained from batteries, and will in many cases prevent unexpected failure of communication equipment. The presence of white powder, soggy white deposits, and corroded spots on the zinc shells of batteries is evidence of electrolytic action. It calls for immediate cleaning and drying.

24-62903ABCD

MAINTENANCE OF AACS* AND WEATHER EQUIPMENT

To improve maintenance conditions of Fixed Plant equipment, the Plant Engineering Agency has started a maintenance program which will provide information to allow maintenance analysis of equipment failures. A Parts Replacement Report Card has been prepared for use by the Officer in Charge of

You can start the ball rolling for better maintenance of your A.A.C.S. and Weather Equipment. Send in a trouble report card for each Equipment failure.



These Cards are Not restricted

BLANK CARDS MAY BE OBTAINED FROM SECTOR OFFICES

SIGNAL AIRWAYS SERVICE
PLANT ENGINEERING AGENCY
ARMY COMMUNICATIONS SERVICE

Airways and Weather Stations to report equipment failures. This card, which is illustrated here, provides for the insertion of certain essential information regarding equipment failures which will be used to analyze the cause of the trouble when the card is received at the Plant Engineering Agency. The card is self-explanatory and will require little time on the part of the station maintenance personnel to prepare it. It is so arranged that no information will be included which would make the card classified matter and it can therefore be forwarded through regular mail channels.

Since Fixed Plant and Weather equipment is repaired by men permanently assigned to the station, it is somewhat difficult to obtain reports of maintenance replacements so that proper analysis may be made of the performance of the equipment. It is reasonable to assume that equipment which gives excellent service in the temperate and frigid zones may not give satisfactory service in the tropical areas, and equipment which works to perfection in dry climates may not function properly in wet or humid areas. It is also assumed that failures might occur on one type of equipment at various stations throughout the world and replacements having been made locally at each station no overall maintenance measures would be taken to prevent similar failures at other stations.

It is expected, however, that information gathered from these cards arriving from world regions will permit analysis of such failures and result in a general substitution at all stations of particular items which fail, effectively preventing subsequent failures from the same cause. It is recognized that equipment failures must be immediately restored, but it is also extremely important that preventative measures be taken to prevent these failures since time, trouble, and often lives are saved if preventative maintenance effort is taken before breakdowns occur.

* Army Airways Communications Service

REMOVAL OF REGISTRATION ON SECRET INFORMATION LETTER No. 2, OCSigO

(The following memorandum, issued by the OCSigO, is quoted here for the benefit of units which, due to reorganization or change of address, may not have received it by mail.)

Effective 18 October 1943, Secret Information Letter No. 2, issued 15 April 1942 by the Office of the Chief Signal Officer, was removed from registration. This document retains its classification of SECRET, but custodians are no longer required to render a semi-annual report on its possession. If this document is no longer of any value to an organization, it may be destroyed in accordance with existing Army Regulations.

SIGNAL CORPS LEGAL AGENCY HELPS SOLVE

BRITISH-AMERICAN WARTIME PATENT PROBLEMS

The Signal Corps Legal Agency, a field agency of Legal Division, Office of the Chief Signal Officer, is now in operation in London, England. The primary mission of this agency is in connection with international patent matters, and its staff members, comprising at the present time Major Nelson Moore, OC, Captain Jesse Moss, Mr. Robert H. Young and S/Sgt. Barney Cohen, were selected for their legal training in patent matters and their knowledge of the procedures involved under the various statutes, international agreements and regulations which govern the interchange of patents and technical information in wartime.

Perhaps the least known and understood of these extremely important documents is the agreement between the United States and Great Britain on "Interchange of Patent Rights, Information, Inventions, Designs or Processes" signed on 24 August 1942 and retroactive as of 1 January 1942. The gist of this agreement is embodied in the first sentence of Article I: "Each government in so far as it may lawfully do so will procure and make available to the other government for use in war production patent rights, information, inventions, designs or processes requested by the other government." The cost of such procurement is borne under Lend-Lease and reciprocal aid.

Each government, when it recognizes the need of any of the items covered, requisitions on the other for that item, and, in the case of a British requisition on a Signal Corps item, it is the Legal Division, OCSigO, that negotiates the necessary patent licenses or other agreements involved. The difficulties arise in knowing when British owned patents are being used by American manufacturers, so that a license is needed, and in keeping track of the ultimate recipient of licenses and technical data transferred to the British. Both of these factors require direct contact with British industry and patent owners, and the Signal Corps Legal Agency supplies this contact. It is able to secure more complete details than are afforded by the bald requisition and by knowledge of exact requirements, and the individuals involved can bring the ultimate parties together.

Another function of the Agency is in connection with applications for British patents on inventions relating to classified material. Such applications are affected not only by the Espionage Act and Army regulations on security, but also by the patent statute on publication detrimental to public safety or defense. Regulations by the Office of Economic Warfare, the Patent Office, and the military authorities have been so strict that some companies have sacrificed their foreign rights rather than assume the responsibilities placed upon them in filing abroad.

Since the establishment of the Signal Corps Legal Agency, such applica-

tions for British patents may be sent to the OCSigO, which forwards them through military channels to the Agency. The latter clears the recipient through G-2 and the British Military Intelligence, or, in special cases, files the application directly in the British Patent Office. Security is thus maintained and American nationals are no longer penalized for making their inventions available to the Allies by possible forfeiture of their foreign rights. This insures closer cooperation between American and British research organizations and their respective governments.

RESPONSIBILITIES RELATING TO THE SIGNAL CORPS EQUIPMENT POOL

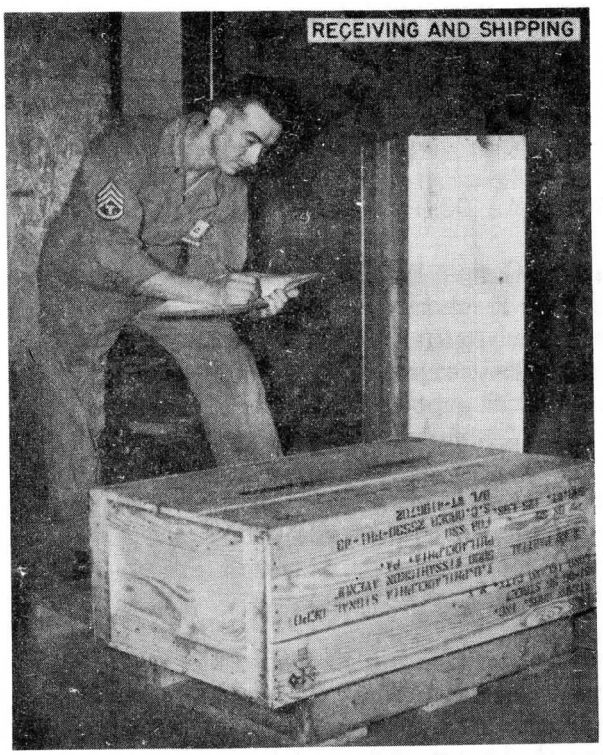
The establishment of the Signal Corps Equipment Pool was the result of a recognized need for a method of providing those critical Signal Corps items which, due to their specialized nature or inherent characteristics, are not adapted to normal issue on T/BA or T/E. In general, pool items include special items of equipment, the use of which is determined by local conditions in theatres of operation rather than the general mission of a type of organization. The inclusion of these special items of equipment in the proper amounts on T/BA or T/E to perform efficiently a specialized job results in much critical material being expended to little or no advantage.

Operation of equipment pools within theatres of operation is a responsibility of the theatre commander who will authorize equipment to using organizations as required for special projects. In this manner, pool equipment is provided at the time and in sufficient amounts to perform efficiently a specialized task. Upon completion of any particular job, it is expected that pool items will be returned to the theatre pool for future use. The equipment necessary to stock theatre pools will be provided on request of the theatre commander from available stock in the pool depot within the continental United States.

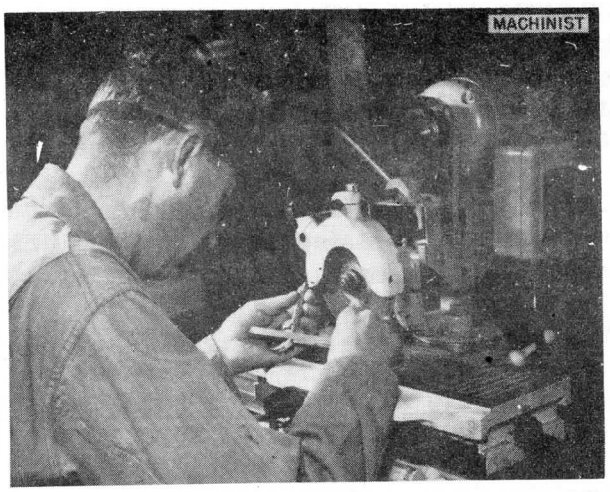
Since only a minimum of pool equipment will appear on T/BA and T/E, it has been necessary to establish a plan for the handling of pool items to insure adequate procurement and proper issue.

TRAINING FOR ENLISTED MEN AT

During the past year hundreds of enlisted men have been trained at the Philadelphia Signal Depot for important specialized Signal Corps duties. They have come from various Army activities, such as replacement centers and Signal service companies at Fort Monmouth and Camp Crowder, Army Air bases at Jefferson Barracks, Missouri, and Kessler Field, Mississippi, and unit training centers at Camp Wood, New Jersey, and elsewhere. Brig. Gen. A. A. Farmer, Commanding General at the Philadelphia Signal Depot, has made it possible for these men to receive practical instruction and real on-the-job experiences in the various Signal supply functions of the Depot.


RECEIVING AND SHIPPING

Enlisted men selected for this training are qualified by previous civilian experience in particular specialties, or have demonstrated ability in particular specialties while in military service. For example, such different designations as Radio Repairman, Salvageman, Warehouseman, Instrument Repairman, Stock Clerk, Machinist, and Quartz Crystal Grinder are among those for which intensive training is given here. It is possible to give training in such diverse activities only because the varied facilities of the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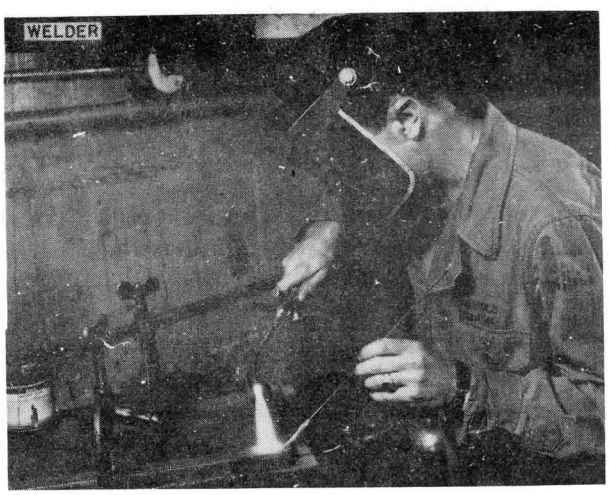
WELDER

THE PHILADELPHIA SIGNAL DEPOT

Philadelphia Signal Depot are available. In order to make full use of these facilities, and to keep the training strictly practical, most of the instruction is given on an on-the-job basis. Trainees spend an average of five hours a day working on various jobs in the sections of the Depot in which their type of work is done. Salvagemen, for instance, learn how to classify unserviceable Signal Corps property, how to use such tools as acetylene burners and hacksaws, how to accomplish such forms as tallies, shipping documents and reports of survey. Warehousemen learn how to operate materials-handling equipment, how to store material properly, and how to keep warehouse records. Storage battery electricians learn to test, repair, connect, fill, and empty lead-acid storage batteries. They also use such apparatus as motor generators, rectifiers and voltage regulators.


SHIPPING PACKER

In addition to on-the-job training, the trainees are given the benefit of up-to-the-minute educational techniques. Interest and vividness are maintained through the use of such visual instruction as films, film strips, and slides. Lectures and demonstrations are in most instances illustrated by charts and diagrams especially prepared. Manuals


BATTERY ELECTRICIAN


TELEPHONE REPAIR

uals are provided to serve as permanent references.

Besides the specialized training, enlisted men are given instruction in general and basic Signal Corps and Army subjects. For example, Signal Corps Orientation includes a resume of depot organization, warehousing, salvage and repair; Defense Against Chemical Attack provides instruction in identification of the most important war gases and their effects. Each student is given one hour and a half daily instruction in The School of the Soldier and in calisthenics, and has opportunity to act as platoon guide and platoon leader, in order to develop leadership and increase self-confidence.

Since its inception, the School has trained almost seven hundred enlisted men and the number of specialized courses available has grown from four to nineteen. The Instruction Circular issued by the Philadelphia Signal Supply Schools now includes descriptions of the following courses:

Salvageman	Transmitter Repairman
Shipping Packer	Machinist
Warehouseman	Welder
Stock Clerk	Woodworking Machine Operator
Toolroom Keeper	Duplicating Machine Operator
Stock Record Clerk	Telephone Repairman
Supply Clerk	Instrument Repairman, Electrical
Electrician	Storage Battery Electrician
Radio Repairman	Receiving or Shipping Checker

Quartz Crystal Grinder

These courses, with the exception of Quartz Crystal Grinding, last from five to six weeks. The quartz crystal course lasts approximately eight weeks.

When the men complete their training here, they go into active service wherever our forces are found, and they carry with them the knowledge and the skill that make our Signal Corps so effective on the world-wide battlefront.

MILITARY TRAINING

SIGNAL CORPS OFFICERS' TRAINING COURSES

COMPANY OFFICERS' GENERAL COURSES

Basic Military Training Course — (Three Weeks)

Purpose: To condition the newly commissioned officer to the change from civilian to military status in the shortest possible time; to acquaint him with the essential items of Military Training, customs of the service, etc., which he may shortly be required to teach recruits; to give the officer without military experience an understanding of the life and duty of an enlisted man.

Scope: The course covers the most essential portions of the Signal Corps Replacement Training Center training program condensed from four to two weeks, together with a brief orientation course.

Prerequisite: This course is for commissioned officers who have not previously completed a course in basic military subjects or who have not had such training within a reasonable period of time.

General Subjects (Common) Course — (Six Weeks - Proposed Increase to Eight)

Purpose: To provide instruction for the student officer in nontactical and tactical subjects to the extent required to qualify him in general military knowledge and tactical signal communication for duty with any signal corps tactical unit or installation provided he is proficient in the necessary technical specialty.

Scope: This course is a continuation of basic military training and includes the nontactical subjects, training methods, company administration, and tactical subjects such as general tactics, agencies of signal communications and combat orders.

Prerequisite: It is designed for all Signal Corps Officers of company grade or for field grade officers. This course is a pre-requisite for the Advanced Officers' Course.

COMPANY OFFICERS' SPECIALIST COURSES

Long Lines Outside Plant — (Nine Weeks)

Purpose: To instruct the student officer in the installation, operation

and maintenance of commercial type outside plant long lines systems, to include details of hasty open wire construction capable of being expanded into standard construction. Maintenance of open wire systems is emphasized.

Scope: This course includes the principles of telephone and telegraph installation and operation, the use of field wire, the installation and maintenance of commercial open wire and overhead cable, the laying out and planning of wire communication lines and preparation of bills of material, methods of burying wire and cable, and the organization of a construction platoon into appropriate working teams.

Prerequisite: Students should be graduated from Company Officers' General Subjects Course, experienced in some phase of open wire cable, pole line construction, with telephone, telegraph, or power company; if no previous experience, shows adaptability for outside plant work. Electrical Engineering training desirable.

Long Lines Inside Plant — (Nine Weeks)

Purpose: To instruct the student officer in the installation, operation, testing and maintenance of central office long lines equipment typical of army corps, field army GHQ, aircraft warning service installations, and installations in the larger air force units.

Scope: This course includes instruction in telephone and telegraph fundamentals, principles of vacuum tubes, transmission over wires, voice frequency equipment, carrier equipment, telephone and telegraph repeaters, wire terminal equipment, teletypewriter equipment; installation, operation and maintenance of central office switchboards and equipment; and telephone and telegraph procedure and traffic control.

Prerequisite: Graduation from Company Officers' General Subjects Course is required. Previous experience in the telephone, telegraph or general electrical field, on switchboard, wire, cable or instrument work is desirable but if no previous experience the student should show adaptability for intricate mechanical work. Electrical Engineering training is desirable.

Radio Communication — (Nine Weeks)

Purpose: To instruct the student officer in the powers and limitations of field radio communication with emphasis on message traffic and including detailed instruction in the operation and field maintenance of field radio equipment.

Scope: This course includes: code practice and radio operating procedure, to include light signaling; field radio operating; and test and repair of field radio equipment.

Prerequisite: Graduation from Company Officers' General Subjects Course is required. Graduate Electrical Engineers or the equivalent; or those who have been employed in the radio field; or have owned and operated amateur radio stations are eligible.

Electrical Fundamentals Course — (Seven Weeks)

Purpose: To provide the student officer with a more adequate electrical background to prepare him for one of the electrical communication courses.

Scope: This course covers the basic fundamentals of electrical theory and practice through direct and alternating current theory and circuits, vacuum tube operation and circuits, the fundamentals of electrical machinery and internal combustion engines. Particular consideration is given to standard Signal Corps field power equipment; all phases of the course are dealt with from the viewpoint of basic wire and radio communication with emphasis on practical exercises in the laboratory and work with electrical wiring diagrams.

Prerequisite: Graduation from Company Officers' General Subjects Course is required. Courses designed and intended for those who have had no previous background in electricity to qualify them for courses in telephone, radio and wire.

Administration and Supply — (Five Weeks)

Purpose: To instruct the student in administrative and supply procedures essential to the operations of Signal Corps Units and installation.

Scope: This course covers administrative and supply functions of Signal Corps field units; post, camp, and station Signal Offices; Signal Property Offices and Signal Depots. Particular attention is given to the training of Unit Administrative and Supply Officers.

Prerequisite: Graduation from Company Officers' General Subjects Course is required. Experience in merchandising field, warehousing and storage, purchasing or manufacturing of merchandise is preferred.

Motor Transport — (Six Weeks)

Purpose: To present to the students the fundamental principles of motor transport maintenance and operation so that they will be able to take charge of Signal Corps motor transport and have the knowledge necessary to successfully organize, operate, and maintain it, both tactically and administratively.

Scope: This course includes the study, from practical and theoretical standpoints, of tactical convoy operations and procedure under simulated field conditions, echelons of maintenance, personnel organization and training, char-

acteristics, operation and maintenance of military motor vehicles, and field expedients over difficult and varied terrain, including stream crossings.

Prerequisite: Graduation from Company Officers' General Subjects Course is required. Students that show inclination for mechanical work on automotive equipment are selected. Previous experience as automobile mechanic or with an automotive manufacturing concern is desirable.

Division Field Wire Systems -- (Nine Weeks)

Purpose: To prepare the officers for the supervision in the care, operation, testing and maintenance of telephone and telegraph equipment, and the installation, operation and maintenance of field wire systems; particularly as they apply to division wire systems.

Scope: This course includes a study of circuits and equipment used for field telegraphy, teletypewriter, local and common battery telephony; subcourses in motor transport and message center operations and procedures; circuit diagrams and line route maps; movement of command posts; pole line and hasty open wire and lance pole construction.

Prerequisite: Graduation from Company Officers' General Subjects Course is required. Previous experience in telephone, telegraph, or power field is desirable and students who show adaptability for outside field wire work are preferred.

Message Center Officer -- (Nine Weeks)

Purpose: To prepare selected Signal Corps Officers for duty as message center officers. To provide these officers with sufficient knowledge of and procedure in message center operations to insure sufficient operation in the field with tactical units.

Scope: The subjects include radio installation and operation, teletypewriter operation and maintenance, agencies of signal communication, telephone switchboard installation and operation, basic cryptography and cryptanalysis, message center procedure, message center tactical movements and opportunities for application of techniques through participating in field problems.

Prerequisite: The student should have had basic military training, a thorough knowledge of Army organization, ability to read maps and aerial photographs, and training in handling correspondence and messages. G-2 Clearance.

ADVANCED COURSES

Advanced Officers' Course -- (Fifteen Weeks) (Proposed 14th and 15th weeks at Camp Bradford, Va., and return to Monmouth for additional two weeks)

Purpose: To instruct especially selected officers in subjects necessary to qualify them to: command tactical Signal Corps battalions; serve as Signal Officers of tactical units; train Signal Officers for the Army Ground Forces and Army Air Forces.

Scope: This course places emphasis on development of field signal orders, wire and radio communications amphibious operations, tactics and tactical applications of signal communications for all armed forces. Training and planning air-amphibious operations are also included.

Prerequisite: Officers selected to pursue this course should have completed the Company Officers' General Course with a grade of at least "Very Satisfactory" and have demonstrated fitness for higher command responsibilities with a field unit; or have sufficient technical ability together with adequate field experience to qualify for higher command responsibilities. Students should be of the grade of Captain or higher; or senior first lieutenants fitted for staff assignments with higher command.

Signal Depot Supply: Philadelphia (Ground Equipment)) Transferred to
Lexington (Ground Radar)) Holabird Signal
Dayton (Airborne Radio and Radar)) Depot October 1943.

(Present courses are four weeks' duration with a few students spending a four-week preliminary period at the Quartermaster School at Camp Lee, Virginia.)

Purpose: To train Signal Supply Officers in both Depot and Field Supply procedures and familiarization with equipment and materials to insure maximum efficiency in the performance of their duties wherever they may be assigned.

Scope: The training includes Signal Corps equipment inspection, nomenclature, salvage, repair, test, receiving, warehousing, shipping, requisitioning and identification; it also includes military correspondence, office management, Signal Depot organization and practical work.

Prerequisite: Will have completed the Company Officers' General Course and Administration and Supply Course or their equivalent.

OFFICERS ELECTRONICS TRAINING

Harvard - Pierce Hall — (One Month)

Purpose: A review of mathematics, electricity and magnetism given to officers assigned to A E T C who fail to pass qualifying examination for admittance to Harvard Cruft Laboratory basic electronics course or qualifying examination for M I T Radar School, Radar Course.

Scope: This course is an intensified review of mathematics, electricity

and magnetism to qualify for study of basic electronics.

Prerequisite: B. S. In E. E. or Electronics or Physics and completion of officers "three months basic course" is required.

Harvard - Cruft Laboratory — (Three Months)

Purpose: To instruct officers for radio communication assignment or to qualify for study of radar at M I T.

Scope: The course is a combination lecture and laboratory course in basic radio theory.

Prerequisite: B.S. in E. E. or Electronics or Physics and completion of "three months officers basic course" plus qualifying upon preliminary examination for study at this level or satisfactory completion of Pierce Hall review course is required.

Massachusetts Institute of Technology, Radar School — (Three Months)

Purpose: To fit Coast Artillery officers for assignments to Coast Artillery Radar Assignments. To provide Air Corps or Signal Corps officers with a complete theoretical background in Radar principles.

Scope: The course is an intensive radar theory supplemented with some practical laboratory work on specific prototype equipments. For Coast Artillery emphasis is on practical laboratory work on specific Coast Artillery Radar Equipment.

Prerequisite: Entrance requirements are B. S. in E. E., Electronics or Physics plus completion of "three months officers basic course" plus qualifying by examination or by selection from best qualified graduates of officer Laboratory Course.

Camp Murphy, Florida — (Thirteen to Eighteen Weeks)

Purpose: To provide a detailed knowledge of specific Airborne Reporting Radar Equipments for Air Corps or Signal Corps officers. To provide a detailed knowledge of specific gunlaying Radar Equipments to Coast Artillery or Signal Corps officers.

Scope: This course is a thirteen- to eighteen-weeks study of one reporting or gunlaying Ground Radar equipment with associated identification equipments or thirteen weeks study of three specially selected Airborne Radar Equipments.

Prerequisite: Satisfactory completion of M I T Radar School, or comple-

tion of approximately one year field experience in E. T. G. outside continental U. S. constitute entrance requirements.

ADVANCED RADIO COMMUNICATIONS

Cryptographic and Cryptanalytic Officer Training -- (Classified)

Prerequisite: Students should have knowledge of electrophysics, sound and light physics, and mathematical and engineering solution of equations. Should also be familiar with the frequency of alphabetical letters, vowels and consonants in specified languages; be familiar with Army organization, customs and usages; have knowledge of military terminology, and appropriate usage of military terms; and have satisfactorily completed a minimum of four years of college training in physics, mathematics, linguistics, philology or related subjects.

ENLISTED MEN'S COURSES

TELEPHONE

SSN

039 Cable Splicer, Tp. & Tg. -- (13 Weeks)

Prerequisite: A G C T score of 90 or more; experience in work requiring the use of small tools. Must not be color-blind.

095 Central Office Repairman -- (13 Weeks)

Prerequisite: A G C T score of 95 or more; experience in work requiring the use of small tools. Must not be color-blind.

097 Installer-Repairman, Tp. & Tg. -- (13 Weeks)

Prerequisite: A G C T score of 90 or more; experience in work requiring the use of small tools. Must not be color-blind.

187 Repeaterman, Tel. -- (26 Weeks)

Prerequisite: A G C T score of 100 or more, completion of a course of 120 hours on the Principles of Electricity with standing in upper half of class. If the man has had subcourse No. 25, only 20 weeks of instruction are required. Must not be color-blind.

231 Switchboard Installer, Tp. & Tg., Dial. -- (8 Weeks)

Prerequisite: AGCT score of 95 or more; experience in work requiring the use of small tools. Must not be color-blind.

SSN

232 Switchboard Installer, Tp. & Tg., Manual — (17 Weeks)

Prerequisite: A G C T score 95 or more; experience in work requiring the use of small tools. Must not be color-blind.

238 Lineman, Tp. & Tg. — (21 Weeks)

Prerequisite: A G C T score of 80 or more.

261 Wire Chief, Tp. & Tg. — (17 Weeks)

Prerequisite: Qualification as Central Officer Repairman (SSN 095). Must not be color-blind.

595 Field Wire Chief — (17 Weeks)

Prerequisite: Qualification as Field Lineman (SSN 641). Must not be color-blind.

637 Installer Repairman, AW Plotting Board — (20 Weeks)

Prerequisite: Same as qualification for Wire Chief, Tp. & Tg. (SSN 261)

641 Lineman, Field — (21 Weeks)

Prerequisite: AGCT score of 90 or more.

650 Telephone Switchboard Operator — (21 Weeks)

Prerequisite: AGCT score of 90 or more; must speak English fluently.

950 Wire Repairman, V.H.F. — (12 Weeks)

Prerequisite: Qualification as Central Office Repairman, Manual (SSN 261). Must not be color-blind.

PHOTOGRAPHIC

042 a. Camera Repairman — (16 Weeks)

Prerequisite: A G C T score of 110 or more; if a student has experience in the manufacture or repair of optical equipment, the A G C T score may be as low as 95.

042 b. Projector Repairman — (12 Weeks)

Prerequisite: A G C T score of 110 or more; if a student has ex-

SSN

perience in the manufacture or repair of projector equipment, the AGCT score may be as low as 95.

043 Motion Picture Cameraman — (17 Weeks)

Prerequisite: A G C T score of 110 or more; two years of high school; experience as a still photographer for three years with a major newspaper or pictorial magazine, or other such publication, or two years' experience as a newsreel or commercial motion picture photographer.

131 Editor, Motion Picture Film — (8 Weeks)

Prerequisite: A G C T score 100 or more, but with three or more years practical experience, a score of 90 is acceptable. Practical civilian experience as a cutter is essential.

154 Photographic Darkroom Man — (17 Weeks)

Prerequisite: A G C T score of 95 or more and advanced amateur or professional experience as a darkroom technician of three years or more.

402 Photographer, News — (17 Weeks)

Prerequisite: AGCT score of 110 or more and a high school graduate. Should have professional news or commercial practical experience of three or more years. Recognized standing as an advance amateur may be substituted for the latter requirements.

ELECTRICAL

078 Electrician — (9 Weeks)

Prerequisite: AGCT score of 90 or more; experience in work requiring use of small tools.

098 Instrument Repairman — (6 Weeks)

Prerequisite: AGCT score of 90 or more; experience in the use of small tools.

338 Instrument Repairman, Electrical — (6 Weeks)

Prerequisite: AGCT score of 95 or more; experience in manufacture or repair of watches or electrical meters.

SSN

RADIO REPAIRMAN

174 Radio Repairman, Ground Eqmt. - (17 Weeks)-(to include FM Eqmt.,23 Weeks)

Prerequisite: AGCT score of 110 or more; if a man has experience in manufacture or repair of radio equipment, AGCT score may be as low as 95. Must not be color-blind.

647 Radio Repairman, Aircraft Equipment -- (26 Weeks)

Prerequisite: Same as qualification for Radio Repairman (SSN 174). Must not be color-blind.

649 Radio Repairman, Fixed Station -- (8 Weeks)

Prerequisite: Qualification as Radio Repairman (SSN 174). Must not be color-blind.

951 Radio Repairman, V.H.F. -- (12 Weeks)

Prerequisite: Qualification as Radio Repairman (SSN 174). Must not be color-blind.

RADAR REPAIRMAN

952 Radar Repairman, Gunlaying, Designated Set -- (Approximately 13 Weeks)

Prerequisite: Qualification as Radio Repairman (SSN 174). Cleared in accordance with Confidential AG letter 383.4 (2-25-43), 5 March 1943. Must not be color-blind.

953 Radar Repairman, Reporting, Designated Set -- (Approximately 13 Weeks)

Prerequisite: Qualification as Radio Repairman (SSN 174). Cleared in accordance with Confidential AG letter 383.4 (2-25-43), 5 March 1943.

954 Radar Repairman, Airborne Intercept Equipment, Designated Set -- (Approx. 13 Weeks)

Prerequisite: Qualification as Radio Repairman (SSN 174). Cleared in accordance with Confidential AG letter 383.4 (2-25-43), 5 March 1943. Must not be color-blind.

955 Radar Repairman, Airborne Search Equipment -- (Approx. 13 Weeks)

Prerequisite: Qualification as Radio Repairman (SSN 174); cleared in accordance with Confidential AG letter 383.4 (2-25-43), 5 March 1943. Must not be color-blind.

SSN

RADIO OPERATOR

543 Radio Intelligence Control Chief — (6 Weeks)

Prerequisite: Qualification as Radio Repairman (SSN 174) or Radio Operator, High Speed, Manual (SSN 766). Must not be color-blind.

738 Intercept Operator, G. — (7 Weeks)

Prerequisite: Qualification as Radio Operator, High Speed, Manual (SSN 766). Must be cleared in accordance with Confidential AG letter 383.4, (2-25-43), 5 March 1943.

739 Intercept Operator, J. — (12 Weeks)

Prerequisite: Qualification as Radio Operator, High Speed, Manual (SSN 766). Must be cleared in accordance with Confidential AG letter 383.4 (2-25-43), 5 March 1943.

766 Radio Operator, High Speed, Manual — (13 Weeks)

Prerequisite: Qualification as Radio Operator, Low Speed (SSN 776)

776 Radio Operator, Low Speed — (21 Weeks)

Prerequisite: AGCT score of 90 or more, ROA score of 100 or more.

777 Radio Operator, High Speed, Automatic — (17 Weeks)

Prerequisite: Same as qualification for Radio Operator, High Speed (SSN 766).

CRYPTOGRAPHIC

805 Cryptographic Technician — (21 Weeks)

Prerequisite: AGCT score of 95 or more; previous clerical experience. Cleared in accordance with AG letter (Confidential), 383.4 (2-25-43), 5 March 1943.

807 Cryptographer — (Approximately 10 Weeks)

Prerequisite: AGCT score of 110 or more; training in mathematics or language, or both, on college level; FBI and MID clearance.

808 Cryptanalyst — (Approximately 14 Weeks)

Prerequisite: Qualification as Cryptographer (SSN 807).

SSN

TELETYPEWRITER

237 Teletypewriter Operator — (21 Weeks)

Prerequisite: AGCT score of 90 or more.

239 Teletypewriter Mechanic — (17 Weeks)

Prerequisite: AGCT score 95 or more; experience in work requiring the use of small tools. Must not be color-blind.

MISCELLANEOUS

014 Automobile Mechanic — (21 Weeks)

Prerequisite: AGCT score of 90 or more; experience in work requiring the use of tools.

060 Cook — (21 Weeks)

Prerequisite: AGCT score of 90 or more; good health.

070 Draftsman — (21 Weeks)

Prerequisite: AGCT score of 90 or more; must be able to print and write neatly.

166 Powerman — (13 Weeks)

Prerequisite: AGCT score of 90 or more; experience in work requiring the use of small tools.

194 Salvage Man — (6 Weeks)

Prerequisite: AGCT score 90 or more; experience in the use of small tools.

203 Packing Case Maker — (6 Weeks)

Prerequisite: AGCT score 90 or more; experience in the use of small tools.

207-208 Sound Recording — (12 Weeks)

Prerequisite: AGCT score of 110 or better with practical experience in radio repair and maintenance. College work in electrical engineering is also required, but graduate engineers, who make better sound men, are not necessarily required.

SSN

245 Truck Driver, Heavy — (21 Weeks)

Prerequisite: AGCT score of 80 or more.

368 Clerk, Personnel — (21 Weeks)

Prerequisite: AGCT score of 90 or more; previous clerical experience is desirable.

405 Clerk-Typist — (21 Weeks)

Prerequisite: AGCT score of 90 or more.

542 Communication Chief — (17 Weeks)

Prerequisite: AGCT score of 100 or more; qualifications as Teletypewriter Mechanic (SSN 239) or Radio Repairman (SSN 174). Must not be color-blind.

560 Pigeoneer — (21 Weeks)

Prerequisite: AGCT score of 90 or more.

585 First Sergeant — (21 Weeks)

Prerequisite: AGCT score of 110 or more; must be a non-commissioned officer.

667 Message Center Clerk — (21 Weeks)

Prerequisite: AGCT score of 90 or more. Must be cleared in accordance with Confidential AG letter 383.4 (2-25-43), 5 March 1943.

675 Messenger — (21 Weeks)

Prerequisite: AGCT score of 80 or more.

835 Supply Clerk — (21 Weeks)

Prerequisite: AGCT score of 90 or more.

The purpose and scope of the individual courses for enlisted men are not included in the above list. They are included in detail in Army Regulations 615-26.

PROCUREMENT AND DISTRIBUTION

SAVINGS IN SPARE TIRES.

The Purchases Branch has informally contacted the Philadelphia Procurement District, Requirements Division, and Engineering and Technical Service with the view of keeping rubber requirements to a minimum. As one result, it has been decided that spare tire, wheel and tube assemblies should not be procured with one-ton, two-wheel cargo trailers for use with Radio Set SCR-399 ( ). Immediate action is being taken to cancel undelivered requirements of these spares and future requirements will not include this type of equipment. The above action is resulting in the saving of approximately 4500 tires and tubes on cancelled orders, in addition to the saving which will occur by this type of equipment not being included in future requirements.

COST ANALYSIS NOW FUNCTION OF PURCHASES BRANCH

Effective 15 October 1943, the cost analysis activities in the Office of the Chief Signal Officer and in field activities under control of the Chief Signal Officer were transferred from the jurisdiction of the Fiscal Division to Purchases Branch, Procurement Division, Procurement and Distribution Service.

PROCUREMENT OF POWER UNITS

To meet the needs of the Army, it has been necessary to procure large quantities of many different types of power units, ranging from 300-watt, single-phase alternating current units to 100-kilowatt units. There have been many improvements and simplifications in design in the various engines and completed power units since large-scale production started.

The problem of supplying adequate spare parts has continued to place a considerable load on the various suppliers. In certain instances, power units have been shipped without spare parts with plans for completing the complement of spares at a later date. This arrangement has been possible due to the wide-spread distribution of spare parts previously shipped.

A program is under way whereby the quantity of spare parts for each unit is reduced in accordance with actual field expediting experience. In one instance, the total value of the spare parts for a power unit was reduced approximately 90 percent. This and other reductions allow production of many more completed power units each month and also save considerable procurement funds. Further reduction in quantity and cost of spare parts for power units is being considered where field experience indicates that original estimates were high.

SIMPLIFICATION OF DESIGN

In war time the required quantities of items of equipment are pyramided and existing manufacturing facilities are often unable to expand rapidly enough to meet the demand. As a result, it has been necessary wherever possible to reduce the number of operations used in the manufacture of an item in order that every hour of labor can be fully utilized. A recent example where this has been accomplished is that of Pliers TL-13-A, a part of Tool Equipment TE-48 (a collection of small test items). The specifications of Pliers TL-13-A called for notches which are used in skinning wire. Individual operations are required to form these notches. It has been found that by eliminating the notches the pliers are, for all general purposes, as satisfactory as before and enough manufacturing time is saved to meet requirements without expanding facilities.

PACKAGING OF SIGNAL CORPS EQUIPMENT

"Packaging Specifications" have been completed for approximately five hundred items of Signal Corps equipment.

An "Index" of these Specifications has been prepared and is being distributed to Signal Corps Depots, Ports of Embarkation, Inspection Zones, Procurement Districts, and other organizations interested in the packaging of Signal Corps equipment.

Organizations not receiving but requiring copies of the Index may procure them from:

Philadelphia Signal Corps Procurement District
5000 Wissahickon Avenue
Philadelphia, Pennsylvania.

Copies of Specifications listed in the Index may be obtained from the same source.

Requests for Indexes and Specifications should be limited to actual requirements.

MILITARY ORGANIZATION

BASIC CHANGES IN ORGANIZATION

War Department Circular No. 256, dated 16 October 1943, subject: "Reorganization of Corps Headquarters and Organic Troops," contains pertinent information of particular interest to all Signal Corps officers.

The following summary indicates the major changes in the organization of large units:

1. The armored corps, as such, has been eliminated. It is contemplated that infantry and armored divisions will operate together in a corps with such reinforcing groups of engineers, tank destroyer, anti-aircraft, cavalry or field artillery, as are necessary.
2. The motorized division has been eliminated. The infantry division, unchanged in basic organization but reduced approximately 8 percent in strength and 14 percent in vehicles, can now be transported by a troop transport battalion consisting of six truck companies.
3. The armored division now consists essentially of three tank battalions, three armored infantry battalions, and three armored field artillery battalions. These may be grouped in any manner under two organic combat commands.
4. A new light division whose transportation consists essentially of hand carts, pack animals, and $\frac{1}{4}$-ton trucks is being tested for amphibious, airborne, mountain and jungle operations.
5. In general, staffs are being revised downwards to provide only sufficient personnel for combat needs. It is contemplated that field orders will be oral or in message form and will normally be disseminated to subordinate commanders by liaison officers.
6. Supply procedures, with few changes, still conform to the principles laid down in FM 100-10. The Army is now charged with the responsibility of placing supplies within convenient reach of regiments, separate battalions, and smaller units. Personnel and transportation to handle all supplies, including the establishing and manning of supply points, are furnished by the Army and not by the using units.
7. Composite organizations composed of base type units as well as fixed strength T/O units are provided within the communications zone. (A composite organization is defined as an intra-branch unit when all elements are from one branch, for example, components of the Signal Service Organization, T/O & E 11-500, and as an inter-branch unit when elements of the unit pertain to more than one branch).

Changes which directly effect the Signal Corps may be summarized as:

1. The armored signal battalion has been eliminated.
2. The armored signal company has been increased approximately 50 percent in wire personnel and equipment in order to meet requirements for

wire communication between division headquarters and each combat command.

3. The radio intelligence platoon has been removed from the division signal companies and its function has been taken over by the corps signal battalion. It is contemplated that the battalion will be provided with trained traffic analysts to evaluate information obtained by two organic radio intelligence platoons.

4. A signal order will normally be oral or in message form.

5. The Army is charged with the responsibility for placing signal supplies within convenient reach of regiments, separate battalions, and smaller units.

6. As stated on page 75, Signal Corps Technical Information Letter No. 23, cellular teams based on T/O & E 11-500, are provided for communications zone activities. Such teams may either form composite intra-branch units or be contained in composite inter-branch units.

REORGANIZATION OF UNITS

The units listed below will be reorganized as indicated, without change of station or assignment, each with an authorized strength of 34 officers, one warrant officer and 343 enlisted men, all Army personnel, and nine officers and 113 enlisted men, Navy personnel.

Present Designation	New Designation	Reorganization by
292nd Signal Co., Special	292nd Joint Assault Signal Co.	XIII Corps
295th Signal Co., Special	295th Joint Assault Signal Co.	XIII Corps
592nd Signal Co., Special	592nd Joint Assault Signal Co.	II Army
593rd Signal Co., Special	593rd Joint Assault Signal Co.	IV Army
594th Signal Co., Special	594th Joint Assault Signal Co.	IV Army

CHANGES OF STATIONS

Organization	From	To
259th Signal Construction Co.	Camp Claibourne, La.	Desert Training Center
30th Signal Company	Tennessee Maneuver Area	Camp Atterbury, Ind.
98th Signal Company	Tennessee Maneuver Area	Camp Rucker, Alabama
91st Signal Company	Oregon Maneuver Area	Camp Adair, Oregon
96th Signal Company	Oregon Maneuver Area	Camp White, Oregon
84th Signal Company	Louisiana Maneuver Area	Camp Claibourne, La.
99th Signal Company	Louisiana Maneuver Area	Camp Maxey, Texas
102nd Signal Company	Louisiana Maneuver Area	Camp Swift, Texas
35th Signal Company*	Camp Rucker, Ala.	Tennessee Maneuver Area
100th Signal Company*	Ft. Jackson, S.C.	Tennessee Maneuver Area
89th Signal Platoon*	Camp Carson, Colo.	Louisiana Maneuver Area

Note: * represents temporary change of station.

MISCELLANEOUS

The Eastern Signal Corps Replacement Training Center, Fort Monmouth, N.J., was discontinued as of 16 October 1943.

The 3118th Signal Service Battalion was constituted 4 November 1943 for activation at the Central Signal Corps Training Center, Camp Crowder, Mo., and assignment to the Seventh Service Command for preparation for field service. Its authorized strength is 45 officers and 490 enlisted men.

The 3106th, 3107th and 3108th Signal Service Platoons, each with an authorized strength of two officers and 52 enlisted men, were activated 1 November 1943 at the Eastern Signal Corps Training Center, Fort Monmouth, N.J.

The 846th Signal Service Photographic Battalion was disbanded 25 October 1943 at the Signal Corps Photographic Center, Long Island City, N. Y. Personnel of Company B, stationed at the Signal Corps Photographic Laboratory at the War College, Washington, D. C., were transferred to the Laboratory. Personnel in Company C, then stationed at Wright Field, Dayton, Ohio, were transferred to the Photographic Center at Long Island City or to the Army Air Forces motion picture unit at Culver City, Calif. The remaining personnel were transferred to the Photographic Center at Long Island City.

Also disbanded was the 834th Signal Photographic Detachment, Special Services. The personnel, stationed at the Western Division Signal Corps Photographic Center, Beverly Hills, Calif., were transferred to that Center.

The 3105th Signal Service Company was activated 25 October 1943 at the Eastern Signal Corps Training Center, Fort Monmouth, N. J., with an authorized strength of 15 officers and 148 enlisted men.

MILITARY PERSONNEL

EMPHASIS ON PROPER ASSIGNMENT AND CLASSIFICATION OF S. C. OFFICERS

In early September, Major General Styer, Chief of Staff, Headquarters, ASF, directed that a survey be made of malassignments of officers within the Army Service Forces. Discussions and conferences were held by representatives of Military Personnel Branch, OCSigO, with officials from ASF, Headquarters, on methods and procedures for conducting such surveys for the Signal Corps. In October, a three-day conference was held in Washington at which representatives of the military personnel divisions of all service commands and the technical services discussed ways and means of conducting this survey with the Director of Personnel, ASF.

A preliminary study of the effectiveness with which officers were assigned to their various duties in the Office of the Chief Signal Officer was completed by 1 November 1943, at the request of Major General Dalton.

At present the Chief Signal Officer is engaged in coordinating the surveys relative to the assignment of Signal Corps officers within the Army Service Forces and is emphasizing the importance of utilizing to the maximum degree possible the actual and potential skills of all military personnel at a time when the shortage of civilian manpower is becoming increasingly acute. To this end, Office Memorandum No. 134, dated 1 November 1943, subject: "Correct Classification and Assignment of Army Service Forces Officers and Enlisted Men," has been sent to all services, divisions, and branches of the Office of the Chief Signal Officer and all field activities under control of the Chief Signal Officer, outlining the objectives and procedures to be followed in surveying malassignments of Signal Corps military personnel.

For the benefit of those in the field who do not receive such office memoranda, the following information is given, as it has general implications which affect installations outside OCSigO.

A recent report of the Inspector General indicates that immediate and direct action is necessary to effect a closer system of control of classification and assignment procedures throughout the Army Service Forces. Therefore, the commanding generals of the service commands have been directed to select and train teams of commissioned and enlisted personnel, with the assistance of The Adjutant General, for the purpose of conducting surveys of all Army Service Forces military personnel within the geographical limits of the respective service commands. The survey teams will visit each installation and interview each officer, warrant officer and WAC officer below the grade of general officer. They will secure Position Description Form, WD, AGO Form No. 0856, and Officer Qualification Record, WD, AGO Form No. 0857, from each officer so interviewed, who will be required to prepare completely and accurately the forms listed. Each enlisted man and woman will be interviewed, also, and the Survey Teams will audit each WD, AGO Form No. 20, pertaining to each individual.

The findings of the survey teams will be made available to commanding officers. A copy of the report pertaining to installations under the Chief Signal Officer will be forwarded to OCSigO. Commanding officers will then forward through channels to the Chief Signal Officer their recommendations or a report of action taken for enlisted personnel reported malassigned and their recommendations for each officer who may appear to be malassigned. The survey teams are not to evaluate assignments of officer personnel. In the case of OCSigO personnel this will be a responsibility of an Assignment Review Board to be established by the Chief Signal Officer.

Officers and enlisted personnel at classified installations will be exempted from the survey. Arrangements will be made to select and train personnel within these installations to conduct the survey necessary to accomplish the objective desired.

It is the desire of the Chief Signal Officer that commanders of all units and installations apply their personal influence to insure the heartiest cooperation of subordinate commanders with the respective service command representatives. In view of the emphasis on proper assignment and classification of military personnel, it is believed that surveys similar in nature will prevail for all branches of the armed services in order to make sure that the right man is placed in the right job and thus enable the United Nations to achieve victory in the shortest time possible.

NEW TECHNICAL MANUALS FOR JOB DESCRIPTIONS

When the Signal Corps Manual of Officers Military Occupational Specifications and Codes was issued in July 1943, it was the first complete, up-to-date manual so compiled for a technical branch of the Army. Previously, officers' job specifications were contained in Army Regulations, which were issued in tentative form and continuously revised, rescinded and rewritten as circumstances dictated. The Signal Corps Manual (based on AR 605-95) has been favorably received wherever it was distributed. It has the advantage of being in the form of a loose-leaf binder which makes it possible to prepare additions, deletions and revisions easily, without affecting the simplicity of its arrangements or the accessibility of up-to-date data at all times.

The Adjutant General will issue a series of three technical manuals on officers' job specifications some time prior to the first of the year 1944, following to a considerable degree the format of the Signal Corps Manual, and containing in general the identical job descriptions, with the exception of a few changes in titles.

The new manuals to be distributed by The Adjutant General will be called "TM 12-405 Officer Classification - Civilian Occupations," "TM 12-406 Officer Classification Military Specialties" and "TM 12-407 Officer Classification - Field Organization Military Specialties." TM 12-405 will be given an overall distribution. TM 12-406 is to be distributed to overhead organizations only and TM 12-407 will go to troop units, or T/O organizations. Decision will be

made at a later date as to whether the Signal Corps Manual will have to be revised, although it is understood that a conversion table will be included with the new technical manuals which will facilitate the use of the Signal Corps Manual as a composite extract of TM 12-406 and TM 12-407. During the transition stage, at least, the Signal Corps Manual will continue to include both types of job descriptions in one booklet and may serve as a convenient reference for purely Signal Corps job descriptions.

With the publication of the technical manuals, the planned inclusion of job descriptions in Army Regulations will be discontinued, and AR's will only consist of rulings on how to use job specifications, referring to the Manuals concerned.

SCTIL ORDER FORM

This form is for use in reporting changes of mailing address, inaccuracies in present addressing, or the need for an increased number of copies of the SCTIL.

When the form is filled in, mail through normal channels to the Office of the Chief Signal Officer (SPSAY), Washington.

Office of the Chief Signal Officer (SPSAY)
Washington 25, D. C.

It is desired that the following changes be made in the distribution records of the Signal Corps Technical Information Letter:

Change Address

Old Address: _____
_____
_____

New or Corrected Address: _____
_____
_____

Mail More Copies

Number of Copies Now Received Monthly: ____
Number of Additional Copies Required: ____
Total Required Mailing Hereafter: ____

Mail SCTIL to Associated Communications Units of Other Arms

The following communication units have requested that they receive the SCTIL each month. It is recommended that these requests be granted and that direct mailings be made to them:

_____
_____
_____

Name and Rank of Requesting Officer: _____
(SCTIL 12-43) _____