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SIGNAL CORPS
Technical Information Letter

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ARMY SERVICE FORCES · OFFICE OF THE CHIEF SIGNAL OFFICER

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SIGNAL CORPS

TECHNICAL INFORMATION LETTER

PURPOSE THE SIGNAL CORPS Technical Information Letter is a monthly publication designed to keep Signal Corps personnel and other military personnel using Signal Corps equipment informed on Signal Corps matters. It provides means for the dissemination and interchange of information of a widely-varied nature, both technical and tactical.

SOURCE THE LETTER is compiled mainly from information available in the divisions and branches of the Office of the Chief Signal Officer. Signal Corps and other communications personnel are invited to submit, through channels, material of general interest. Information on problems encountered and overcome by combat and service communications troops is desired. Such items should reach the Chief Signal Officer (SPSAY) not later than the 15th of each month for inclusion in the letter for the following month.

DISTRIBUTION DISTRIBUTION overseas is made by The Adjutant General on the following basis: Theaters of Operations (25); Armies, Corps, Departments, Island Commands, Air Forces and Base Commands (10); Divisions and AAF Commands (7); AAF Wings and Groups (4); AAF Squadrons (2); Signal Battalions (6); Signal Companies and separate Signal units (2).

Within the continental limits of the United States the Letter is distributed to Signal and other Ground and Service Forces units and installations by the Chief Signal Officer (SPSAY), Washington 25, D. C. Distribution to Army Air Forces units and installations in the continental United States is made by the Commanding General, Army Air Forces (AFMPB), Gravelly Point, Virginia.

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

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CONTENTS

THESE SCR 608s ARE BEING USED TO RADIO BACK ARTILLERY DATA FROM AN OP OVERLOOKING THE CITY OF CHERBOURG

COMMUNICATIONS—FRANCE

Signal Men and Equipment During the First Thirty Days—the Normandy Operation

"FOR FOUR or five hours after the initial landing on beach, considerable confusion existed because of intense hostile enemy action. The Infantry was unable to move inland, and jamming of units on the beach ensued. All personnel were pinned to the ground and Signal Corps personnel fought alongside the Infantry with such weapons as were picked up from the beach. Some time elapsed before Signal Corps detachments joined the units they were to serve due in part to the landing plan which separated them and to the units landing at other than the prearranged points. Once joined, however, the establishment of communications systems was rapid."

The above paragraph is taken from a report on Signal Corps activities covering the period from D-Day (June 6th) to D+30 (July 6th). The author of the report was the Signal Corps member of a War Department Observers Board. His report, on which the following remarks are based, covers the first 30 days of the "liberation of Europe."

Signal Corps personnel and equipment losses in the landing and during the crossing of the beaches were not excessive. Personnel losses were light, and equipment losses were about as foreseen and provided for in the plan of operation. One unit lost 8 men out of 70, seven of them while crossing the beach. Another unit lost 7 out of 8 radio sets (6 SCR–284's and 1 SCR–694) in the initial assault phase. A third unit found itself able to furnish satisfactory communications despite severe equipment losses as a result of the planning and augmentation of equipment above tables of equipment.

Personnel of some signal companies had received training in the detection and removal of mines. This training paid dividends, as wire

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SWEEPING AT THE BASE OF A TELEPHONE POLE IN FRANCE

lines on the beaches had to cross extensive mine fields. At least one joint assault signal company found it imperative to be on the lookout for mines and booby traps.

Although most of the Signal Corps units employed in the operation followed the basic organization prescribed in current T/O & E's, division signal companies and air-borne signal companies were augmented by the addition of personnel and equipment to correspond approximately with the April 1942 tables; armored signal companies were only slightly augmented over the strength prescribed by current tables but were in general reorganized internally according to the needs of the division. JASCO's were organized under First Army SOP and operated in conjunction with engineer special brigades. Corps and army signal battalions and signal construction battalions were organized under T/O's of April 1942.

Communication facilities of the JASCO's extended inland for approximately 5 miles; beach sections covered 500 yards to 1 mile of beach.

Personnel of JASCO's found it necessary to fight alongside assault infantry and engineers even while bringing in and setting up equipment. No casualties to equipment resulted. It was felt that this was due to the lengthy amphibious training which had been undergone prior to the operation and which had conditioned personnel to carrying greater than average loads through heavy fire without dropping any of the equipment. Shore fire control parties of the JASCO's operated as much as 12 miles inland. Air liaison parties did not operate as parts of JASCO, but were under air force control.

Excellent results were reported with the waterproofing of signal equipment, which had been accomplished in accordance with ETO signal supply instructions. One of the JASCO's reported, however, that telephone equipment suffered severely from sand and salt water condensation, particularly when dug in.

WIRE

Wire during the period covered by the report was not only the primary means of communication; once established it tended to become the exclusive means except in front line infantry companies. One unit reported that approximately 95 percent of its communications was by wire. Another unit reported that wire and message center facilities were used to a considerably greater extent than radio.

Rate of construction of field wire during combat by construction companies of one signal battalion ranged from 8 to 15 miles per hour per company. Another construction battalion reported an average rate of construction by field wire teams of approximately 15 miles per day. The same battalion stated that the average rate, in combat, of permanent pole line construction per construction company, including the erection of poles, was about 4 miles.

As always the maintenance of wire circuits was one of the Signal Corps' greatest problems within the beach area. This was due to the immense volume of traffic on the beaches. Trucks and tracked vehicles chewed up wire laid on the surface of the beach and bulldozers, cutting new roads, severed wire circuits that were buried. Even overhead lines were broken by cranes and poles were knocked down by trucks.

In addition to marking wire circuits with regular tags, one signal company marked wire for identification by brush and red paint. The brush, dipped in the paint, was drawn across the wire on the drum as the wire was played out.

Spiral-four cable was used generally by army and corps. In one corps the signal battalion layed spiral-four to divisions and to lateral units. One division signal company used spiral-four cable for circuits between division and rear echelon.

Commercial wire systems which had not been destroyed were under control of army. Each division reported the status of fixed wire facilities in the area through corps to army. Only limited use of these facilities was possible to divisions.

Teletypewriter service was provided down to divisions, but was not in general used to the limit of its capacity. Staff offcers apparently still prefer the telephone. Because of the rate of advance some of the division signal companies did not even connect up the telegraph.

Because of the limited use of radio, one of the JASCO's found it necessary after the initial assault phase to provide common battery telephone equipment for shore communication in the beach area. Another JASCO switchboard which was at an engineer brigade headquarters, handled more than 1,500 calls in a 24-hour period.

RADIO

Use of radio by division and corps headquarters was limited; JASCO appeared reluctant to use their inland radio links because of the danger of interfering with front line infantry nets.

"Radio centrals" for remote control of all the radios of a headquarters were used wherever time

LINEMEN TENSIONING A LINE ON THE NORMANDY FRONT

U. S. RADIOMEN TRYING OUT A GERMAN WALKIE-TALKIE

permitted their installation; in one case such a central was actually set up on the beach itself. Two methods of remote control were employed; keying the remote transmitters from the central and teletype transmissions to an operator at a "radio park" who, by means of short keying lines, could key all the transmitters from one position.

Armored divisions except in actual combat maintained radio silence. Although the armored division receivers remained tuned, no signals were transmitted; operators merely copied any messages directed to the division. Corps and infantry divisions transmitted to the armored units by the "Fox" method. JASCO's generally used the SCR–193 as an emergency standby for their wire circuits.

Radio Set SCR–300 received high praise for its part in the operation. One unit reported that this radio set had been given a satisfactory performance at a range of 31 miles.

SUPPLY AND MAINTENANCE

Supply of Signal Corps equipment during this period was equal to demand. Units reported that receipt of needed signal supplies had been prompt. No critical shortages were noted in spite of the fact that 100 percent replacement of certain items, particularly radio sets, had occurred in many units. Replacement factor of 100 percent for the SCR–610 in one division was made necessary by the activities of enemy snipers who seemed partial to artillery observers.

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AN ENGINEER HALF-TRACK, EQUIPPED WITH RADIO SET SCR–399, MOVES ACROSS A PONTON BRIDGE IN NORMANDY

Repair sections were able to keep abreast of signal maintenance. As a general rule equipment was returned to service within 24 hours. During the landing operation, one wire repair section and one radio repair section from a signal repair company were attached to corps signal battalion. Division signal company repair personnel proved adequate for all repairs necessary within the divisions.

Among the otherwise excellent results of the smooth functioning of signal supply and repair systems, due in part to the newness of the equipment, and the equipment reserves piled up in the United Kingdom for this operation, the observer noted and commented strongly upon the fact that the current abundance of signal equipment has caused a tendency to develop in some units to treat signal equipment with less than the proper degree of respect.

The report concludes: The morale of the Signal Corps troops observed during the period covered by the report was excellent.

USE OF ENEMY EQUIPMENT

DURING THE initial phase of the invasion of France, Allied paratroopers utilized German walkie-talkie radio sets. Captured telephone and wire equipment was immediately put to use by U. S. troops and is proving most useful.

Radio equipment has been used to good effect within U. S. divisions. An example of this is a commander of the — Division, who with the assistance of an EEIS team had a German Torn. FU bl (two-man walkie-talkie) installed in his vehicle. With this set he has been "working" his own SCR–536, –284, and –193 radio nets.

German pike poles have been found very useful by wire teams. EEIS teams have been of assistance in rehabilitating damaged or slightly damaged French and German switchboards. This has helped expedite the establishment of the French communication system.

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FACSIMILE EQUIPMENTS

A Converter Is Being Added to the Present Three To Allow AM Radio Transmission

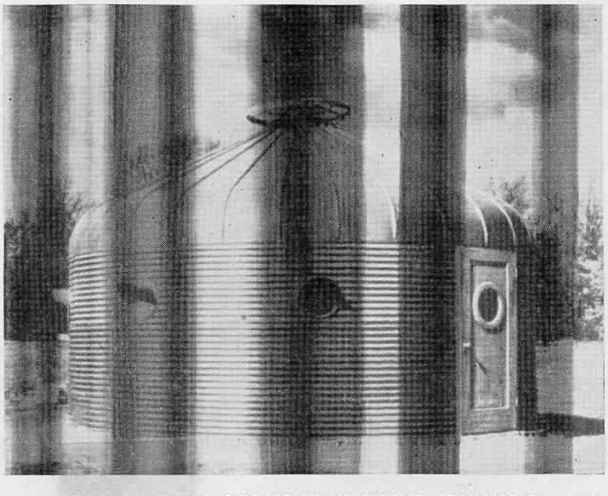
THREE TYPES of fascimile equipments have been standardized for use by the Armed Forces and have already been issued. They are Facsimile Equipment RC–58–( ), Fascimile Equipment RC–120–( ), Fascimile Set AN/TXC–1–( ).

Facsimile Equipment RC–58–( ) is a relatively new item to the field, issue beginning in the spring of 1944. This equipment provides for the transmission of handwritten or typed messages on ¾-inch paper tape over regular voice communication channels (wire or radio). Its principal components are Recorder-Scanner BC–918–( ), Amplifier BC–908–( ), and Writing Stand MC–308.

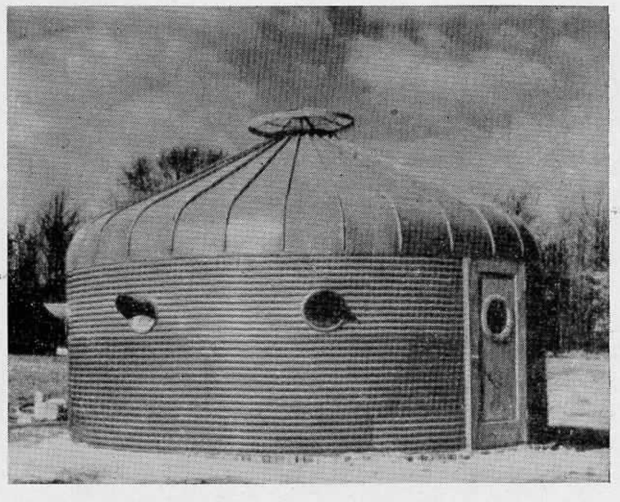
The operation of Facsimile Equipment RC–58–( ) is as follows: A message is prepared on the paper tape by being handwritten in large characters with black pencil using Writing Stand MC–308, or by being typed on a special typewriter which uses large type. Standard typewritten characters are too small to be reproduced satisfactorily. The message thus prepared is threaded into Recorder-Scanner BC–918–( ) through which it is automatically fed at a speed of 50 inches per minute, corresponding to approximately 42 handwritten words. As the tape moves through the recorder scanner, it is scanned by a rapidly moving beam of light, which is reflected from the surface of the tape to a photoelectric cell. The variation in intensity of reflected light is thus converted into variations of electrical current. These electrical variations (or impulses) are amplified by Amplifier BC–908–( ) and then transmitted by radio or wire. In the receiving station, the incoming impulses are again amplified in an Amplifier BC–908–( ) and then are sent through the printer mechanism in a Recorder-Scanner BC–918–( ), which duplicates the original message. Because of voltage variations in vehicles, the machines do not remain in perfect synchronization. This causes the received message to "drift" across the tape. To overcome this, two lines are printed at the receiving end so that one line is always on the tape. As used for receiving, Facsimile Equipment RC–58–( ) starts automatically when an incoming signal is received, and stops automatically when the signal ceases.

Facsimile Equipment RC–58–( ) is designed for operation from a 12-volt source, but conversion to 24-volt operation may be made by slight changes in connections and by the replacement of several electrical subunits in the equipment. By the use of Rectifier RA–54–( ), it can also be operated from 115 volts, 60 cycles. This equipment is expected to prove particularly useful under high ambient noise conditions, such as exist in tanks and armored vehicles.

Facsimile Equipment RC–120–( ) is capable of handling copy 7 by 7⅜ inches in 7 minutes. Facsimile Set AN/TXC–1–( ) handles copy 12 by 17½ inches in 20 minutes. Both are used for



RC–120 AM TRANSMISSION WITHOUT CONVERTER



RC–120 AM TRANSMISSION WITH CONVERTER CV–2–( )/TX

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SAMPLE OF HAND PRINTED COPY RC 58 B TAPE FACSIMILE EQUIPMENT

a

SAMPLE OF HAND PRINTED COPY RC 58 B TAPE FACSIMILE EQUIPMENT
SAMPLE OF HAND PRINTED COPY RC 58 B TAPE FACSIMILE EQUIPMENT

b

TOP LINE (A) IS ORIGINAL MESSAGE; BOTTOM LINES (B), IN DUPLICATE TO PREVENT "DRIFTING," IS RECEIVED MESSAGE

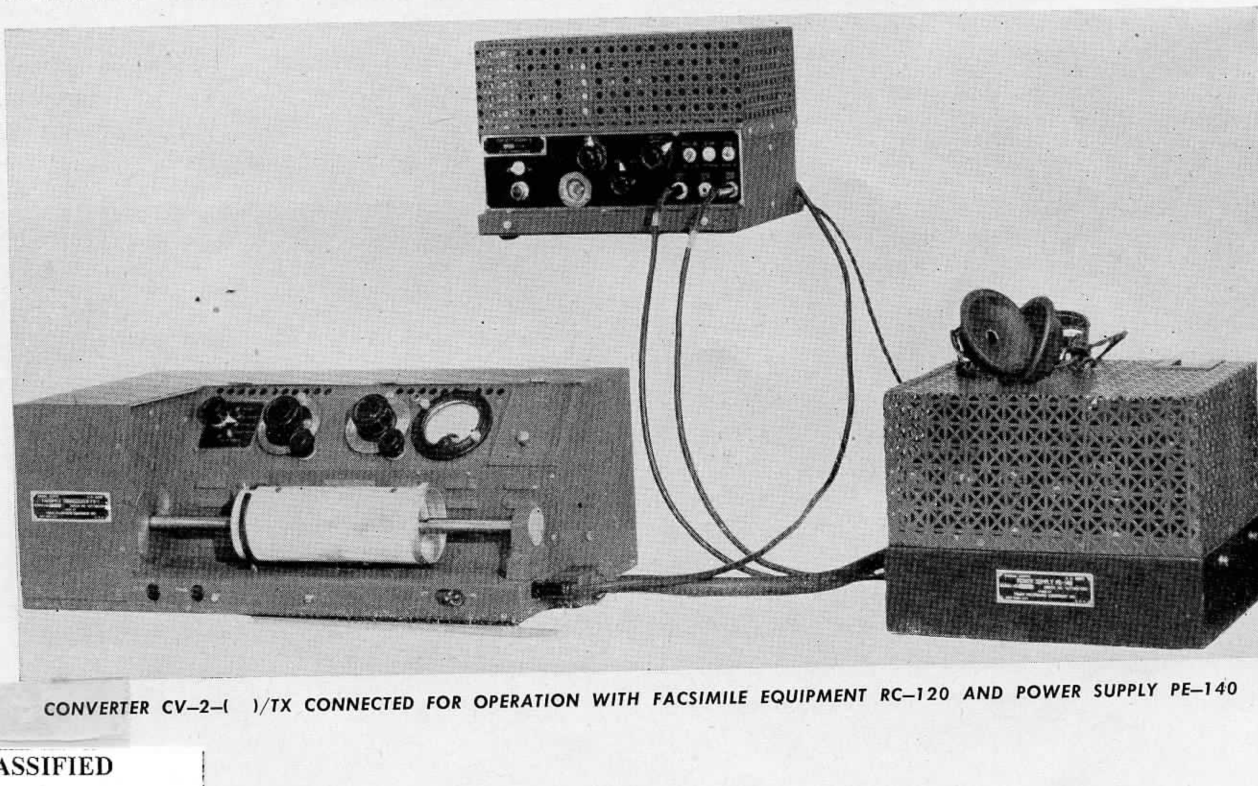
the transmission and reception of maps, diagrams, typed or handwritten pages, photographs or drawings.

Facsimile Equipment RC–120–( ) has been used in the field for some time. Its principal application is for the transmission of photographs and maps. Facsimile Set AN–TXC–1–( ) was standardized in January 1944, and is now in production. It was intended primarily for the transmission of weather maps, but it is expected that additional applications will be found.

Copy transmitted by these machines can be of any color, but it is received in black and white. Copy is received in its original size, and can be recorded on material requiring no further processing (teledeltos paper), or on material which must be photographically processed (photographic paper or film). Copy may be transmitted to produce either a positive or a negative at the receiving end.

These machines were designed for transmission over wire circuits, but satisfactory transmissions can be obtained over FM radio circuits and over short AM circuits which have no fading. It is, however, essential that Converter CV–2–( )/TX (described below) be used with either of these equipments in order to obtain satisfactory transmission over long AM radio circuits.

Converter CV–2–( )/TX (now under development) is used to adapt Facsimile Equipment RC–120–( ) and Facsimile Set AN/TXC–1–( ) for transmission over radio circuits. The output of Facsimile Equipment RC–120–( ) and Facsimile Set AN/TXC–1–( ) is a constant carrier frequency, amplitude modulated by the varying black and white density of the copy being transmitted. If any changes in amplitude are introduced between the facsimile transmitter and the facsimile receiver, such as the fading of radio signals, the shading of the received copy will be distorted. Converter CV–2–( )/TX reduces the effect of such variations by changing the amplitude modulated signal of constant carrier frequency to a frequency modulated signal of constant amplitude on the transmitting end, and vice versa on the receiving end. Black, white, and shades of gray



CONVERTER CV–2–( )/TX CONNECTED FOR OPERATION WITH FACSIMILE EQUIPMENT RC–120 AND POWER SUPPLY PE–140

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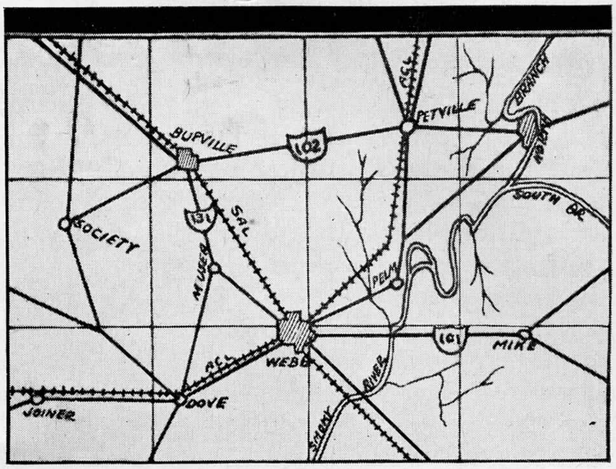
are represented by the transmitting portion of the converter as frequencies between the limits of 1,800 and 3,000 cycles per second.

This signal is then transmitted over a conventional AM radio circuit. Fading over the radio circuit introduces amplitude variations of the received signal, but does not change the received frequencies. The receiving portion of the converter first reduces the amplitude variations of the signal. The frequency variations are then made to cause corresponding changes in output amplitude. Thus, the signal fed from the receiving portion of the converter to the facsimile equipment is amplitude modulated to conform with the black, white, and shades of gray of the copy being transmitted, and the variations in amplitude introduced by the radio circuit have been overcome.

Cord CD–1018 and CD–1019 and Plug PL–55 and PL–68 are furnished with the converter for making connections to the microphone and headset jacks of the radio set.

Development models of Converter CV–2–( )/TX have been furnished one theater of operations and have proven satisfactory. The converter is now undergoing service tests and no delay in standardization is expected. It is believed that the converter will greatly increase the military applications of Facsimile Equipments RC–120–( ) and AN/TXC–1–( ).



TELEDELTOS RECORDING OF MAP SENT MORE THAN 500 MILES OVER SCR–299 CIRCUIT USING CONVERTER CV–2–( )/TX

NOTES FROM THE ADMIRALTIES

THE FOLLOWING information, extracted from a report of operations in the Admiralty Islands, outlines some of the methods used by a reconnaissance troop of a cavalry division in maintaining its communications.

The radio sets with which the troop was equipped worked well, but their weight often hampered the movement of small patrols. Simple improvised codes were frequently used, but the most satisfactory solution to the requirement for maximum security and speed was obtained by the use of six Sioux Indians who could speak their tribal language fluently. By having them operate voice radios, messages could be sent in the clear with impunity. However, in the latter stages of the operation it is doubtful whether the enemy had any radios with which to intercept messages.

Very satisfactory results were obtained from the use of pigeons. Usually 2 were released at a time on the theory that at least 1 would get through. Of 67 messages sent by this means all reached headquarters, despite the fact that 4 pigeons were wounded. One criticism made of the use of pigeons was that they could not be depended upon to fly after being thoroughly soaked in a tropical downpour. This was corrected by providing waterproof covers for the cages. Another objection was that their circling above the points of release betrayed the presence and location of the patrol. This was largely eliminated by having 1 man release them at a distance from the patrol, or by releasing them just as the patrol moved out. Both measures were very effective when the patrol was operating well away from paths.

The use of native runners also proved efficient. For greatest efficiency it was desirable to use individuals in an area with which they were thoroughly familiar, but in some cases they quickly traversed strange areas. On protected routes, such as between watching stations and the coast or the base camp, they could make 6 miles per hour. In more dangerous and hilly areas they could still be counted on to make 2 to 3 miles per hour. Not a single instance of failure to deliver a message by this means was reported.

Sound powered telephones were used constantly between trail watchers and the main body when an ambush was set up.

Blinkers were used with considerable success, principally across water between base camps or from base camps to boats. They were found to be efficient for distances up to 5 miles even in daylight.

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CAPTURED GERMAN EQUIPMENT

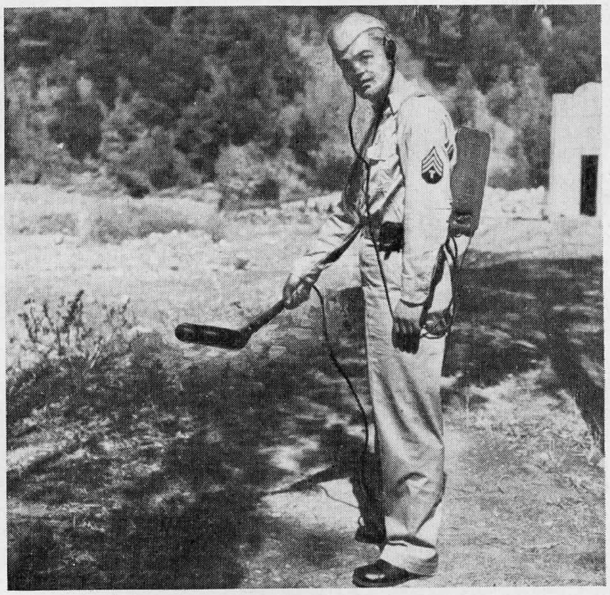
NEW ENEMY equipment, captured on French and Italian battlefields, has been examined and tested by Enemy Equipment Identification Service teams overseas, and at Signal Corps laboratories in this country. A description of some of the more recent equipments follows:

German portable set Torn. FU bl.—A new two-position ground switch provides reduced power to the receiver for strong signals. Indicating a shortage of magnesium alloy, galvanized iron cover plates are used. Types and stage nomenclature have been painted on the outside and covered with a thin transparent protective coating of lacquer.

German audio frequency amplifier.—This is used with the standard field telephone, and is known as the "Endverstarker." The amplifier is used to increase the range of operation of the standard German field telephone and to act as a field repeater. The instrument amplifies only the incoming signal, having no effect on the output of the local phone. Two of these units therefore are required to establish distance communications, one at each end of the line. The tube used in the Endverstarker is mounted on springs for protection against shock and vibration. The Endverstarker can be used in connection with U. S. Telephone EE-8-A by changing telephone connection plugs.

German motor generator set GG-400.—This was picked up in the Normandy Peninsula and is apparently used as a battery charger. It is a portable gas engine generator and provides charging rates for 2 voltages, 12 and 16. The set is of new design and has the following outstanding features: Use of relay to allow batteries to remain connected to the generator when the motor is stopped; exhaust noises are almost eliminated; air intake is muffled; ignition system is shielded to prevent electromagnetic radiation. The set is made of lightweight electron alloy material.

German cordless 10-line switchboard.—This also was picked up in Normandy by EEIS teams. These switchboards use switches for interconnecting subscriber lines rather than the usual cord and jack. The Germans have apparently copied Italian usage in this respect since the latter have had a cordless switchboard for several years. The switchboards are designed primarily for common battery operation but can also serve as local battery boards. The set accommodates 9 lines besides the operator's phone, and can handle only 2 conversations at one time. The set is well made, easy to use and maintain with the added advantage of being easily portable. It has the disadvantage of being unable to take care of more than one conversation at one time. However, it can be used for conference calls.



GERMAN MINE DETECTOR M. S. FRANKFURT 42

German mine detectors—M S Wein 41 and M S Frankfort 42.—The Germans have incorporated them in the pack case of their field radio telephone. The casing of the chassis and of the front panel are the same in both instances. Identical power supplies are also used.

These mine detectors are operated on the principle of magnetic coupling between an audio oscillator and the pick-up coil of an audio amplifier. The object being detected serves to increase the coupling between these two circuits. Audio frequencies are used throughout. The set is adaptable for transportation on the back of the operator. Sensitivity adjustments are made by remote control from a small black plastic box which is normally strapped on the belt of the operator. The indicating tone is broadcast in the headset worn by the operator. The sweeper brush which is the sensitive detector's component, is at the end of a hollow metallic pole of three sections.

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RADIO INTELLIGENCE OPERATIONS

RI and D/F Teams Must Be Tailored To Fit Particular Missions According to Overseas Reports

THE MATERIAL contained in this article represents a summary of operational developments in the employment of ground radio intelligence units, based on reports from these units and from the headquarters employing them. It is not to be construed as tactical doctrine.

As a matter of information, there are two types of units now organized for ground radio intelligence work: The signal radio intelligence company, T/O 11–77, and the two radio intelligence platoons of headquarters and headquarters company, signal battalion, T/O & E 11–16. Of these, only the first type has so far operated against the enemy.

This report, therefore, will deal entirely with the radio intelligence company and its operation. Although most companies have been conducting operations against the enemy, only a few of them have operated as elements of tactical forces in contact with the enemy, and it is with these operations that these comments will be chiefly concerned.

Operating practices deviate considerably from those outlined in FM 11–20 and FM 11–35 as will be evident from the information to follow. These manuals did not consider the widely varied kinds of missions to be performed. As a matter of interest, FM 11–35 is currently being revised to include up-to-date information on radio intelligence operation.

At this point the definition of the current conception of radio intelligence is considered timely and may be stated as follows: Radio intelligence is that part of the signal intelligence mission which deals with enemy radio communication. It constitutes intelligence derived by means of various methods from radio intercept and radio direction finding operations. The methods by which intelligence is derived from the raw materials produced by radio intercept and radio direction finding may be broadly defined as traffic analysis and cryptanalysis. In every case a secure and rapid communication system is required for the exclusive use of the radio intelligence company.

In order to fulfill the requirements for radio intelligence in a particular theater or of a particular mission, it has been found necessary to modify the internal organization of the companies and to add personnel and equipment not already provided in some cases. In tactical operation, at army level and below, modifications in general have involved the abandonment of the arrangement of operating the company as a complete unit and the regrouping of its personnel and equipment into detachments serving corps and army headquarters. Each detachment performs all of the operations set forth in the definition of radio intelligence, including traffic analysis and cryptanalysis. Inasmuch as the radio intelligence company contains no intelligence personnel and but limited radio communications personnel, it is necessary that these be added.

SEPARATE DETACHMENTS

Radio intelligence functions for an army are performed by detachments serving each corps headquarters and a detachment serving the army headquarters. Corps detachments consist of, roughly, 4 officers and 100 enlisted men who operate from 8 to 10 radio receivers and 1 radio direction finder, and perform the intelligence and communication functions necessary to produce information for the corps commander from intercepted messages and direction finder bearings. The army detachment is made up of about 8 officers and 150 enlisted men who operate from 12 to 15 radio intercept positions and from 1 to 3 direction finders controlled by the intercept station. Necessary communication and intelligence personnel are included to carry out these functions properly. Corps and army detachments each work primarily for their local commander on problems of specific interest to that commander. As a result, corps detachments are concerned with traffic of opposing divisions with emphasis on VHF plain language, while the army detachments work largely on MF, CW traffic of all units opposing the army. Corps detachments operate as close to the enemy as practicable without exposure to fire or possible capture in case of a break-through. In VHF intercept work a location as close to the enemy as possible is required because of the limited propagation range of transmissions on such frequencies. Since the traffic with which the army detachment is

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concerned employs greater signal strength and does not involve VHF transmissions, this unit can operate at a greater distance from the enemy than the corps detachment. It is sometimes divided into a forward and rear echelon in order that continuity of intercept may be maintained during moves.

Control of operations in all detachments or in complete companies is exercised by the intelligence team assigned to the particular unit. Each intelligence team in turn reports to the next higher team in a chain starting at corps level and ending at the theater headquarters. For example, intelligence personnel of a corps detachment will produce information primarily for their corps commander but will at the same time forward their results to the intelligence team operating with the army radio intelligence detachment. Similarly, intelligence produced at army level is forwarded to the signal intelligence service of a theater. Technical information and the results of studies to prevent duplication of effort are forwarded to lower levels by the theater signal intelligence service together with instructions necessary for the proper operation of the combined system. The allocation of specific missions, however, remains a local responsibility.

Thus far the information presented has been based on tactical operations of units in close contact with the enemy. At theater level, on the other hand, radio intelligence companies operate under the direct control of the theater signal intelligence service. Under the circumstances functions of intelligence and communication not provided for in the company organization are performed by the theater SIS. In some cases several companies may work under the direction of the theater SIS.

RADIO USED MAINLY

Intercommunication between elements of a detachment or company and between detachments and companies is accomplished by means of wire and radio. Radio, however, has assumed a greater importance than wire since it is the only means available in all but short distance, slow moving operations. For example, wire has seldom been used to coordinate the work of a direction finding net, while radio has been found quite satisfactory for this function. In most units there is, therefore, a shortage of radio communication specialists and equipment and an excess of telephone and teletype facilities and personnel. This excess can seldom be trained for radio operation inasmuch as they are usually assigned to wire work only after careful sifting of all personnel for radio operator material. The requirement for radio operators has been met by adding personnel rather than by borrowing intercept operators from the units. When wire is available it is used in general only for local installations and between signal intelligence detachments. If lines are suitable, teletype is employed on the same circuits.

As expressed earlier, one direction finder is used by each corps detachment while several are employed by the army detachment to enable fixes to be made. The base line varies from 5 to 50 miles depending on the situation. More than three sets are seldom used and, as stated, all are generally controlled by radio. Fixes required by corps can be obtained from army on request. In general, direction finding is considered as a supplement to intercept activity.

It is agreed by the majority of reporting officers that there is no practical substitute for training on the job in operation against the enemy as the final phase of training. Some reports recommend training in this country on recorded enemy traffic. It is certainly true that all signal intelligence units should be trained on the type of traffic they will eventually copy in operations against the enemy. If operators reach a speed of 25 words per minute on simulated enemy traffic, only a few weeks are required for the transition to live traffic. On the other hand, if training in the U. S. is not specialized on one type of traffic as many as 6 months are sometimes required for the transition period. Reports have also stressed that there is essentially no difference between D/F and intercept operators. They should both receive the same training inasmuch as they may be rotated between the two jobs in the field. All D/F operators should be trained intercept operators.

Material differences have been noted between maneuver training and operations in the theater. While maneuvers have been valuable in familiarizing units with the conditions of field operation in general and the handling of their equipment in particular, no experience of value with regard to actual intercept operations has been reported since the types of traffic encountered and the methods of unit organization and grouping bear very little

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PROBLEMS OF
HIGH ALTITUDE COMMUNICATION
PART III

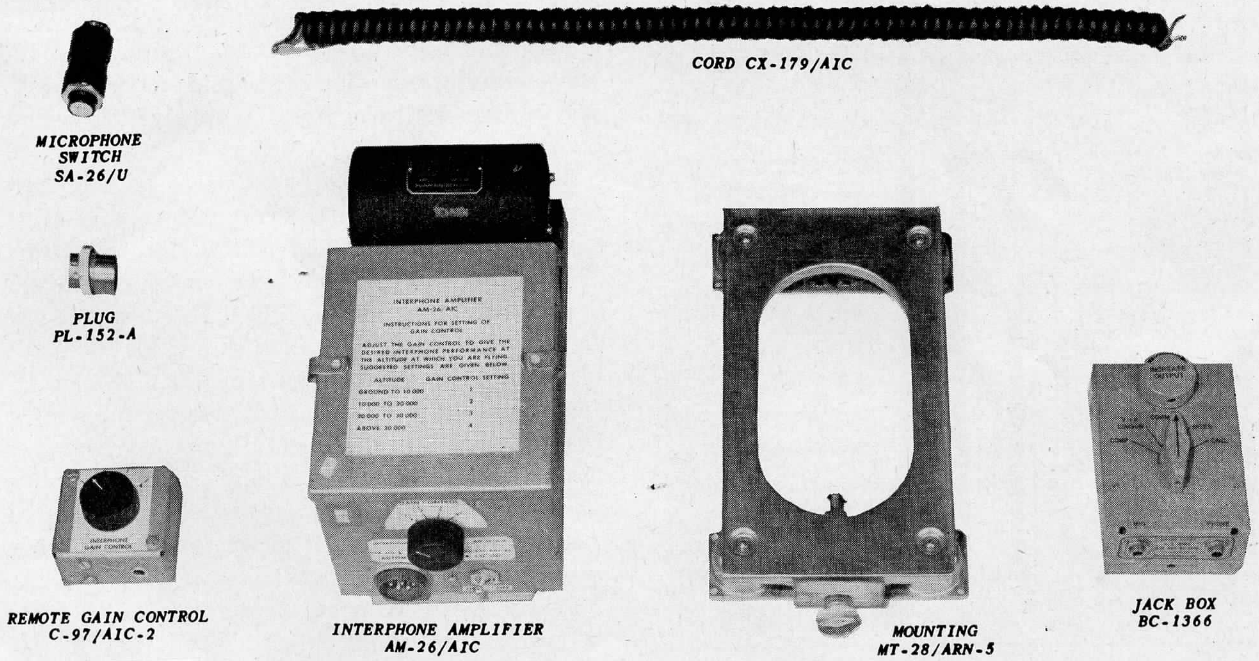
Interphone Amplifier AM–26/AIC Overcomes Reduction of Voice Level

THIS ARTICLE will conclude the series on aircraft interphone communications at high altitudes begun in SCTIL No. 25, December 1943. Standard Signal Corps headsets for use in aircraft were described in the introductory article. In SCTIL No. 26, January 1944, oxygen mask and throat microphones were discussed.

As stated in the previous articles, the volume level of sounds produced by the voice is greatly decreased in the reduced air pressures of high altitudes. It is estimated on the basis of measurements made in high altitude chambers that the drop in level between altitudes of approximately 5,000 and 35,000 feet is from 10 to 15 db for the normal voice. In the extremely high noise levels of multi-engine aircraft, which in contrast to speech levels are relatively unaffected by altitude, this acute reduction in the power of speech sounds has a serious effect upon the intelligibility of interphone communications in high altitude aircraft. For this reason considerable amplification must be introduced into the interphone equipment if efficient communication is to be achieved under all service conditions. This requirement, in practice, is further enforced by the fact that the talker at high altitudes experiences shortness of breath and a reduction in physical energy which quickly discourage any attempt to raise the voice above normal conversational level.

Based on extensive laboratory and flight tests, it was determined that for an interphone amplifier to be used at 35,000 feet in conjunction with a carbon oxygen mask Microphone ANB–M–C1 and a low impedance Headset HS–38, the over-all voltage gain should be approximately 30 db for the best articulation results. Furthermore with this gain provided it was found that the amplifier should have a power output capability of at least 200 milliwatts per headset to prevent overload distortion of the speech peaks.

As a result of these tests, interphone Amplifier AM–26/AIC was designed to provide sufficient



INTERPHONE EQUIPMENT AN/AIC–2 WHICH INCLUDES THE NEW AMPLIFIER AM–26/AIC AND MICROPHONE SWITCH SA–26/U

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gain and power output to compensate for these natural losses in the levels of speech, thereby increasing the ease and intelligibility of interphone communication at high altitudes in medium and heavy bombardment type aircraft. The new amplifier has a power output capability of 4 watts and a total increase in voltage gain of 16 db over that of the Interphone Amplifier BC–347–C (power rating approximately 0.75 watts) which for medium and heavy bombardment type aircraft, it is designed to replace. The amplifier is provided with an initial gain of approximately 16 db and provision for obtaining 16 db additional gain in three steps, each step corresponding roughly to the gain required for the different altitudes. The settings on the gain control is left to the discretion of the crew but the suggested settings of the gain control switch for various alitudes are given on the amplifier and are as follows:

Altitude	*Gain control setting*
Ground to 10,000 feet	1
10,000 to 20,000 feet	2
20,000 to 30,000 feet	3
Above 30,000 feet	4

The gain of the amplifier may be controlled

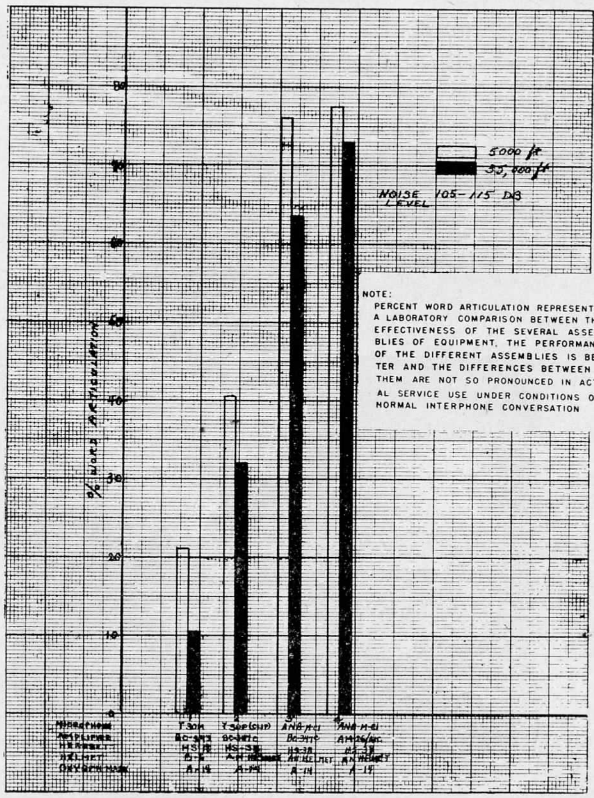

CHART SHOWING IMPROVEMENTS IN INTERPHONE EQUIPMENTS

either from the front panel of the amplifier itself or by means of a Remote Gain Control C–97/AIC–2. A pressure switch, which will accomplish the changing of the gain with altitude automatically, is now in development and will probably be incorporated in the amplifier at some future date.

The Interphone Amplifier AM–26/AIC is being introduced in medium and heavy bombardment type aircraft as part of the Interphone Equipment AN/AIC–2–( ) to replace the Interphone Equipment RC–36. In addition to the new amplifier, the AN/AIC–2–( ) equipment includes Microphone Switch SA–26/U, which mounts on machine guns and other convenient parts of equipment that are used by the navigator, radio operator, etc. A retractable Cord CX–179/AIC is used to connect the switch to the interphone control box so that there is very little possibility of a dangling cord resulting in interference with the operation of the machine gun. A few minor circuit changes deviating from those in the RC–36 equipment have also been made to permit wiring in VHF equipment in place of the liaison set in certain positions of the aircraft.

In the previous articles the progressive improvements in the microphones and headsets for use at high altitude were discussed. The accompanying chart shows the progressive improvement in articulation at low and high altitudes in the overall interphone systems, beginning with the No. 1 system that was available at the beginning of the war (with the exception of the A–14 oxygen mask) and ending with the No. 4 system which is now being issued.

The results graphically indicated on the chart were obtained in actual flight test in a B–17 at the altitude of 5,000 and 35,000 feet, as shown. The results are an average of a considerable number of tests using six to eight enlisted men as the articulation crew. The score shown for the No. 4 system was not obtained with the new AM–26/AIC amplifier since it was not available for these tests. For the tests an experimental amplifier having a stepped gain control and a high power capability was used. This score is a very close estimate of the articulation expected in relation to the other systems shown.

It is desired to point out at this time the meaning of "percent word articulation" and how it was obtained. Extensive use has been made of word

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articulation tests in the past for the purpose of comparing different microphones, headset, interphone equipment, etc. The method used was to have a speaker read monosyllabic words to a listening crew of sufficient size to give a reliable score. The listeners wrote each test word on answer sheets which were later scored. The monosyllabic words were arranged in master lists of 50 words each with each of these lists containing phonetic elements in the same proportion as is found in everyday speech. The master lists were of equal difficulty as previously determined in laboratory tests. The proper speech level was maintained by instructing the speakers to make himself as intelligible as possible while reading the test words. Sidetone is furnished to the speaker's headset in an interphone system, and this was the speaker's clue as to the intelligibility of his speech and signal level. The interphone in these tests was therefore used as it would normally be used by experienced flying personnel. Since these tests were conducted in actual flight, the high noise level of 105 to 115 db was present and the articulation crew occupied the positions that would normally be occupied by aircraft crew members during flight.

The equipment used for the four interphone systems shown on the chart are described as follows:

System No. 1

Microphone T–30–M—Originally designed for tank use and then applied for use in aircraft because of the advantages obtained in freeing the hands for operation.

Amplifier BC–347—Having a gain of approximately 16 db and a power output of approximately 0.7 watt and high impedance output.

Headset HS–18—High impedance headset having a peak response at about 1,000 cycles. Designed for use in CW communication.

Helmet—Army Air Forces helmet B–6 which has leather cups for insertion of the HS–18 headset and practically no noise attenuation characteristic.

Oxygen Mask A–14—This is the latest type of demand type oxygen mask in use by the Army Air Forces.

System No. 2

Microphone T–30–P—This is an improvement over the T–30–M microphone and has a clip added to it to keep the carbon buttons in definite contact with the throat. This microphone was designed with a view towards use in aircraft.

Amplifier BC–347–C—Improved amplifier having better response characteristics than BC–347, gain of approximately 16 db, power output of approximately 0.75 watt, high and low impedance output.

Headset HS–38—Low impedance flat response headset designed for voice communication.

Helmet—A–N Helmet. Helmet superior to the B–6 which incorporates large doughnut cushion for insertion of head, thus providing good attenuation of the noise prevailing in aircraft and increased comfort.

Oxygen Mask—Same as 1 above.

System No. 3

Microphone ANB–M–C1—Designed especially for use in oxygen mask, and providing communication far superior to the throat microphone. It has a response curve which takes into account the cavity resonance formed by the oxygen mask so that when this microphone is installed in the oxygen mask a fairly flat response is obtained. Throat microphones are inherently inferior because of the lack of high frequencies in sounds made in the throat, and the variations in speech characteristics between personnel. The ANB–M–C1, which picks up the actual speech directly from the lips, therefore provides far superior communications.

Amplifier—Same as 2 above.
Headset—Same as 2 above.
A–N Helmet—Same as 2 above.
A–14 Oxygen Mask—Same as 1 above.

System No. 4

Microphone—Same as 3 above.

Amplifier—AM–26/AIC is a high powered, high gain interphone amplifier providing superior communications to the BC–347–C at high altitudes. Power output of approximately 4 watts, flat response characteristic, gain of approximately 16 db with adjustment to 32 db, high and low impedance output.

Headset—Same as 2 above.
A–N Helmet—Same as 2 above.
A–14 Oxygen Mask—Same as 1 above.

It must be stressed that the percentages shown on the chart are for the purpose of comparing the various systems tested and give a relative indication of what communications may be expected from each system. Since the scores were made with monosyllabic words, the intelligibility scores with the systems shown using sentences as contained in normal speech would be increased relatively to a higher value. The chart indicates the tremendous improvement in high altitude communications that has been achieved during the past 2 years. Any additional improvement will result in increasing the quality of the various components that go to make up an interphone system and in increasing their reliability under service conditions. As in all research and development work, particularly with voice communications, the last few percentage points to reach perfection always require

(Continued on p. 32)

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SIGNAL INSTRUCTIONS

REPRODUCED BELOW are two signal instructions used recently by a corps operating in Italy.

SIGNAL INSTRUCTION
NUMBER 7

SYMBOLS INDICATING MINE FREE PATHS ALONG OVERHEAD WIRE ROUTES

NOTE: These symbols will be drawn boldly in white chalk on the poles carrying the route.

1. On the road side of the pole.

a. Ⓢ Pole swept for eight feet all around.

b. ↑ 4-foot path swept between road and pole.
→
or

c. ← 4-foot path swept to pole in direction indicated.
or
↔

2. On the track (path or trail) side of the pole, if a track (path or trail) runs along the route in addition to the road:

a. = Whole track (path or trail) along side poles swept.

b. ⊐ End of swept track.
⊏

SCHEDULED MESSENGER SERVICE

SIGNAL INSTRUCTIONS
NUMBER 8

1. Scheduled messenger service to units of the corps will be established as required and according to schedules prepared and distributed by SigO, ——— Corps.

2. Prior to surrendering messages to the custody of "other unit messengers" for delivery, message centers of the corps echelon will habitually require authentication by means of the ——— Corps Authenticator System, SOI Item No. ——.

a. Challenge and Reply.

(1) The challenge will be: "What is today's authentication?"

(2) The messenger will reply as he has been instructed by his message center chief.

(a) Message center chiefs will prepare their own messengers to identify themselves by verbally advising them of the correct reply to the day's challenge. (Example: "Your authentication for today is ———.")

(3) By reference to the authenticator system and using the Msgr Challenge Items specified therein, the message center will verify the "other unit messenger's" reply. This completes the authentication.

WRAPPINGS PROTECT BEARINGS

BEARINGS ARE still at the top of the list of critical items used by the Army. Therefore, constant attention to the use and handling of bearings is one of the important duties of Army personnel who operate and maintain the equipment in which they are used. No less important is their handling before installation.

A common failing in handling bearings is the tendency to take them out of wrappers before they are ready for installation, or to fail to wrap them when they are being stored.

An unwrapped bearing hasn't got a chance against its mortal enemies—sand, grit, rust and breakage. It only takes a few grains of sand to score a bearing and turn it into scrap. A bearing stored in a bin without wrapping is subject to a constant shower of sand and grit sifting down from items thrown in on top of it. A bearing placed on the running board of a vehicle or on a dirty workbench can pick up enough grit in an instant to ruin it for good. Moisture from the hands will cause rusting as surely as if the bearing were dipped in a pail of water.

There are other danger points equally vital in handling bearings. They must be properly cleaned and lubricated. In this regard it is essential that dry-cleaning solvents and lubricants be clean. Lubricant containers, therefore, should be kept covered as much as possible, to prevent dust and grit from settling and blowing into them. Hands, benches, rags, tools—everything that touches the bearing—must be kept clean.

Lubrication orders and instructions in technical manuals must be followed to the letter, so that bearings are installed and lubricated properly.

Bearings are scarce—they must be protected. The wrapping is one of the most important forms of protection. A bearing that is unwrapped for any reason should be wrapped again before storing. A bearing should never be issued unwrapped. Bearings must be kept wrapped at all times—right up until the time they are installed.

PASS THIS COPY ALONG.

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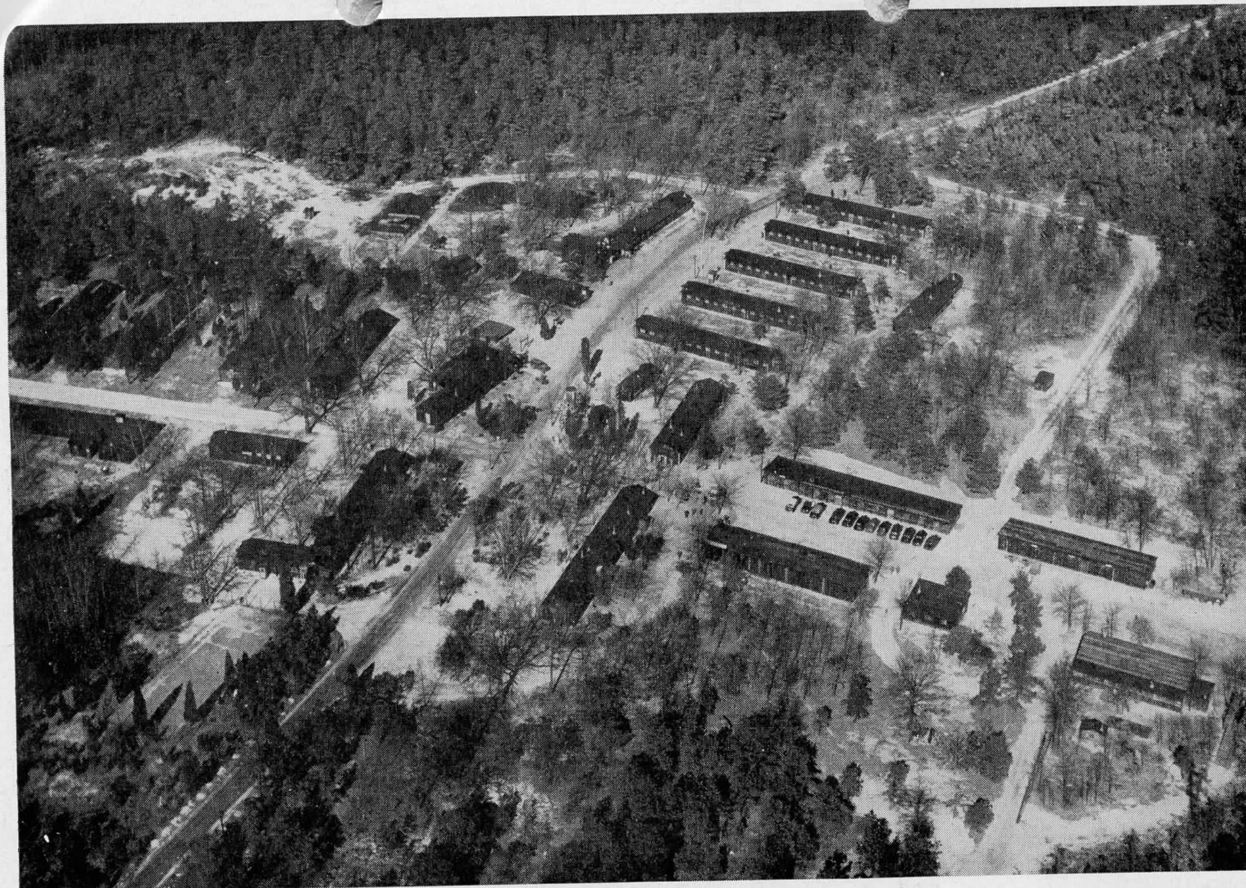

LEBANON STATE FOREST AREA. IT IS IN CANTONMENTS LIKE THIS THAT SIGNAL UNITS LIVE DURING FIELD EXERCISES

SIGNAL TRAINING—1944

Troops Are Being Fitted for Communication Zone Service Through Field Exercises in UTC "Theaters of Operations"

THE LIEUTENANT sat up sharply. In the half light of dawn he saw the sergeant bending over him.

"What is it?" he asked.

"The keying line is out, sir," the sergeant replied. "The captain says it has to be in by six."

"What time is it now?" the lieutenant inquired, swinging from his cot.

"It's four-thirty, sir," the sergeant said.

"Okay. Get the men up." The lieutenant began lacing his leggings.

Within minutes, the group was outside the farm-house and gathered about their leader. Quietly he outlined the job.

"Everyone understand?" he asked.

The coveralled men nodded.

"Let's go, then," the lieutenant said, and the group clambered into the truck standing outside the yard.

The motor whirred as the driver put his foot on the starter. It sputtered once, then died. Again the driver kicked at the starter. Again the motor whirred, and again it died.

"What is the matter?" The officer was half out of the cab. "Here, help me." He opened the hood, and his flashlight probed the interior. In the white circle of light, bits of porcelain, glittered, and on the motor block, where a sparkplug should have been, was an empty socket.

The occurrence described above took place not in France, not on New Guinea, but at Camp Wood, N. J. It was one of the ingeniously staged "emergencies" by which a signal unit at this Unit Training Center is kept on its toes and conditioned for

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OPERATING RADIO POSITIONS AT THE MTO SIGNAL CENTER

operations overseas. Field training today, for signal organizations scheduled for overseas Communication Zone assignments, is rigorously realistic; as real as the training infantrymen get going through the infiltration course at Fort Benning.

This training is given to signal units at three Signal Corps unit training centers—Camp Crowder, Camp Kohler, and Camp Wood. The discussion below is based on the activities at the latter installation.

A year ago in August, the Eastern Signal Corps Unit Training Center was established at Camp Wood, then a replacement training center. Its mission is to train the inexperienced soldier to operate as a functional part of a team or unit destined for a particular mission within a theater of operation. Units trained are of two general types, consisting of certain standard T/O organizations and special units built up of cellular teams tailored to perform special missions as required by particular theater operations.

One of the major reasons for the establishment of this Unit Training-Center was the increase in requirements for signal service organizations to operate the more or less fixed plant equipment in allied rear areas—which came into being following the invasion of North Africa. At the same time, the need for combat signal troops then had been met to an extent that training emphasis could be changed over from Ground Force organizations to what is more familiarly known as LOC signal units.

Training for Communication Zone signal troops takes place at Camp Wood and its subsidiary posts—Camp Edison, Mount Misery, Lebanon State Forest, Penn State Forest, Freehold, Allenwood, Hamilton, Squankum, Barton, Hackettstown, Whippany, Butler, and Allaire. These installations are all located within a 100-mile radius of the main post.

Camp Wood is used for basic technical training, unit activation and refresher training. Camp Edison and Allaire are used for basic military training as well as for team and unit training. The other area is used for field training and fixed signal communications team and unit training.

The UTC program consists of basic military training, 6 weeks, basic technical training, 8 weeks to 27 weeks, unit training, 6 weeks, and overseas preparation, 3 weeks. Although this is the theoretical break-down of a unit in training, all three aspects of this training may be going on at the same time. For example, a unit may be in field training; even so, some of its personnel may be continuing basic or basic technical training, and at the same time various individuals in the unit are being prepared for overseas movement.

Signal units under T/O 11–500 and the more standard organization plan are activated at Camp Wood by directive from the Adjutant General, based on specific overseas requisitions. Training supervisors at Camp Wood know in general the type of country a unit will work in, and the type of signal operations for which it will be responsible. When a unit is activated, it is formed for a particular mission and its training is aimed to familiarize personnel of the organization with these factors.

To illustrate: A unit is activated to perform a certain mission in a Pacific Theater of Operations area. Since this is known to training officials, the unit, in addition to its technical training, will be given experience in such specific items as malaria control, moisture and fungus resistive processing of equipment, working through jungle atmospheric conditions, etc.

The major installation for unit training at Camp Wood is the "Monmouth Theater of Operations." The Monmouth Theater of Operations consists of a theater headquarters, located at the main post; a headquarters, Zone of Communication, at Allaire; and two base sections. Base Section 1 includes Barton, Allaire, Wayside, Squankum, Allenwood, Freehold, Whippany, Butler, Hackettstown, Hamilton; Base Section 2 includes Mount Misery, Penn State Forest, Lebanon State Forest, Fort Dix.

Alumni of the wooded flatlands of central and northern New Jersey are operating communications circuits wherever American forces have wrested real estate from the foe. A listing of some of these units is a roster of the many different types of Signal Corps organizations now in existence: the 221st Signal Depot Company, the 222d Signal Depot Company, the 991st Signal Port Service Company, the 980th Signal Service Company, the 995th and the 819th Signal Port Service Companies, the 246th Signal Operating Company, the 3104th Signal Service Battalion, the 3111th, the 3112th, ditto; the 3105th Signal Service Company.

Soon to join these organizations are those now in training: the 3123d Signal Service Company, operating at Fort Dix; the 3161st Signal Service Company, learning radio relay installation, maintenance and operation at Mount Misery, the 3130th Signal Service Company, at the Barton Training Area; the 3150th Signal Service Company, also at Barton; the 3162d Signal Service Company, training for wire installations, at Freehold; the 3170th Signal Service Company, at Sea Girt, and the 543d Signal Base Depot Company, on temporary duty at the Holabird Signal Depot.

When a signal unit is activated, the field training problem follows closely the actual procedure undergone when the unit really goes abroad. This procedure includes assignment of a shipment number, crating and packing a move to a staging area, thence to a Port of Embarkation, the movement across, arrival at Port of Debarkation, reporting to theater headquarters, assignment and movement to the assigned area and installation. From there all operations are established and maintained according to the mission given the unit by the theater commander.

Key installation of the Field Training Branch, responsible for field training, is the Operations Center at Camp Wood. The Operations Center, staffed by members of the Branch, is the planning, mapping, and control agency for the tactical situation at the Monmouth Theater of Operations. Field orders and administrative and withdrawal orders which dictate the activity of the organization in the field problem, originate in this center. The Operations Center monitors all radio nets in the Monmouth Theater of Operations field problem for traffic analysis and cryptographic security.

One method by which a unit training is assured of complete understanding of its mission and of help in attaining proficiency to meet this mission, is the training supervisor. This officer, a member of the Field Training Branch, Training Division, knows what the mission of the unit is and, acquainted with the facilities at Camp Wood, is able to advise both the unit commander and training officials as to the type of training that should be undergone. At the same time, as training continues, he becomes familiar with the capabilities of the unit and is thus able to recommend the aspects of training that need to be stressed. The training supervisor also supervises the technical training of the specialists in the organization and is invaluable in helping the unit commander complete the POMing of his personnel.

Just as organizations overseas are scattered throughout a theater so in the Monmouth Theater of Operations units are widely dispersed. For example, a signal operations company, based at Freehold, had its message center and messenger platoon at MTO headquarters, its installation and maintenance men at Squankum and Wayside, its telephone operations platoon at Freehold, and detachments of its radio platoon at Penn State, Allaire, and Hamilton.

The Signal Service Company is a good illustration of the different levels of training going on among individual members of an organization. The Company itself was conducting specialist refresher and team training but its two EI teams (radio and telegraph fixed station two-position) were handling radiotelegraph communications at MTO Signal Center. This was possible because the two EI teams were fully trained, having completed their specialist and team training in another unit which had been disbanded.

Field training of signal units at Camp Wood

OLD BUILDING HOUSES ARMY GROUP SIGNAL CENTER

OPERATIONS ROOM, PROBLEM AND CONTROL HEADQUARTERS, WHERE PLANS FOR UNITS IN THE FIELD PROBLEMS ARE MADE

consists not only in a day to day progressive curriculum, but training officials have found it best for a unit to be confronted with emergency situations. These consist of cut telephone wires and cables, shortage of vehicles for a movement, gas attacks, the elimination of a means of transmission at a Signal Center, jamming of radio operators, short notice for movements, equipment with faulty components, etc.

Thus, when the lieutenant, whose actions were described at the beginning of this article, was awakened that morning, he was being tested not only on the normal hazards of keeping keying lines open, but also on his ability to react to an emergency situation such as a "damaged" vehicle.

There are many other methods of throwing bugs into the work. Instead of furnishing new cable for units to install, Class B lines are given them so that they must police continuously in order to maintain operation. An entire section of the Field Training Branch does nothing but foul up equipment and send it out to repair teams to be returned within a certain time.

The results of this realistic training have evoked commendations from field commanders in theaters of operation all over the world. Signal units trained under this plan in the U. S. are not only smooth-working teams but have had experience handling the type of communication troubles likely to be encountered in their scheduled theater.

The commanding officer of a signal service company, now in CBI Theater, wrote: "* * * to the fine work of the UTC * * * goes most of the credit for preparing our company to tackle its overseas work. The modern and practical methods of training have made it possible for the men to take over responsible jobs quickly and efficiently, and has aided much in keeping up the present high morale of the outfit."

One signal unit activated at Camp Wood was called for by a theater and found itself moving to a Port of Embarkation without all of its field training completed. There it took 3 days to complete the POM items necessary before it could go aboard the waiting transports.

Sometime later, another signal unit, which had had its complete cycle of training, arrived at the same Port. This outfit had had the experience of going through the training "Port of Embarkation." At the real port, it amazed and delighted regular Port officers by being ready for loading 3 hours after arrival.

CARRIER INTERCONNECTION

Notes for Interconnecting Various Carrier Telephone Systems in the Field

IN USING tactical carrier telephone equipment in the field, it often becomes necessary to build up a long circuit by interconnecting channels of several shorter carrier telephone systems. In the usual case, all of the carrier systems are of the same type, employing Telephone Terminal CF–1–A (Carrier), but in some instances it becomes necessary to interconnect channels of a CF–1–A to other carrier equipment, such as the British types and U. S. commercial models, and to certain types of multi-channel radio sets in which the means for deriving several voice frequency channels are provided integrally. Fortunately, the transmission considerations involved are practically the same for connection to the various types of carrier systems and it is not necessary to establish separate recommendations for each combination. Therefore, material is presented below which describes the specific interconnection of CF–1–A carrier systems; the same procedures should be applied when connecting channels of the CF–1–A to other types of carrier telephone equipment. Some information is also supplied on the connection of carrier telegraph equipment.

Tandem Operation of Carrier Telephone Channels

The equivalent transmission paths of one carrier telephone channel are shown in figure 1. It will be noted that the net loss of the channel is shown as 6 db. Actually, the CF–1–A includes sufficient amplification to operate at considerably lower losses, but in the interest of good telephone service it is advisable to use the 6-db value in order to provide a circuit which will remain stable even though temperature and other variations cause the cable or line losses to change. If such a circuit is terminated on a switchboard it may be connected, as desired, to other telephone circuits and a number of such 6-db circuits may be connected together to build up a long circuit with a total loss of less than 30 db, which value is considered to be the maximum that should be inserted between two telephone stations.

When it is desired to provide less than four telephone circuits between two distant points and also to provide circuits to intermediate points, it will be necessary to establish several shorter carrier systems having their terminals at the intermediate points. Those circuits which are desired over the entire distance may then be provided by making direct and permanent connections between channels of the adjacent systems at the intermediate points. This type of interconnection is known as "back-to-back" or "tandem" operation.

With channels connected in tandem it is not necessary to tolerate a 6-db loss in each channel, which would total 12 db for a two-link circuit, since a special line-up procedure may be applied, as shown in figure 2, to reduce this to 6-db net loss over-all. All that is necessary is to line up each channel as usual to 6 db, then interconnect the two-wire terminations of the through channels at terminals B and C, and increase the channel GAIN dials, which control the receiving amplification, at B and C by six steps (6 db). Tests should then be made over the over-all circuit and any final adjustment necessary may be made with the GAIN dials at the A and D terminals.

The simplest method of connecting three channels in tandem is to extend the arrangement as indicated in the paragraph above, and connect the channels together on a two-wire basis. This arrangement, as in figure 3, will provide a 6-db circuit over the entire length. As before, the channels are first lined up to 6 db each, then connected together at the intermediate points and the GAIN dials increased six steps at all intermediate terminals. In some cases, particularly if some of the carrier systems involved employ equalization which is not as suitable as that of the CF–1–A, the use of the 6-db net loss may cause the circuit to sound hollow and approach the singing condition. In such cases the channel GAIN potentiometers at terminals A and F should be decreased by about three steps, thus increasing the loss of the end sections and the over-all net loss from 6 to 9 db.

Signaling

As is usual with carrier telephone circuits, voice frequency signaling must be employed on tandem-operated carrier circuits. However, in tandem operation, the signaling equipment is required at the extreme ends of the circuit only, and not at the intermediate points, for the voice frequency signals

Symbols used in the transmission diagrams showing interconnection of Telephone Terminals CF–1–A (Carrier) are as follows:

H=Hybrid coil
R=Voice-frequency ringer
G=Channel gain control
—▷=Amplifier

are readily passed through the interconnections. In fact, it is preferable that no signaling equipment be inserted at the intermediate points, for such "relaying" of the signals introduces a time delay which may cause ringing errors; the extra equipment at those points may also affect the hybrid balances. Thus the proper procedure is to disconnect the ringers provided at the intermediate points for those channels which are to be connected through, or to disable the integral signaling if provided in the carrier terminal.

It is important that the ringing equipment provided at the two terminals of the circuit use the same type of voice frequency signaling; this does not require that identical equipments be used, but that the operating principles of the equipments be alike. When the interconnected carrier systems are all CF–1–A, the ringers provided will all be of the same type, Ringing Equipment EE–101–A (Voice Frequency), which operates with 1,000/20-cycle signals, and so through-signaling will be satisfactory without any special provision. In fact, if connecting to other types of U. S. carrier equipment, such as the packaged types, it will be found that 1,000/20-cycle signaling equipment is also provided and may be used for ringing over tandem connections.

However, when connecting to British carrier equipment it will be found that 500/20-cycle signaling is used in most cases, but unmodulated 500 cycles is used in a few equipments. It will then be necessary to make special arrangements for coordination, such as providing a 1,000/20-cycle ringer to be used in lieu of the usual ringer. In some instances it may be found that the British circuit is equipped with Ringer TP–8. This ringer, although bearing U. S. nomenclature and produced in this country, has been procured exclusively for use by the British. It will function on 500 or 1,000 cycle signals, either modulated or unmodulated, and transmits modulated 500 or 1,000 cycles; thus, when the TP–8 is encountered, it may be readily switched to 1,000/20 operation.

When it is not possible to provide the proper

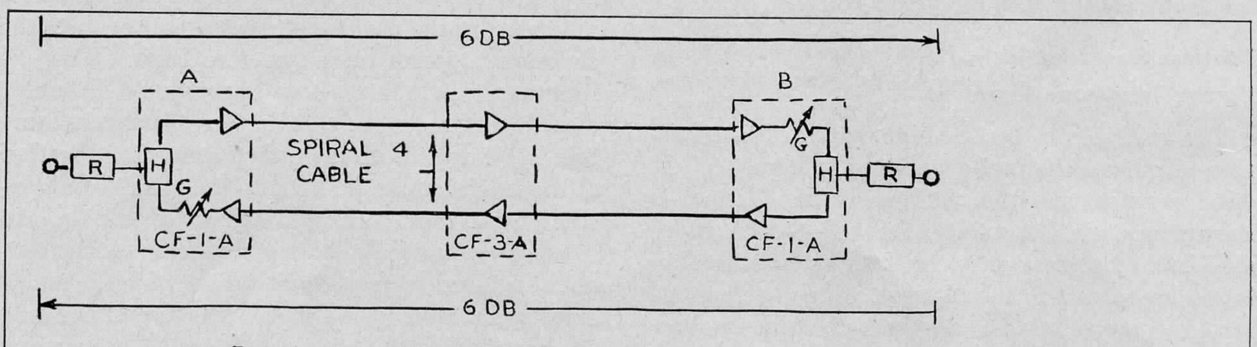


FIG. 1 – BASIC CARRIER CHANNEL

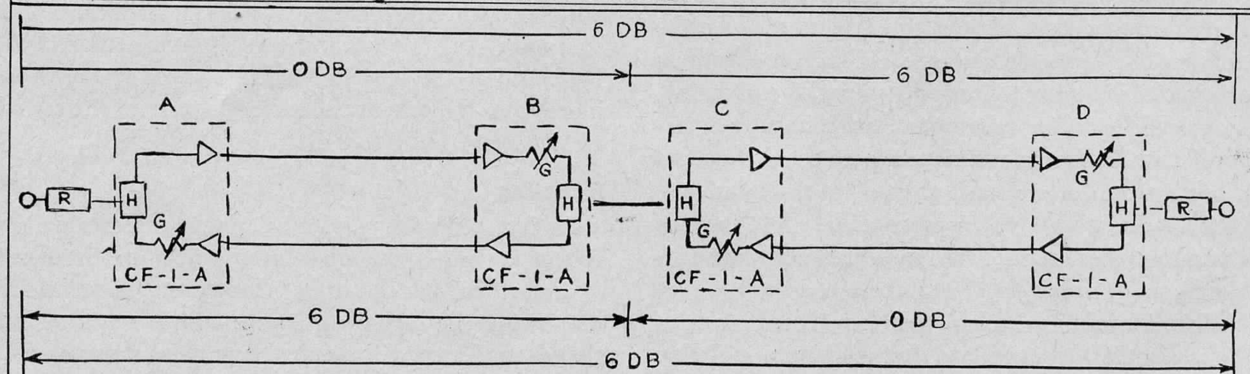


FIG. 2 – TWO CARRIER CHANNELS IN TANDEM

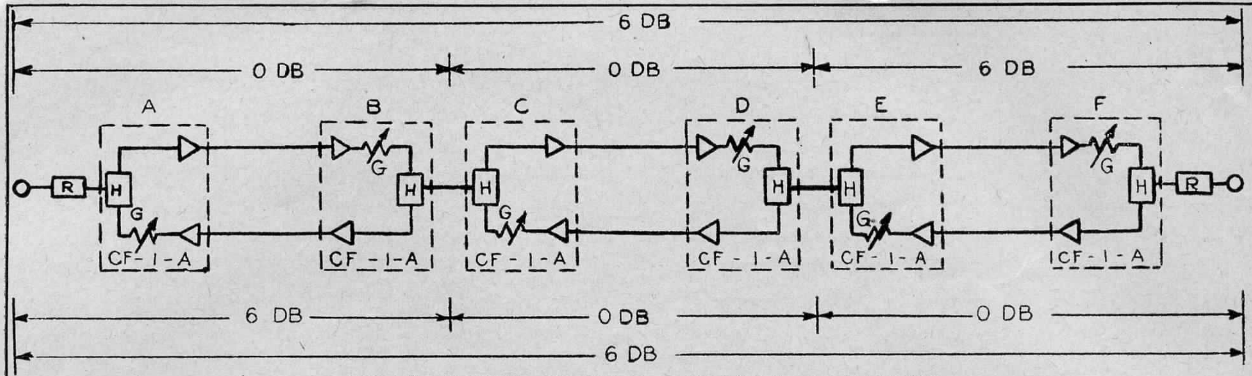
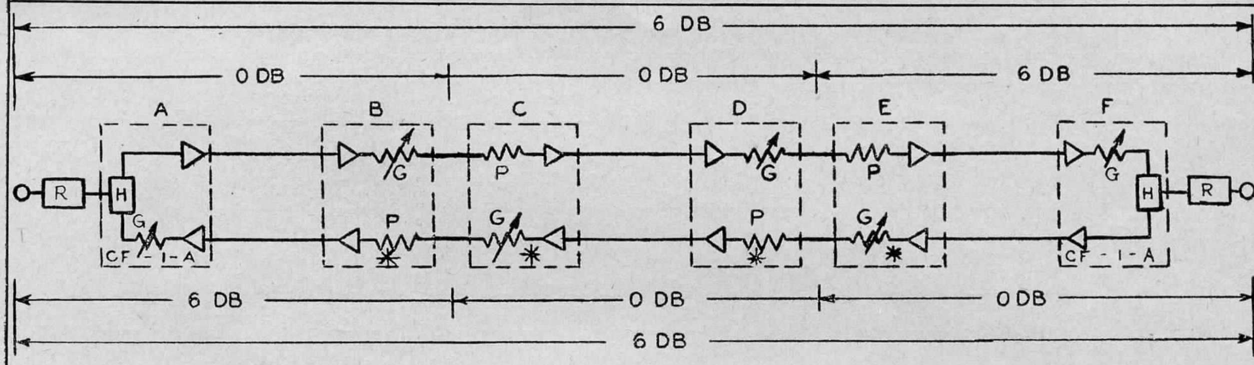


FIG. 3 - THREE CARRIER CHANNELS IN TANDEM



(* CF - 1 - A MODIFIED FOR 4-WIRE TERMINATION, P = 3 DB PAD)

FIG. 4 - CARRIER CHANNELS IN TANDEM WITH FOUR-WIRE INTERCONNECTION.

equipment for through-signaling, the different types of signaling units may be connected "back-to-back" at the intermediate point. Then 1,000/20-cycle signaling will be used in one section and another type, such as 500/20, in the adjacent section.

Tandem Operation of Carrier Telephone Channels With Four-Wire Connection

It will be seen that the 2-wire interconnection methods of figures 2 and 3 introduce several return current paths, but the particular methods described will provide adequate singing margins and satisfactory transmission for the two and three link applications. When more than three carrier channels are to be connected in tandem, or when other considerations make it desirable to reduce the return current paths, the channels may be interconnected on a four-wire basis as shown in figure 4. Then the transmitting link and intermediate links are each operated at zero db net loss, and the receiving link is adjusted to provide the desired 6 db over-all net loss.

As the channels of the CF–1–A are ordinarily used with two-wire termination only, it will be necessary to make certain simple modifications in the terminal to permit four-wire connection. The details are provided in Technical Manual TM 11–2001, "Complete 100-Mile Spiral-Four carrier System." The pad P, shown in figure 4, is provided as a part of the modification and has a loss of 3 db in order to duplicate the usual hybrid coil loss; with this pad the net loss of the channel for any particular setting of the GAIN control is the same with either two-wire or four-wire termination.

Carrier Channels in Tandem With Bridged Stations

There are certain instances wherein it is desired to establish long multi-station circuits which will permit satisfactory transmission from each station to any or all of the other stations on the circuit. This type of service may be provided by connecting carrier channels in tandem on a two-wire basis, and then bridging the intermediate telephone stations at the points of interconnection. In setting up such a circuit it will not be feasible to provide an over-all net loss as low as 6 db because

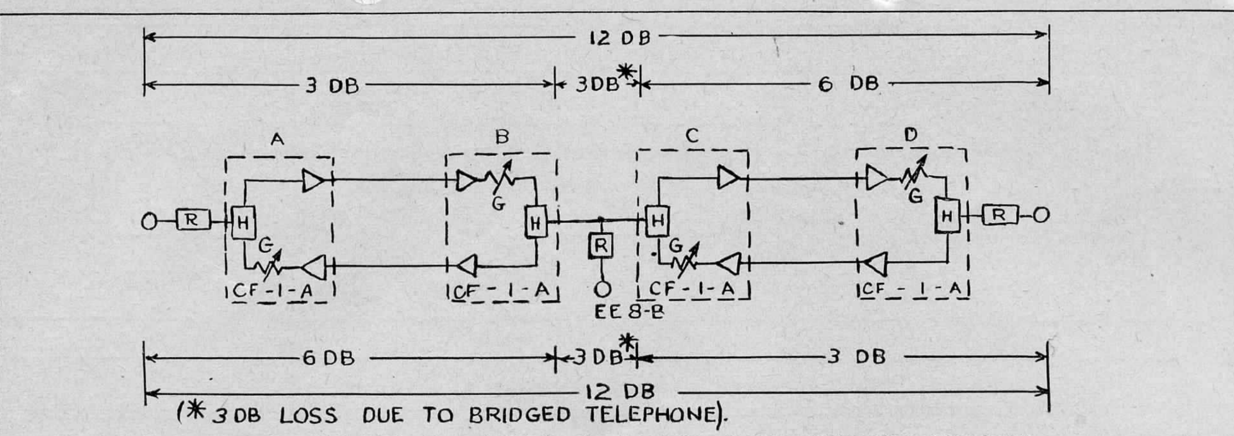


FIG. 5 - TWO CARRIER CHANNELS IN TANDEM WITH BRIDGED STATION

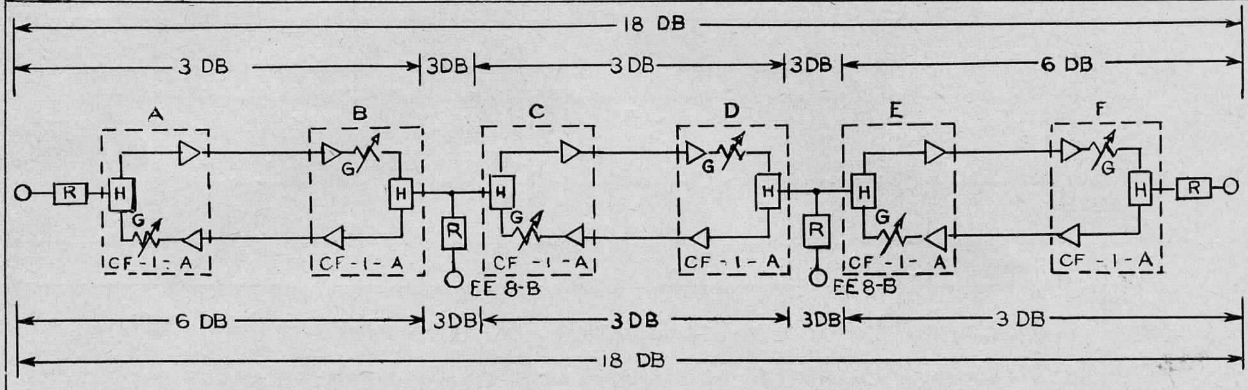


FIG. 6 - THREE CARRIER CHANNELS IN TANDEM WITH BRIDGED STATIONS

the intermediate telephone stations introduce bridging losses and also reduce the hybrid balances, but this is not serious inasmuch as such a circuit is not usually intended for use as a low-loss switching trunk.

An arrangement for interconnecting two carrier channels with one intermediate station is shown in figure 5. Here the GAIN dials at terminals B and C are advanced three steps from the usual 6-db line-up. In computing the losses of such a circuit, an allowance of 3 db must be made at the intermediate point because of the bridged connection. Consequently, the over-all net loss is 12 db, while that from terminals A and B to the intermediate station is 6 db and from that station to A and B amounts to 9 db. This indicates adequate transmission to and from all stations.

A similar scheme for the provision of two intermediate stations with three carrier channels in tandem is shown in figure 6. Again the channel GAIN dials at the intermediate points, terminals B, C, D, and E, are advanced three steps from the normal 6-db line-up. Here the losses are from 6 to 18 db over various portions of the circuit.

For signaling over multi-station circuits, voice frequency ringers must be used as previously described for tandem operation. In this case an additional ringer will be required for each intermediate station and code ringing may be used for selective calling.

Carrier Telegraph Terminals

The customary application of Telegraph Terminal CF–2–( ) (Carrier) is for it to be connected to the two-wire terminals of one channel, usually channel three of CF–1–A in order to provide four two-way telegraph circuits; when six telegraph channels are needed Telegraph Terminal CF–6–( ) may be used along with the CF–2–( ). For such four- or six-channel operation the voice frequency telegraph signals are transmitted at a level of −10 dbm per telegraph channel and must be received at the distant telegraph terminal at a level not lower than −25 dbm. Thus it is necessary to provide an over-all net loss between telegraph terminals of less than 15 db, with 6 db as the usual value.

The tandem connections shown in figures 2, 3, and 4 will provide telephone circuits suitable for carrier telegraph operation. In establishing other combinations of telephone circuits for telegraph use, it is essential to ascertain that the over-all net loss will be within the capabilities of the telegraph terminal. This is particularly important when carrier telephone equipment other than CF–1–A, such as the British types, is involved for then one of the channels is the unamplified voice circuit with higher net loss. A carrier telephone channel should be assigned unless it is known that the voice circuit loss can be made less than 15 db.

To provide combinations of long and short carrier telegraph circuits, two Telegraph Terminal CF–2–( ) (Carrier) may be connected "back-to-back" in a manner comparable to the carrier telephone applications already described. In connecting channels of one CF–2–( ) "back-to-back" with channels of another CF–2–( ), interconnection should be on a neutral full duplex basis using two wires; this connection is appropriate regardless of whether half or full duplex telegraph service is being supplied over the channel. However, in those instances in which it is desired to operate an intermediate telegraph station in a long half-duplex circuit at the junction point, interconnection between telegraph terminals must be on a neutral half duplex basis using one wire, with which the line unit of the intermediate station is then connected in series.

When connecting the CF–2–( ) to British carrier telegraph equipment or to teleprinter stations, the two-path polar mode of operation should be employed. This requires two connecting wires, and will be suitable for half or full duplex service. No conversion apparatus or equipment modifications are required.

When it is desired to operate more than 6 telegraph channels over 1 telephone circuit, 2 CF–2–( ), or 2 CF–2–( ) and 2 CF–6–( ) may be used at each end of the system to provide 8 or 12 2-way channels, respectively. For such operation the telegraph terminals must be arranged for 4-wire operation, so as to send 8 (or 12) different frequencies on 1 pair of wires and to receive the same 8 or 12 frequencies from the distant terminal over the second pair of wires. The CF–2–B and CF–6–( ) are designed for such 4-wire connection, but a slight modification is required in the CF–2–A; this is described in Technical Manual TM 11–2001 "Complete 100-mile Spiral-Four Carrier System."

The telephone channels used for 8- or 12-channel telegraph transmission must be 4-wire circuits throughout, which would be similar to figure 4 with the addition of 4-wire termination at terminals A and F. At terminals B, C, D, and E and 3-db pads (P) and the adjustments for the GAIN controls will be the same as for voice use. However, at terminals A and F the use of 3-db pads would only provide the proper conditions for 4- or 6-channel telegraph operation, with each telegraph channel transmitting a level of −10 dbm. In order to prevent overloading when the number of channels is increased, the level per channel must be reduced to −13 dbm for each of 8 channels or −16 dbm for each of 12 channels. As there is no provision for reducing the sending levels below −10 dbm at the CF–2–( ) and CF–6–( ), it is necessary to provide additional loss between the telegraph terminal and the telephone channel. This may consist of external 3- and 6-db pads for the 8- and 12-channel cases, respectively, or pad P may be increased from its original 3 db to 6 or 9 db, respectively.

RADIO INTELLIGENCE

(Continued from p. 10)

resemblance to those actually met with in operations against the enemy. In general the greatest training deficiency has been reported in connection with radio operators who were universally too slow and who were not familiar with enemy code and procedure.

Recommendations of the various reporting officers as to changes in organization and equipment agree on only a few specific points since each officer naturally bases his report on the experience of his own unit at its particular location and performing a particular mission. Reports nevertheless have been quite valuable as a basis for new equipment development. The impression created by a comparison of all reports is that theater intelligence appears, in the light of operational experience, to represent a much more variable and specialized field than previously realized, and that consequently the supply of special equipment and personnel to fit the numerous kinds of missions is necessary and desirable.

TRAFFIC ROUTING DIAGRAM

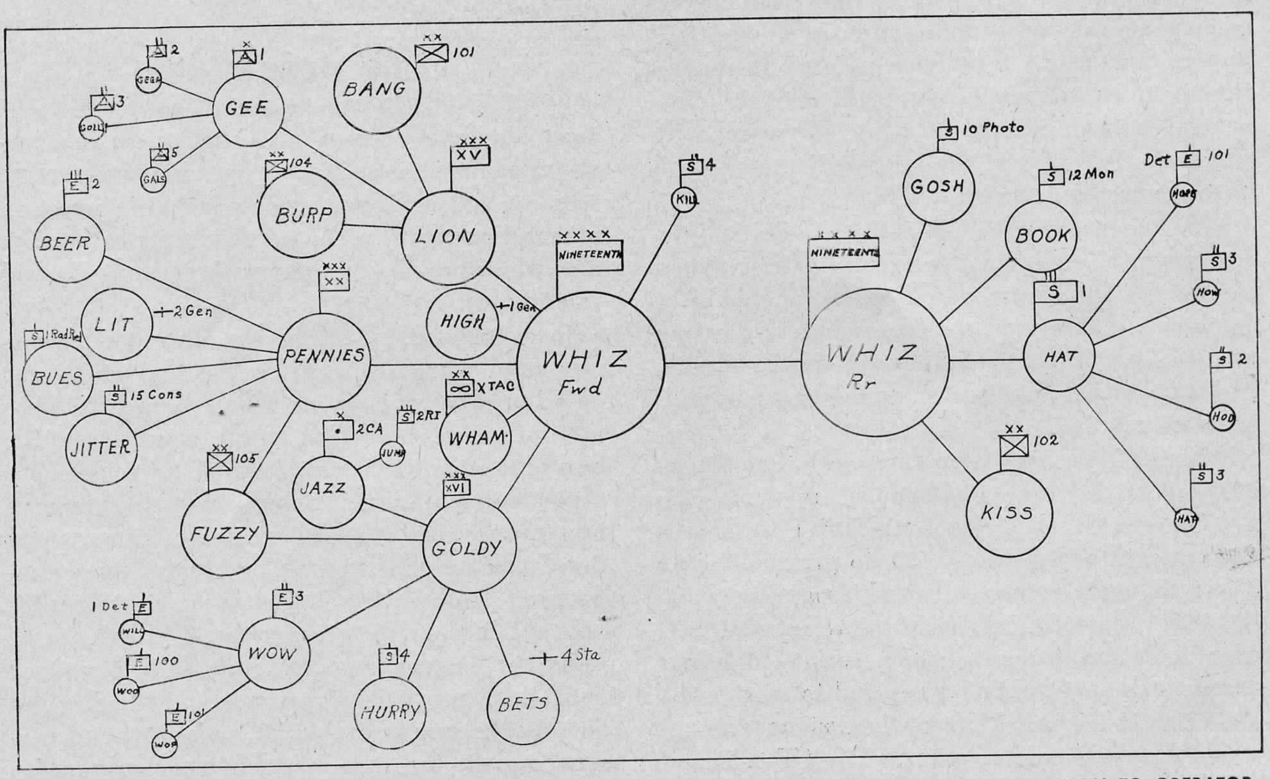
Grid Coordinates Make It Simple To Keep Up With Frequent Changes of Subordinate Units

A METHOD of maintaining traffic routing information known as the Grid Coordinate Method has been devised by a signal battalion in the field. This method appears particularly suitable for use at the switchboard of a large headquarters where the locations of subordinate units are frequently changed with consequent frequent changes in trunk routing.

This system uses a board consisting of two sections; Section I is laid out in grid squares similar to a map grid numbered in both directions starting in the lower left corner. Alternate squares around the perimeter are used to represent minor exchanges. Major exchanges are distributed throughout the central portion of the board using as many squares as may be required. Rubber bands, stretched between pins in the squares representing exchanges, indicate routes of wire lines. One rubber band may indicate any number of lines between two exchanges. Section II is in tabular form and consists of three columns. The first column is a list of units arranged alphabetically by arm and service and numerically within each arm or service. In the second column the directory name of each unit appears opposite the unit designation in the first column. The third column shows for each unit the coordinates of a switchboard through which calls may be routed to reach the unit. If the number of subordinate exchanges is great enough to warrant it a supplementary section may be added showing the same information but arranged in alphabetical order of directory names.

When a call is received for a unit by name, a reference to Section II of the diagram associates the unit with its directory name and gives the coordinates of a switchboard having lines or trunks to the unit. A glance at Section I then shows the routing necessary to reach the unit.

Examples (see fig. 1):



TELEPHONE TRAFFIC DIAGRAM MORE COMMONLY USED BY WIRE CHIEFS TO SHOW ROUTING INFORMATION TO OPERATOR

Units	Code	Co-ord
19th Army	WHIZ	
Air Forces:		
X Tactical Air Command	WHAM	9–5
Antiaircraft:		
1st AA Brig	GEE	4–7
2d AA Bn	GEEP	1–9
3d AA Bn	GOLLY	1–9
5th AA Bn	GALS	1–9
Artillery:		
2d CA Brig	JAZZ	14–3
10th CA Bn		
Corps:		
XV Corps	LION	19–5
XVI Corps	GOLDY	9–5
XX Corps	PENNIES	9–5
Engineers:		
2d Eng Regt	BEER	4–3
* *	*	* *
2d Gen Hosp	LIT	4–3
4th Sta Hosp	BETS	14–3
Signal:		
1st Sig Regt	HAT	14–7
1st Sig Bn	HAP	18–6
2d Sig Bn	HOO	18–6
3d Sig Bn	HOW	18–6
4th Sig Bn	KILL	9–5
10th Sig Photo Co	GOSH	14–7
* *	*	* *
101st Engr Co (Det)	HOPE	18–6
2d RI Co (Plt)	JUMP	7–1
Etc.		

A call is received for 1st AA Brigade. A reference to Section II, under *Antiaircraft*, shows that 1st AA Brigade has the code name GEE, and can be reached through the switchboard at 4–7. The grid section of the board shows at 4–7 the LION exchange. Therefore GEE may be reached through LION.

A call is received for the 3d Signal Battalion. Under *Signal* find 3d Signal Battalion. Directory name shown is HOW. The coordinates given are at 18–6. At 18–6 on the grid section appears HAT. The call is routed through HAT.

Entries in the first two columns of Section II, and names of the major exchanges in Section I are painted in, while coordinates in Section II and names of minor exchanges, around the edge of Section I, are entered in chalk to facilitate making changes.

The use of this type of traffic diagram permits changes to be made at a moment's notice, in any one circuit or any one exchange without disturbing other entries. The conventional traffic diagram, in pencil, or even in chalk, required only a few changes to make the whole diagram illegible, and the possibility always exists that in erasing one line or changing the position of one exchange other facilities may be accidentally removed.

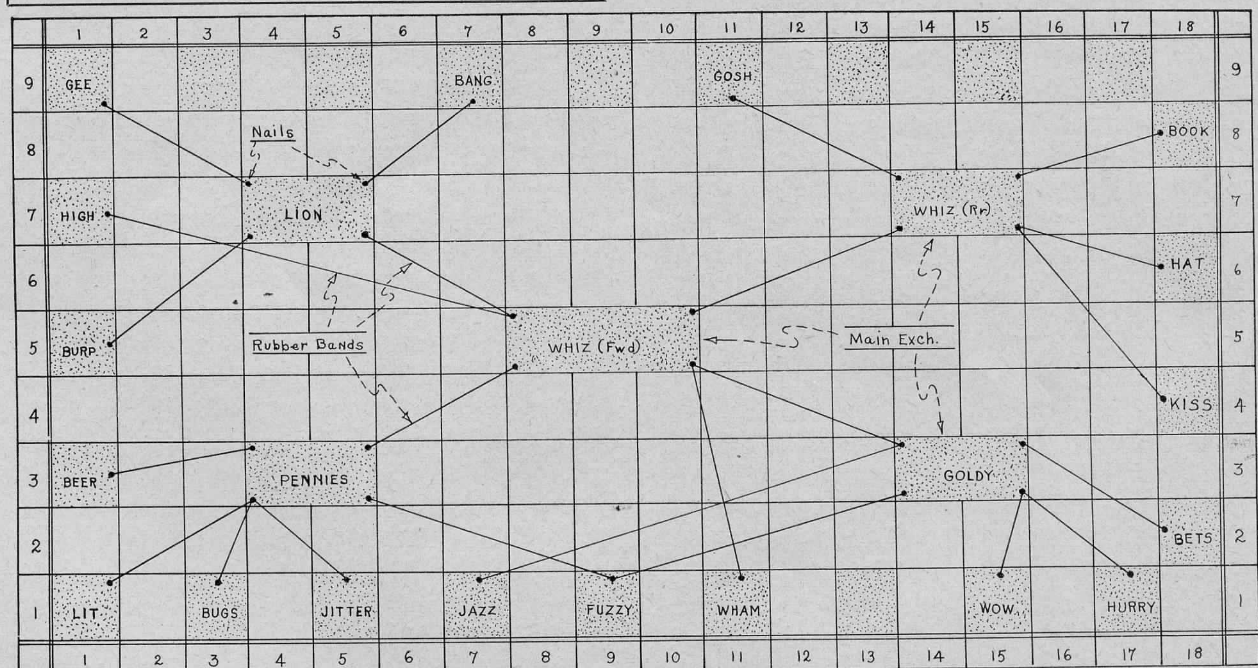


FIGURE 1.—GRID COORDINATE METHOD. SECTION I IS GRID BOARD DIRECTLY ABOVE; SECTION II IS TABLE TOP LEFT

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PARTS CONTROL LISTS

Three Lists Now Show Complete Equipments, Components, and Component Applications

INSTALLATION OF a uniform system to expedite and correlate all procurement, storage and issue for the Signal Corps has been mainly completed on most ground tactical items and is currently being expanded to cover all other types of Signal equipment.

Basis of the new system is the SIGNAL CORPS PARTS CONTROL LIST. This includes:

PROCUREMENT AND ISSUE CONTROL LIST. It consists of a listing of the components, and the quantities thereof, that go to make up a complete equipment, together with the correct stock number and the unit of measure of each component. The quantity of each component required as running spares is also indicated.

SUBASSEMBLY CONTROL LIST. This list does for a subassembly or a component what the Procurement and Issue Control List does for the complete equipment or set. For example: A Procurement and Issue Control List may indicate that a power unit is a component of a certain radio set. The Subassembly Control List on the power unit states precisely what components are required to make the power unit complete and operable.

COMPONENTS APPLICATION LIST. This lists each component together with a complete enumeration of all the equipments in which the component appears. In addition, there is listed necessary procurement reference data (specification, drawing number, or commercial designation) and permissible substitutes for the component.

Procurement and Issue Control Lists and Subassembly Control Lists, together with the supplementary Components Application List, have already been prepared and published on the great majority of ground nonradar items. Preparation of similar lists on ground radar, air-borne, photographic, and plant equipments by the respective organizations responsible for development of these items, has begun. Such lists will be issued periodically in the SIGNAL CORPS PARTS CONTROL LIST by the Distribution Division, Procurement and Distribution Service, Office of the Chief Signal Officer, Washington 25, D. C. Organizations requiring such data in the performance of their responsibilities should request copies from Distribution Division. It is necessary only to request the latest issue of the SIGNAL CORPS PARTS CONTROL LIST, since it includes Procurement and Issue Control Lists, Subassembly Control Lists, and the Components Application List on all items for which these lists have been prepared.

Procurement and Issue Control Lists and Subassembly Control Lists will serve as the basis for procuring, storing and issuing all Signal equipments on which the lists are available. For such purposes, the lists will supplant all other "parts lists" or "issue lists" and thus become the official source of information as to which components, in what quantities, are required to make up any complete equipment or major component.

All future procurements of items on which Procurement and Issue or Subassembly Control Lists are available will be on the basis of such lists. In addition, open orders will likewise be analyzed, and adjusted where necessary, to bring them into line with the Control Lists. The same Control Lists will govern the assembly or association of sets or components into complete, operable equipments, suitable for issue.

Designation of the Procurement and Issue Control List, or, in the case of a component, the Subassembly Control List, as the official parts lists on that item does more than eliminate the confusion necessarily arising when several "parts lists" are in use on one item. It also assures greater interchangeability of like components among different equipments.

A further application for the Control Lists is found in the category of vehicular and plane radios. Here, variations of the same basic set will be installed in different vehicles or planes. Thus, one radio set may have as many as 20 different variations, resulting from accommodating the set to different vehicles or planes. Control Lists make the following procedure suitable: As a result of having all data recorded on machine tabulating equipment, all the components common to *every* variation of a set may be sorted and listed by machine. This list is known as a Basic Unit Control List, and such a list, for say the Radio Set SCR–508–( ), will indicate the components common to every installation of an SCR–508–( ). The additional components required to make the basic unit of the SCR–508–( ) operable in a given vehicle are likewise obtained and listed by machine process. Such a listing is known as an Installation Unit Control List.

Current packaging specifications outline in complete detail what is to be included in each package and the method of protection so as to conform to limitations on weight and volume and to assure receipt of the equipment in good condition. Procurement and Issue Control Lists serve as the basis for such specifications by showing which components should be grouped together to form operable equipments.

Procurement and Issue and Subassembly Control Lists have a special value in determining requirements since they can be used to break down a requirement for complete equipments into the various components needed to make up the complete equipments. Thus, the requirements of the Army Supply Program, task forces or theaters, which are invariably stated in terms of complete equipments, can be quickly translated into requirements for components by "multiplying" the requirement for an equipment by the Control List of that equipment.

TROPICALIZATION OF SCR-300—( )

ALL MODELS of Radio Set SCR-300-( ) currently being produced are moisture and fungus proofed at the factory in accordance with Specification 71-2202-A, "Moisture and Fungus Resistant Treatment of Signal Corps Ground Signal Equipment." Approximately 18,000 Radio Sets SCR-300-( ) were produced and delivered to the Signal Corps prior to the adoption of the tropicalization treatment in production. Those sets which were NOT tropicalized fall within the scope of TB SIG 13, "Moistureproofing and Fungiproofing Signal Corp Equipment," and should be tropicalized as soon as practicable. ALL Radio Sets SCR-300 should be reprocessed, whenever necessary, in accordance with TB SIG 13.

RADIO SETS SCR-300 REQUIRING INITIAL TROPICALIZATION PER TB SIG 13

Order No.	*Manufacturer*	*Serial No.*
15025-Phila-43	Galvin Mfg. Corp	All sets, #1 through #14708.
32870-Phila-43	Galvin Mfg. Corp.	#2117 through #5194.

ARTILLERY WIRE LINES

THE FOLLOWING comments dealing with artillery wire lines are extracted from an overseas artillery information bulletin. It should be noted that these comments indicate that operating difficulties confronting artillery wire teams continue to parallel those encountered by Signal Corps units.

The wire route reconnaissance should be made with the idea in mind of laying lines cross country. Usually routes can be found that have been already traveled on, thus minimizing the danger of mines. Wire laid along roads, either on the ground or overhead, is in danger not only from enemy shelling but also from friendly vehicular and tank traffic. Signal Corps personnel salvage wire that is not in use. They ring in with test clips on a line and if no answer is received they assume the line is abandoned and pick it up for salvage.

It has been found that on long OP lines, the practice of establishing test stations, permanently manned, at the base of the OP has been advantageous. On these lines the breaks are caused mainly by shell fire, and it is necessary to repair the lines several times a day. The use of the forward test stations enables crews to start at both ends of the lines simultaneously, find the breaks, and put the line back in service with a minimum of delay.

Owing to the large number of circuits that follow the same routes, units should devise some method of identification for their own wire, for example distinct tag marking, large wooden tags stencilled with unit code name.

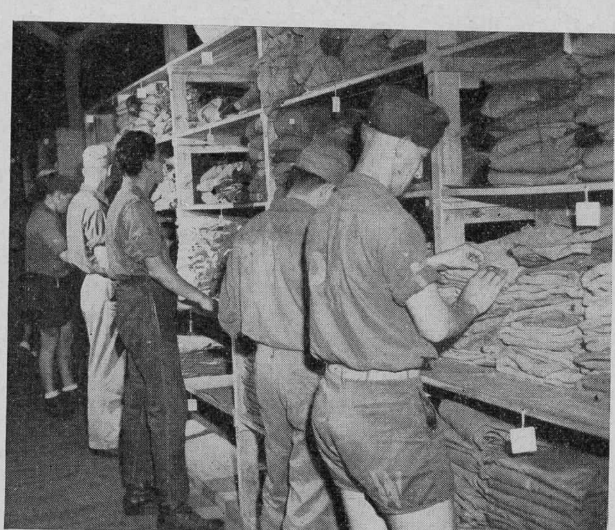
Wire communication is a main problem and concern for about the first 30 days of combat. Wire crews soon learn the little tricks that simplify the whole communication problem. They service a line properly and carefully during installation so that breaks will be minimized, thus allowing them to get a normal amount of sleep. When wire does go out, repair crewmen, instead of running up and down a line with test clips, check the location of enemy shelling and proceed to the scene of the shelled area, usually finding their trouble right there.

GERMAN PWS AT HOLABIRD

Perform Station Complement Work at St ation Depot—Italian Units at Monmouth

THE EXPERIENCE of Holabird Signal Depot, after a period of nearly 2 months, shows that prisoners of war can be used with complete success in relieving the present manpower shortage which confronts practically all Army installations.

At Holabird, prisoners of war have relieved enlisted personnel for other assignments, and are working 8 hours a day 6 days a week as cooks, cook's helpers, bakers, butchers, orderlies, storekeepers and warehousemen, in the general mess, the officers' mess, the hospital mess, the commissary, the clothing and equipage warehouse, and in the post hospital. Replacing unavailable civilians, other prisoners of war are working the same hours in the post laundry, where they act as washmen, press operators, flat-iron workers, and mechanics; in the supply warehouse of the depot where they are performing work in loading and unloading cars, general warehousing, crating, packing and shipping, and as operators of fork-lift trucks. In the post garage they work as general mechanics, servicing and repairing motor vehicles, including materials—handling equipment. At Holabird automotive pool, they service practically every type of vehicle operated by the Army; and last on the salvage lot of the depot they work as operators of acetylene torches, power-driver saws, and a band-iron cutting machine, preparing salvaged metals and lumber either for sale or for future use.



GERMAN PWs CHECKING AND SORTING CLOTHING AT HOLABIRD.

A basic policy of "fairness with firmness" governs every phase of relations between officer or supervisory personnel and the prisoners of war. It has been carried out by setting up a chain of command which functions through two company spokesmen, and a camp spokesman, selected from among the prisoners of war. Requests and grievances of the prisoners are transmitted first to one or the other of the company spokesmen and thence to the camp spokesman who, in turn, confers daily with the Chief of the Depot's Administrative Division, and the Prisoners of War Camp Commander (American). Action on matters presented by the camp spokesman is taken by the Chief, Administrative Division, during these daily conferences.

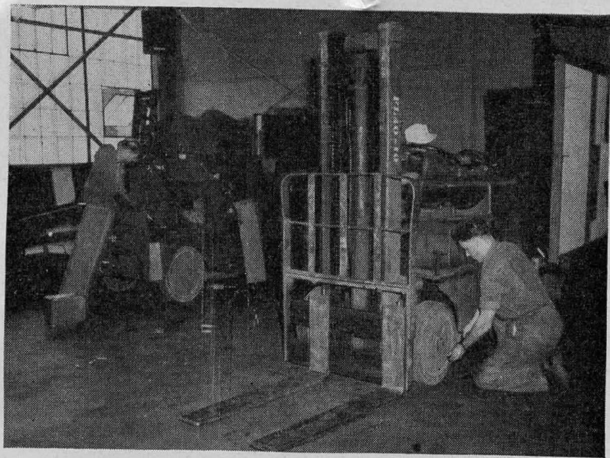
Throughout the warehouses of the Depot's Storage Division, the prisoners work on a two-shift basis to conform with the working schedule of the Division. The first shift works from 0700 to 1600 and the second shift overlaps the first shift, in mid-afternoon—working from 1430 to 2330. In other departments of the depot, where only a single shift is operated, the prisoners of war work from 0730 to 1630. In all cases, a 10-minute break is allowed after the second hour of work and again after the sixth hour of work, as in the case of the depot's civilian employees.

Prisoners are quartered in a compound which is enclosed by a wire stockade. In addition to the usual security measures, two noncommissioned officers are on duty, at all times, in an orderly room of the prisoner of war camp, which is staffed by prisoners who have been selected for duty there in accordance with their special qualifications. The men operate their own mess and perform all other necessary housekeeping duties.

At the present time, a group of prisoners is being used at the depot to break down Truck K–60, the parts of which will be reclaimed while the vehicles will be turned over to the Ordnance Department.

The important thing, as previously stated, is the establishment of a fair over-all policy which is backed by insistence upon complete obedience to discipline.

At Holabird Signal Depot, special care has been taken to develop a fair attitude among supervisory



FORT-LIFTS BEING REPAIRED BY GERMAN PWs.

civilian personnel. This attitude has been expressed, in a different way, during an informal address delivered to the prisoners of war by the officer in charge of the program: "We're not concerned with what happened before you came to this depot. But now, of necessity, you're players on our team. Play the game our way, and we'll play ball with you. But if you don't want to play ball our way, then we can't have you on our team—and, in that case, you can't have the privileges that go with playing on the team."

"SIGNEES" ARE SERVICE TROOPS

In February 1944 as a result of the change of Italy to a cobelligerent status, Italian prisoners of war became available for use in T/O organizations. A survey was conducted at the Eastern Signal Corps Training Center, Fort Monmouth, to determine whether or not Italian prisoners could be utilized. As a result of this survey, three Italian service units were assigned to that center in an ameliorated status to take over housekeeping jobs in the regiments. Personnel are assigned permanent KP duty, or as dining room orderlies, company mechanics, chefs, and firemen. Others are laying new sidewalks in company areas.

Although the service units are stationed at Fort Monmouth they are under the jurisdiction of the Second Service Command who handles all matters pertaining to the discipline, administration, liaison and control, and the supervision of the training and operations. The members of the service units at Monmouth have no direct relation with war operations such as the manufacturing and transporting of arms or supplies of any kind or for transporting material intended for combatant units, although Italian service units at most installations are used primarily for such purposes, nor are they employed in any job that is unhealthful or dangerous. The services of these Italian prisoners are utilized according to the rank and aptitude of the men and no prisoner is assigned a job for which he is physically unfit. Such personnel is being used to replace enlisted men or in lieu of civilian labor when that labor is not available or is available but needed on more vital projects.

Before Italian personnel can be assigned to essential work in the United States a written application for such work must be submitted by each man and a promise signed that he will serve faithfully under the Articles of War. In addition the prisoner must be cleared by the Assistant Chief of Staff, G–2, War Department General Staff. Applicants who refused to sign the promise remain as ordinary prisoners. Captured officers cannot be forced to do work of any kind, but the privates may be assigned any job within limitations of the Geneva Conference. Noncommissioned officers may be forced to do supervisory work only. However, both officers and noncommissioned officers who have been accepted as members of Italian service units may volunteer to work on the same basis as the privates, and many of them have done so.

The construction of additional housing facilities for prisoners of war is not permitted by War Department policy but Fort Monmouth was able to provide adequate housing for the service units assigned to that post. The service units are quartered in barracks the same as the Americans and

AN ITALIAN SIGNEE DOING CARPENTRY WORK AT MONMOUTH.

are allowed to patronize the post exchange and other facilities provided by Fort Monmouth except that they are not allowed to leave the post unaccompanied. In the past all leaves, passes, or furloughs had to be approved by the Commanding General, Army Service Forces, but action has been taken to allow groups of Italian prisoners in the company of American military personnel to visit cities and places of interest. Fort Monmouth is conducting classes in English so that the Italians may be able to perform their duties more effectively.

The Italian service units at the Eastern Signal Corps Training Center, as set up under T/O 10-67S, consist of the company headquarters and two sections. The company commander, a captain, has as his executive officer a first lieutenant. Each platoon is under the command of either a first lieutenant or second lieutenant, making a total of 4 officers for the entire unit. The company headquarters also has a first sergeant acting as "boss" and a corporal as company clerk. In each platoon headquarters there are two staff sergeants, one a mess sergeant and the other a supply sergeant. One sergeant section leader commands two sections with two corporals in each section acting as squad leaders. A total of 189 technicians, privates and privates first class, perform such duties as armorer, blacksmith, cook, laborer, truck driver, and basic, the latter being a replacement in the event any of the regular personnel is unable to work. In each unit there is a total of 215 enlisted men and four officers making a total of 219.

Fort Monmouth issued to each member of the Italian service units an identification card containing a photograph, description, prisoner of war serial number, fingerprints, and the designation of the unit to which he is assigned together with his signature. These cards are used in the same manner as the identification cards required of every American soldier.

ITALIAN SERVICE UNITS DO KITCHEN POLICE.

Italian officers are allowed to choose between the American enlisted man's uniform, divested of all markings peculiar to the American Army, and a uniform tailored in accordance with the standard design authorized by the Italian Army on which the officer's rank is properly indicated. He may wear the regulation Italian officer's cap or a facsimile. Until such a time as distinctive uniforms are available, the Italian enlisted men are wearing American enlisted men's uniforms. Sewn on the left sleeve of the outer garment is a green bassard with "Italy" printed in white block letters. The garrison cap, minus piping, has a circular green patch with the word "Italy" also in white block letters, sewn to the front of the cap in approximately the same place the American soldiers wear their insignia.

GERMAN EQUIPMENT

(Continued from p. 8)

The sweeper brush houses the adjustment bar, the adjustment ring, and oscillator tank coil and condenser, and the amplifier pick-up coil and condenser.

The M S Frankfort 42 is contained in a compact rectangular pack case made of material closely resembling bakelite. In addition to the main unit, there is a chest made of five compartments, containing the following: Accessories case, headset, spare batteries, and spare tubes. The stick, 50 centimeters in length, is pointed at one end and is probably used in conjunction with a metal disc in making initial adjustments of the apparatus. Construction of this set is rigid and compact. It is noted that the case is so constructed and assembled that normal disassembly is impossible.

A TB is being prepared on the operation of these two German mine detectors.

SIGNAL EQUIPMENT

Combat Officers Tell the Uses to Which They Have Put Their Means of Communication

SO THAT Signal Corps men may know the thinking of using personnel on communications and to what uses Signal equipment has been put, the following extracts from letters written by top U. S. Army commanders to a chief of service, Office of the Chief Signal Officer, are reprinted below:

Type CF equipment was introduced to this theater (North Africa) in March 1943 and immediate use made of one CF–2 system on an existing civil cable to obtain badly needed telegraph channels to points west of Algiers. As soon as the tactical situation would permit, CF–1 equipment was used along a 150-mile stretch on the North African coast to provide quickly on spiral-four cable high quality circuits to be used for coast defense. To provide these circuits from civil facilities would have been impossible; to build a new line would have taken approximately 2 weeks longer.

Two CF–1 and one CF–2 systems were installed in June 1943 on an eight-wire RPL open wire line. This formed one of the backbone routes for communications to the East while important operations were being prepared for and carried out. Approximately 6 weeks later commercial type carrier was installed on other routes to supplement this.

Three systems of CF–1 were used a distance of 40 miles between 2 large cities in Tunisia to supply 12 speech channels. Pole line construction was thereby held to a minimum of 8 wires. One of the three systems was used on an existing 1-quad cable and performed very satisfactorily. As circuit requirements dropped these systems have been removed and made available for use elsewhere.

By its flexibility, portability, ease of installation, and maintenance, type CF equipment has proven the best means of providing quickly and efficiently numerous communication channels with limited physical facilities * * *.

The BD–100 Teletypewriter Switchboard has given excellent service in the North African Theater. As many as four 10-line positions have been mounted together for use as fixed plant long-distance networks.

Radio Sets SCR–522 and SCR–542 are gaining more and more favor with experience * * *. Links have been operated with planes at altitudes from 2,000 to 10,000 feet for ranges up to 108 miles with good results. Corps artillery brigades are now using the sets for liaison with P–51's, directing artillery fire to excellent advantage.

The general over-all performance of the Signal equipment used by this division has been excellent * * *. By far the biggest problem is the education of the using personnel in its proper use and an understanding of its limitations. For example, there were at first many complaints from the using troops of the performance of the 500 series frequency modulated radios, but upon explanation of its use and through experience gained using it, appreciation of this radio series changed from low regard to high esteem.

In Tunisia the division laid telephone lines over 27 miles long using W–110 wire. In Sicily one line, W–110 wire, worked satisfactorily over 33 miles. Switchboards and telephones are durable and perform dependably.

The 536 has proved very valuable. The proof of this lies in the fact that the lower infantry units are continually demanding extra sets. Obviously because of its high frequency it does not operate very well in extremely hilly country, such as Sicily or where I was in Italy on the right flank of the Fifth Army, but this can be greatly aided if operators are taught to choose ground properly and to shift intelligently if unable to obtain a connection.

The 511 also gave good results as did both 284 and 193 and 299. The artillery all swear by the 608.

I assume that the Signal Corps is working for greater range per pound of weight. Personally I believe that the radio sets for the smaller units in an infantry division have sufficient range for normal battle requirements. I believe therefore that the emphasis should be placed on reduction of weight and durability. (The assumption made that the Signal Corps is working for greater range per pound of weight is correct. The pending issue of SCR–694, the recent standardization of Radio Set SCR–619, and work now being done to lighten the SCR–300 are pertinent examples of Signal Corps efforts to this end.—Ed.)

Our operating personnel was also well trained mechanically. What we did need was training of those who wrote the messages and orders. Many of them did not know the capabilities and limitation of the equipment, and did not properly consider the time factor i. e. messages were sent which could not possibly reach the headquarters for which they were intended in time to be of any value and merely clogged the air.

I would strongly urge, if it is not already being done, that all personnel sending messages be thoroughly trained in: The time factor, elimination of messages that can be sent by some slower means, establishing of priorities, and the economy of words in messages.

In 22 months service overseas with troops, either in combat or preparing for combat, I have encountered no failure of equipment because of weakness in design, material or manufacture, except minor difficulties readily overcome by the troops themselves. This experience has covered three campaigns including two amphibious landings.

Radio sets SCR-508, 528, 538, and SCR-509 and 510 have become the backbone of communication within the armored division. The inherent advantages of FM in overcoming static and ignition interference and in giving a clear voice signal of sufficient quality and volume to be heard over the noise of tank operation, have fully justified the additional complications of design and manufacture. The flexibility of operation, combined with the accuracy of crystal control, have made this series of sets the easiest sets there are to operate.

The SCR-193 has been the "Springfield rifle" of the Signal Corps. Although slightly outmoded and somewhat complicated to tune, it gets the message through when others fail.

My experience with the SCR-506 has been limited, but I feel it will be the "Garand," as the SCR-193 has been the "Springfield."

The artillery sets SCR-608, 628 and SCR-609, 610 have become not only the backbone of artillery communications when wire is not used and where it is used to supplement wire communication, but had also become the universal set for the Navy for naval fire control parties and naval beach communications, for amphibious engineers and assault infantry divisions during amphibious landing operations. It is universally popular whenever a dependable, portable set is required.

The SCR-299 and SCR-399 radio sets are the international standard for long range radio communication. They are equally in demand in British and U. S. units wherever a high-power set is required. Minor initial deficiencies have been corrected in later models and there is little more one could ask for in a high power long range set. I have recently operated teletype over the set for a distance of 35 miles.

The SCR-511 radio set is dependable, but is subject to considerable failures owing to abuse. Operators insist on using it as a walking stick, a crutch, and sometimes as a club.

The mine detector SCR-625 is the outstanding metallic mine detector of all armies. The only time I knew it to fail was on the slope of Mount Etna, in Sicily, where the iron in the lava deposits misled it. It requires proper care and maintenance, but the best proof of its value is that no unit has ever admitted that it had enough mine detectors.

HIGH ALTITUDE COMMUNICATION

(Continued from p. 13)

a much greater amount of work to achieve than was originally expended, to obtain the decided improvement as shown on the chart. Because of the many human variations and psychological factors involved in high altitude communications, it is felt that the degree of communications achieved with the latest equipment as shown in No. 4 system is very close to the highest percent word articulation that can be obtained and that any additional improvement will result in only a small percentage increase in the score.

As operations unfold, the Chief Signal Officer receives many requests for SOI's, SOP's and related documents used by units in combat. Such documents from divisions, corps, and armies are valuable even when they contain no new principles in that they corroborate current teachings. Divisions and higher units desiring to make such publications available to training installations in the U. S. as well as to other theatres should forward them to the Chief Signal Officer (SPSOC).

MODEL THEATER SIGNAL CENTER

THE TRAINING Division of the Eastern Signal Corps Unit Training Center has constructed a model theater signal center based on the physical set-up of the Signal Center, AFHQ, North Africa.

This model is used to familiarize signal center personnel of the 848th Signal Training Battalion Specialist Courses, and units attached to the ESCUTC, with the size and lay-out of the type installations in which they will later operate. It also affords an excellent means for instructing such specialists as message center personnel, cryptographers and radio and teletype operators in signal center procedure, and the relationship of each individual's duty to the duties of other signal center personnel. It is used extensively by both the officers' and enlisted men's departments of the Eastern Signal Corps Schools, as well as the ESCUTC.

This model can be set up in any classroom over 20 feet in width; and where space permits, bleachers seating 50 men may be placed around the model, thus affording better class control. The table supporting the model slopes from a height of 3 feet at the rear to 2 feet at the front, making possible an over-all view.

Figure 1 shows the general lay-out of the model. It presents a cutaway of the main building, showing three additional floors occupied by the Commanding General and his staff, the Signal Section and Allied Signal Officers, Civil Affairs and Military Government Service, and the offices of Transportation, Quartermaster and Surgeon General, as well as (A) the Signal Center proper, (B) the commercial submarine cable office taken over by the Allies, (C) the telephone central office, and (D) the 40-kw radio station and air-motor messenger service.

The scale of the model theater signal center (5/8-inch = 1 foot) was determined by scaling down the proportions of the actual installation to fit the previously determined over-all size of the model, 10 feet by 15 feet. All equipment such as teleprinters, radios, switchboard and main frame, typewriters, telephones, tables and chairs was carefully made to scale and wired in exactly as it would be in use. Captions identify all installations, giving type of equipment and personnel to be found.

The whole unit is constructed in sections, the

(Continued on p. 56)

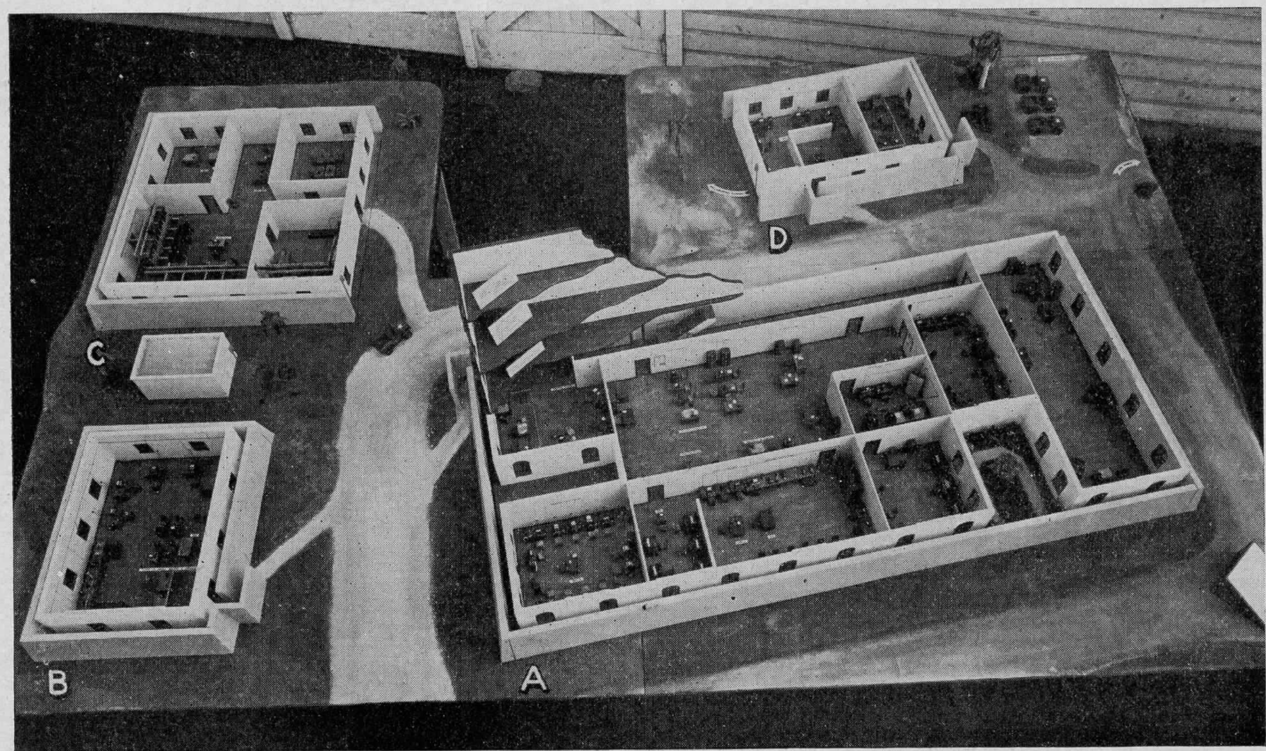


FIGURE 1.—THE MODEL THEATER SIGNAL CENTER BUILT AT THE EASTERN SIGNAL CORPS UNIT TRAINING CENTER, CAMP WOOD

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COVERINGS FOR PROTECTION

THE COVERINGS listed below have been developed specifically for the protection of Signal Corps equipment in amphibious operations and can be used advantageously in the jungle. They are issued by the Quartermaster Corps and are used with, but are not part of, signal equipment.

Half-pound bags of silica gel have been furnished by the Signal Corps to be inclosed with equipments in these bags and coverings to prevent "sweating." When not in use, equipment may be stored in the bags or covers, with silica gel. This will prevent the absorption of moisture by the equipment.

Silica gel can be reactivated by heating in ovens to approximately 300° F. for a period of about 2 hours. Upon activation, silica gel should be kept in sealed containers, or in sealed bags with equipment, since it will reabsorb moisture from the atmosphere if left exposed.

Description	*QM Stock No.*	*Used with, but not part of*
Bags in Which Equipment Cannot Be Operated:		
Bag, Waterproof, Special Purpose, 20½″ long x 16¼″ wide x 11¼″ high (formerly Bag BG–159).	24–B–1264–400	Radio Rec-Trans BC–654 of SCR–284 Switchboard BD–71.
Bag, Waterproof, Special Purpose, 12″ long x 9″ wide x 18″ high (formerly Bag BG–160).	24–B–1263–500	Radio Set SCR–284, Accessories, Frequency Meter Set SCR–211, Telephone EE–8–4 per bag or Switchboard SB–5 and EE–8. Detector Set SCR–625, Signal Lamp Equip. EE–84, Trans. Tuning Unit TU–8.
Bag, Waterproof, Special Purpose, 16½″ long x 15½″ wide x 27″ high (formerly Bag BG–161).	24–B–1264–150	Switchboard BD–72, Switchboard BD–100, Radio Set SCR–244–B.
Bag, Waterproof, Special Purpose, 7¼″ long x 7½″ wide x 12″ high (formerly Bag BG–164).	24–B–1263–200	Generator GN–45–A, TG Set TG–5, Converter M–209.
Bag, Waterproof, Special Purpose, 12″ long x 7″ wide x 16″ high (formerly Bag BG–169).	24–B–1265–250	Radio Set SCR–593, Radio Set SCR–536+ btrys, Chest Unit T–39.
Bag in Which Equipment Can Be Operated:		
Bag, Waterproof, Special Purpose, 19″ long x 15″ wide x 13″ high.	24–B–1264–310	Radio Set SCR–509, Radio Set SCR–510, Radio Set SCR–609, Radio Set SCR–610. See Note.
Covers in Which the Equipment Can Be Operated:		
Cover, Waterproof, Special Purpose, 8″ wide x 56″ long.	24–C–7300	Radio Set SCR–536.
Cover, Waterproof, Special Purpose, 20″ long x 15″ wide.	24–C–7160	Chest Unit T–39 of Radio Set SCR–511.
Cover, Waterproof, Special Purpose, 18″ long x 15″ wide with Section 91″ long x 4″ wide.	24–C–7075	Transmitter and Receiver BC–745 of Radio Set SCR–511.
Paulins:		
Paulins, Waterproof, Special Purpose, 10′ long x 8′ wide.	24–P–47–200	Transmitter BC–610 and PE–95 of Radio Set SCR–299, cover for each.
Waterproof Film:		
Vinylite film plus waterproof tape and instructions for fabricating waterproof covers for radio sets in vehicular installations.		SCR–193, SCR–245, SCR–508, SCR–528, SCR–538, SCR–608, SCR–628.

NOTE.—Bag, Waterproof, Special Purpose, 19″ long x 15″ wide x 13″ high, is used with Packboard, Plywood, Stock No. 74–P–27–30 and bracket Attachment, Packboard, Plywood Stock No. 74–A–33–30 when used for Radio Sets SCR–509 and SCR–609. This bag replaces Bag, Waterproof, Special Purpose, Stock No. 24–B–1254–400 for use with radio set SCR–509, SCR–510, SCR–609, and SCR–610 because it will permit operation of the sets while inclosed and sealed in the bag.

You have enemies other than Nazis and Japs—such as cut and bruised tires, rust, dry bearings, run-down batteries and frayed electrical wiring among others. Preventive maintenance will easily beat these enemies, leaving the beating of Nazis and Japs up to you.

EQUIPMENT NOTES

SIGNAL CORPS BOARD

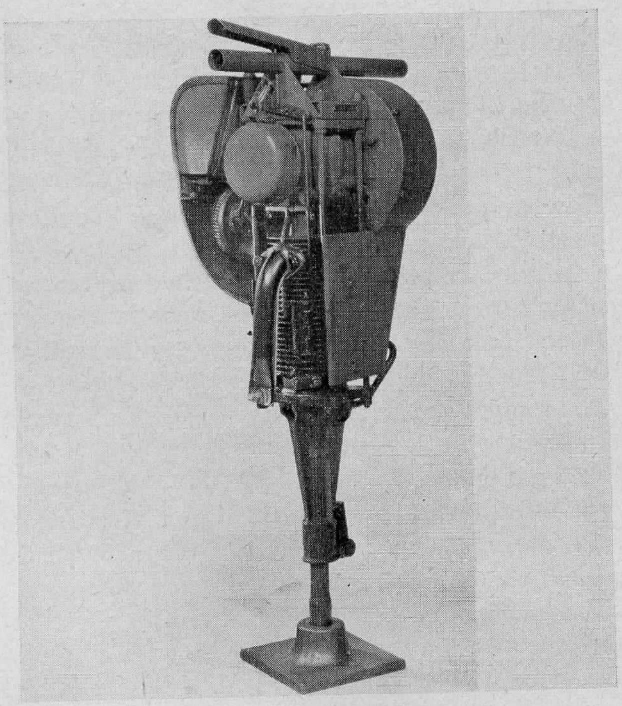
CASES APPROVED BY THE CHIEF SIGNAL OFFICER

Case No. 544—Mobile Air Compressor for Signal Corps Line Construction

The Signal Corps Board was directed to determine the comparative suitability of Tool Equipment TE–59–( ) (Gasoline Hammer) and the Corps of Engineers 55 cfm Air Compressor with 35-pound drill for use in boring holes for military pole line construction in locations where rock is encountered. A supplementary directive requested that consideration also be given to the use of a 105 cfm Air Compressor for the same purpose.

Reports have been received from the field indicating that Tool Equipment TE–59–( ) was inadequate for digging holes in certain types of rocky soils. The principal complaints related to the tendency of dust and debris to accumulate in the holes during the drilling operation, seriously interfering with the penetration of the drill until the dust was removed.

Subsequent to the initiation of this study by the Signal Corps Board, an Army Service Forces program for simplification and standardization of the procurement, storage, and issue of military equipment resulted in the assignment of the responsibility for the gasoline hammer to the Corps of Engineers. In the future this equipment will be issued to Signal Corps units as Engineer Paving Breaker Equipment, Set No. 1, Gasoline, Portable.



EXHAUST SIDE OF GASOLINE HAMMER TE–59–B

The Signal Corps Board tested several models of the gasoline hammer, a Barco Model J2A Driller and Engineer 55 cfm Air Compressor Equipments D–60 and 6R50.

The Board found that the Corps of Engineers gasoline hammer equipment designated as Paving Breaker Set No. 1 when equipped with an exhaust hole cleaner is satisfactory for light work. It is suitable for digging occasional holes in rocky soils but is too slow for effective use and too heavy and cumbersome for continuous work in this type of terrain.

The Corps of Engineers Air Compressor Equipment, including the Model 6R50 Air Compressor, was found to be satisfactory for use by Signal Corps heavy construction companies for drilling holes in rock for wire line construction. In view of this fact, no requirement was considered to exist for the larger and heavier 105 cfm Compressors.

The approved recommendations in this case included provisions for the incorporation of one Engineer 55 cfm Air Compressor Equipment and two Paving Breaker Equipment, Sets No. 1, in the Tables of Organization and Equipment of each heavy construction company, the addition of a clay spade to the Engineer 55 cfm Air Compressor Equipment, and an exhaust hole cleaner attachment for each gasoline hammer equipment now in the field or under procurement for Signal Corps use.

Case No. 549, Part A—Service Test of Synthetically Insulated Spiral-Four Cable

The Signal Corps Board in this case made a preliminary service test to determine if spiral-four cable with Buna S insulation and Neoprene outercover would serve as a substitute for standard Cable WC–548–( ) (spiral-four). Laboratory tests on samples of spiral-four cables insulated with synthetic rubber had indicated that the compression strength at high temperatures was considerably below that of natural rubber. Particular emphasis was therefore given to the mechanical and handling qualities of the cable when subjected to high temperatures.

Quantities of spiral-four cables insulated with synthetic rubber and a quantity of standard rubber insulated spiral-four cables for comparison purposes were used during the tests.

The field tests were made at Camp Murphy, where the temperature varied from 68° to 106° Fahrenheit. All construction work was performed in accordance with the procedure given in Technical Manual 11–369, Spiral-Four Cable. The cable facilities were suspended aerially on existing poles having 40 poles per mile and surface facilities laid on the ground adjacent to the pole line. Sample cables were also laid on sandy and asphalt roads having a surface temperature of approximately 110° Fahrenheit and subjected to vehicular traffic. No trouble developed on any samples after having been crossed 200 times by the vehicles. In the aerial construction special attention was given to the effects of ties and cable hangers on the insulation. Connectors were suspended in midspan by means of tension bridges except at locations where test points were desired for electrical measurements. It was noted when making tension bridges with Kearney Clamps that the metal band carrying the cable assembly designation was frequently attached to the cable at a point where the clamp should be placed. This was undesirable since the clamp when placed too close over the metal tag would slip and also the tag might be forced into the cable jacket.

Tests of aerial construction with span lengths of 133, 266, and 400 feet were made in order to observe the ability of the cables to withstand the effects of strain and crushing in long-span construction. Conductor continuity tests, dc loop resistance, insulation resistance, and transmission loss measurements were made.

As a result of these observations, the Board concluded that Cable WC–548–( ) insulated with synthetic rubber having the mechanical and handling qualities equal to the samples tested is satisfactory for field use under the highest temperatures likely to be encountered when installed in accordance with Technical Manual 11–369 Spiral-Four Cables.

The approved recommendations include provisions for the acceptance of Cable WC–548–( ) with Buna S insulation and Neoprene outercover having mechanical and handling qualities equal to the cables tested as a suitable substitute for rubber-insulated Cable WC–548–( ) (spiral-four) pending the completion of final tests to be reported on in Part B of this case, and that action be taken to arrange for the relocation of the metal rings carrying the type number on Cable Assembly CC–358–( ). A position of 12 inches from the face of the connector is considered satisfactory.

AIRCRAFT RADIO

PSYCHROMETER EQUIPMENT ML–313/AM

Early in 1942 the Army Air Forces indicated a requirement for an aerograph to determine the meteorological conditions in the atmosphere when the equipment is attached to a plane during flight. In the course of the development of such equipment, it became evident that a method of calibration would be required. Following an earlier practice in the calibration of aerographs, the original plan involved the procurement of calibration chambers which would be distributed to the various theaters of operation.

Since these required available power, possibly the availability of dry ice, and required that operators be trained in their use, the Signal Corps investigated the possibility of a simpler method of calibration. Psychrometer Equipment ML–313/AM was developed to fill this requirement. With this equipment, the temperature and humidity readings of the aerograph may be periodically checked. To obtain a complete field calibration of an aerograph, the equipment may be mounted on the same plane with Psychrometer Equipment ML–313/AM and flown in carefully controlled flight under stable air conditions, such as is found below a layer of stratus clouds.

Psychrometer Equipment ML–313/AM includes two interchangeable supports. One support holds two thermometers which read from −35° C. to +15° C.; the other support holds two thermometers which range from 0° C. to −50° C. The thermometers are bent at right angles and are mounted in the support so that they may be easily removed from their operating position for the

ML–313/AM VENTILATOR IN A C–45. INSERT SHOWS THE PSYCHROMETER ASSEMBLY IN THE INTERIOR OF PLANE

purpose of moistening a piece of wicking tied over one thermometer bulb. One pair of thermometers is used at a time, according to the range of temperatures being measured.

In operation, the bulbs of the thermometers extend outside the fuselage of the plane into a streamlined ventilator housing especially designed to control the airflow around the bulb during flight. The temperature indicated by the wet-bulb thermometer will be lower than that recorded by the dry-bulb thermometer, due to evaporation. At a given temperature and pressure, the rate of evaporation is a measure of the quantity of moisture contained in the atmosphere, that is, the relative humidity.

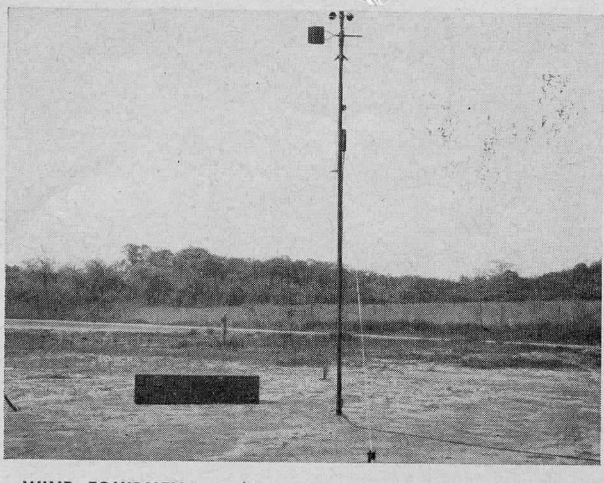
Ordinary tables for the evaluation of the relative humidity, on the basis of the dry-bulb temperature and the temperature difference in the two readings, must be corrected. This correction is required, due to a pressure rise in the ventilator duct, and is a function of the airspeed of the airplane. For airplanes generally used in weather reconnaissance flights, the true air speed varies from 150 to 350 miles per hour. At these speeds the heating effect of the air stream on the thermometer is appreciable and an accurate correction must be made to obtain the correct temperature and humidity values. The Signal Corps Laboratory has developed a circular Psychrometric Calculator ML–322/UM, designed to simplify the humidity evaluation from the observed readings. Psychrometer Equipment ML–313/AM will not give satisfactory information on the ground, since an air speed of 100 miles per hour is required for its effective use.

Spare thermometer tubes, of both ranges, wicking and thread are included in a case especially designed for packing this equipment.

WIND EQUIPMENT AN/GMQ–1 ( )

Before the war, the Signal Corps customarily had furnished an expensive heavy type of Selsyn equipment for the measurement of wind direction and wind velocity, using dial and/or recording indicating equipment. This equipment was installed in the control towers of major airports. The installation of this equipment was a major engineering task, frequently performed by contract, and required the use of special cables and other material.

When the Army began to operate airports in nearly all portions of the world, it became imprac-



WIND EQUIPMENT AN/GMQ–1 PREPARED FOR OPERATION

ticable to make such major installations. As a temporary expedient, the ordinary wind direction and velocity indicating equipment used in fixed weather stations was sometimes furnished; however, this equipment was not completely satisfactory, and action was initiated to develop equipment which was lightweight, transportable, sensitive, accurate, and which could operate without an external source of power. The equipment recently standardized to meet this requirement and future requirements for weather stations is known as Wind Equipment AN/GMQ–1( ). It is also contemplated that this will replace Anemometer ML–80–( ), Indicator ML–117–( ), and Support ML–29–B when the stock of these is depleted.

Wind Equipment AN/GMQ–1( ) is essentially a distant indicating combination anemometer and wind vane. A three-cup anemometer head is coupled to the armature shaft of an alternating current generator. The current generated in the wind-driven anemometer head can be transmitted distances up to 1,000 feet to a rectifier type alternating current milliammeter having dial scales of 0 to 150 miles per hour and 0 to 30 miles per hour. The generator housing is supported by the central support of the wind vane portion of Wind Transmitter ML–203–( ).

The wind direction indicating portion of the transmitter consists of a counterbalanced airfoil-shaped vane coupled to a low voltage direct current telemeter rheostat. Four flashlight-type batteries furnish the entire power requirement for this equipment. An accessory is under development designed to provide for operation from available 110-volt, 60-cycle ac power supply at certain fixed installations. The wind direction indicating dial is graduated by 10° intervals from 0° to 360° and also into the 32 points of the compass.

Wind Transmitter ML–203–( ) is mounted on Support ML–206–( ) which consists of three tubular sections approximately 5 feet in length, a base, guy wires, and fitting suitable for mounting either on a roof or on the ground. The three sections are so constructed that two sections may be used when a 10-foot support is required, or three sections when a 15-foot support is required. The upper section has a terminal box and terminal strip with six marked binding posts for connection to Wind Panel ML–204–( ) with Wire W–110. To facilitate repairs, equipment to be procured in the future will include steps.

For use by mobile or tactical units and for the storage of running spare parts, carrying cases suitable for use in transporting the equipment are provided.

MARKER BEACON RECEIVING EQUIPMENTS

The BK–35 relay employed in the Marker Beacon Receiver BC–357–( ) and BC–1033–( ) has been found to change in adjustment after aging. This change in adjustment is primarily due to very small changes in dimensions in the molded base used. Since the relay adjustment has a major effect on the performance of the receiver, the relay adjustment should be checked after the receiver is installed and also after the receiver has been in service for several months. The necessary instructions for adjusting this relay and checking the tuning of the receiver can be found on pages 3 and 14 of the Handbook of Maintenance Instructions for Radio Receivers BC–1033–A and BC–1033–B, AN 08–10–157.

HIGH VOLTAGE WIRING FOR RADIO COMPASSES AND MARKER BEACON RECEIVERS

Service information from the field indicates that the major part of the failures of Plug PL–108, Socket SO–88 and the power transformer in Radio Compass SCR–269–( ) occur as a result of high voltage breakdown between the pins on these plugs and sockets. To reduce this failure when using Marker Beacon Receiver BC–1033–( ), which requires no high voltage source, the lead from the BK–22–( ) relay used on Radio Compass SCR–269–( ) to pin No. 3 or to Plug PL–108 should be removed.

JEEP-INSTALLED SCR–499. INSETS SHOW INSTALLATION IN A CARGO PLANE (LEFT) AND IN A CARGO GLIDER (RIGHT)

GROUND SIGNAL

JEEP INSTALLED SCR–499

A long-range radio set which could be transported by air in either a Cargo Glider CG–4A or Cargo Plane C–47, and which would be mobile and capable of operation immediately upon landing, was requested by the Air-borne Center, Camp Mackall, North Carolina. CW operation only was required, and operation while in motion was not necessary.

Standard Radio Set SCR–499–( ), which includes the components of Radio Set SCR–399–( ), packed for air transport, is issued to the air-borne signal company for long range use but considerable time is required to move this equipment from a cargo glider or cargo plane and set it up to form an operating radio station. For this reason, it was desired to find a suitable means for mounting the principal components of Radio Set SCR–499–( ) as a mobile operating assembly, which could be easily moved, at least for a short distance. To meet this requirement, various arrangements were considered.

An installation in a jeep and trailer appeared to be the most satisfactory, and Installation Kit MC–549, which includes equipment necessary for installing the components of SCR–499–( ) required for CW operation in a Jeep (Truck, ¼-Ton, 4x4) and Jeep Trailer (Trailer, ¼-ton, Cargo) to provide an operative assembly, was developed. As shown in the photographs, Radio Transmitter BC–610–( ), with necessary coils and tuning units, Antenna Tuning Unit BC–939–( ), Radio Receiver BC–342–( ), and necessary accessories are installed in the body of the jeep. One Power Unit PE–75–( ), a part of the installation kit, is installed on the front bumper of the jeep and a 5-gallon gasoline drum is mounted on the rear. An additional Power Unit PE–

75–( ), extra gasoline drums, Antenna Assembly RC–293, spare tuning units, coil units, mast sections, and other spare parts, tool and test equipment, etc., are installed in the jeep trailer. Supplementary instructions for operation of Radio Set SCR–499–( ) in the jeep, not covered by Technical Manual 11–281 are provided as part of the installation kit.

As seen from the above, complete equipment to provide CW operation is included in the jeep itself.

One glider or cargo plane is required for transporting necessary personnel and the jeep with equipment installed therein, and an additional plane or glider for the trailer. The springs of the jeep must be depressed to permit loading of the jeep on the standard ramps of Cargo Plane C–47; chains for depressing the springs are included as part of the installation kit. As mentioned a power unit is provided on the bumper of the jeep but the load on the jeep may be reduced and satisfactory operation had by removing the unit from the bumper and using the power unit in the trailer. Mounting provisions permit installation of either power unit in either position.

For increasing the range of the subject equipment, Antenna Assembly RC–293 is provided. This antenna includes two telescopic aluminum masts, 25 feet in height when extended; 250 feet of Wire W–148; guys, stakes, etc. It is used as an end fed ¾ wave antenna. Instructions for use of this antenna are included in the supplementary operating instructions.

Installation Kit MC–549 has been standardized and is now under procurement to be issued on T/O & E 11–557 with allowance of four per airborne signal company.

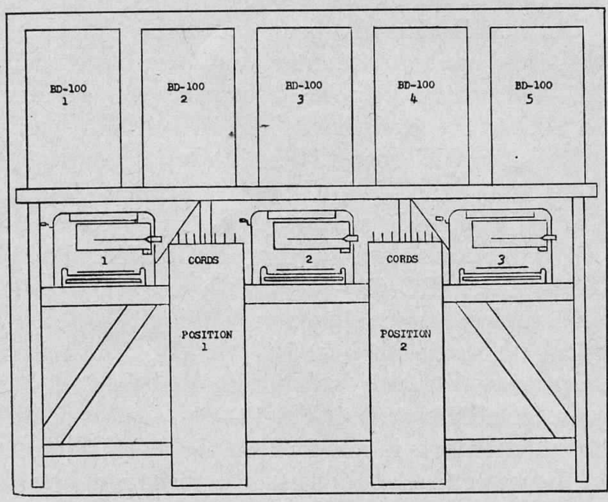


FIGURE 1.—BD–100 ARRANGEMENT AND KEYSHELF POSITIONS

BD–100 GROUP OPERATION

An improved method of installation and operation of a toll Telegraph Printer Switchboard has been devised by a signal regiment (prov.) which permits the direct interconnection of teletypewriter lines on a maximum of five Switchboard BD–100. The principal features of this arrangement, extracted from the NATOUSA "MONTHLY BULLETIN" for July, are as follows:

It is possible to make direct connections between 48 teletypewriter circuits. (The remaining two circuits are required to terminate the two regular operators' teletypewriters.)

All of the circuits can be answered and connected by either of the two regular operators' teletypewriters.

A third operator's teletypewriter is provided to handle overflow traffic, line up circuits, and for maintenance work.

The five positions of switchboard are mounted adjacent to each other on a plank platform directly above the three operators' teletypewriters. The patching jacks were made more accessible by interchanging panel positions and lowering the jacks on the face of the switchboards. The operators' teletypewriters were tilted backward to bring the keyboards closer to the patching jacks.

The principal improvement is the addition of a keyshelf in a convenient location immediately to the right of each of the two regular operators' teletypewriters. Each keyshelf contains seven pairs of cords so that a total of fourteen simultaneous regular connections can be made at one time. Additional overflow connections can be made by the third operator's teletypewriter using regular patch cords and using standard operating procedures. The position of the equipment is shown in figure 1.

Each pair of cords has an associated three-position key to answer, call, or monitor a connection. (See fig. 2.)

A "printer ground key" is located in each keyshelf that is operated during idle periods to prevent the operator's teletypewriter from running open.

Each of the two regular operators' teletype-

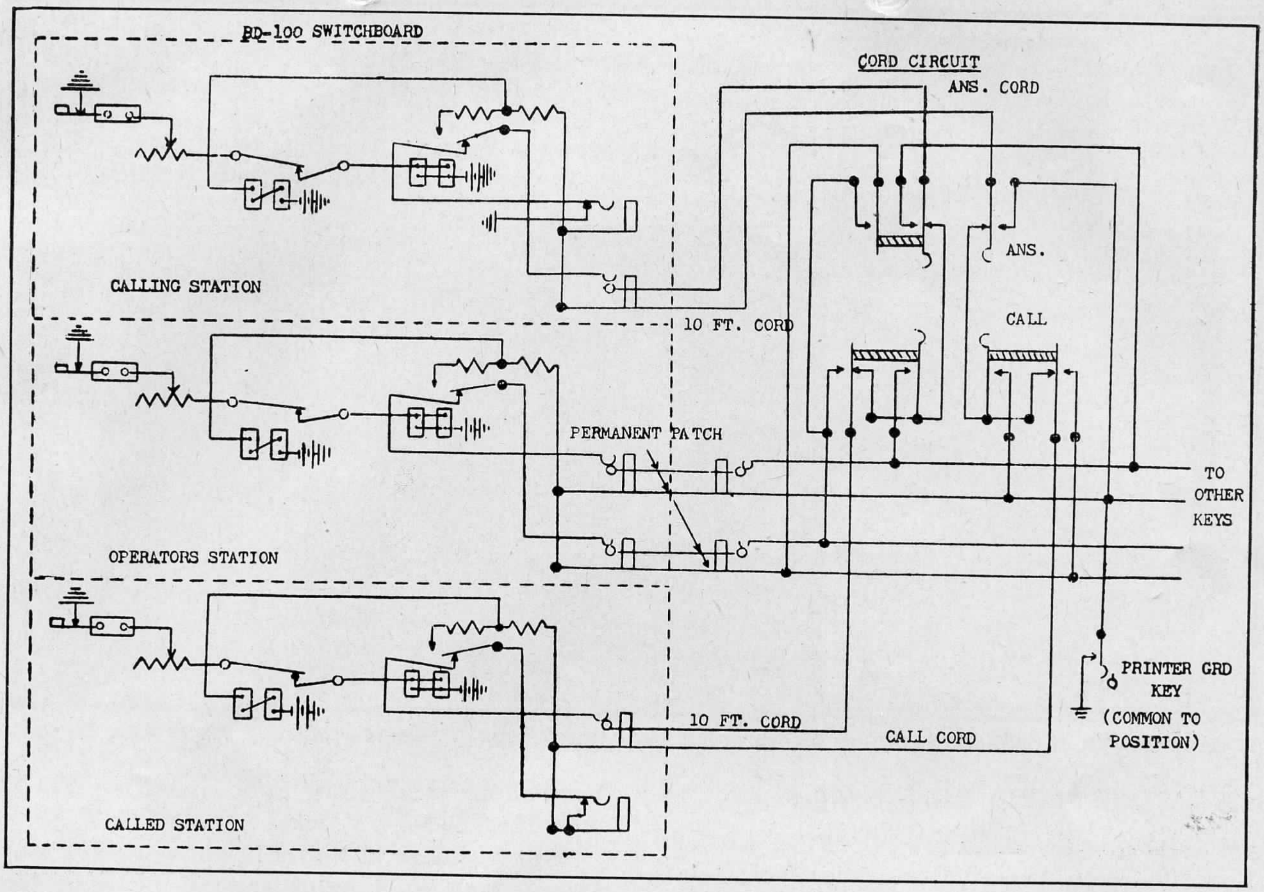


FIGURE 2.—DIAGRAM OF SWITCHBOARD AND CORD CIRCUITS SHOWING THREE-POSITION KEY FOR EACH PAIR OF CORDS

writers is connected to the common ties in the cord circuits through a repeater in a line circuit of one of the BD–100 Switchboards. The overflow machine is connected to the switchboards through the red and black operator's printer jacks.

METHOD OF OPERATION

To Answer an Incoming Call

Release printer ground key.

Operate key of next idle cord to "answering" (back) position.

Connect answering (back) cord of selected pair to the *lower* line jack of calling station.

Momentarily partially depress the *"line open key"* to put out the call lamp.

Acknowledge call in regular manner.

To Complete an Incoming Call

With key in answering (back) position, insert calling (front) cord in *upper* line jack of called station.

After two-second interval (to start called station motor), operate the key to the call or monitor (front) position.

Send bell (BELL/S) signal followed by letters (LTRS) function.

After calling station acknowledges call, leave the connection by restoring key to normal (upright) position.

Operate the printer ground key to stop the operator's teletypewriter from running open.

To Call a Station From Operator's Machine

Proceed as in first 3 steps of answering an incoming call.

Operate break key for two seconds to start distant motor.

Send bell (BELL/S) signal followed by letter (LTRS) function.

To Monitor Connection (Only one connection can be monitored in each position at a time.)

To monitor connection in same position: Release printer ground key; Operate key to talk or monitor (front) position.

To monitor connection of next position: Release printer ground key; Operate key of an idle cord pair to answer (rear position); Connect answer cord (back) to lower line jack of *called* station. *Do not attempt to monitor by using upper line jack of calling station.*

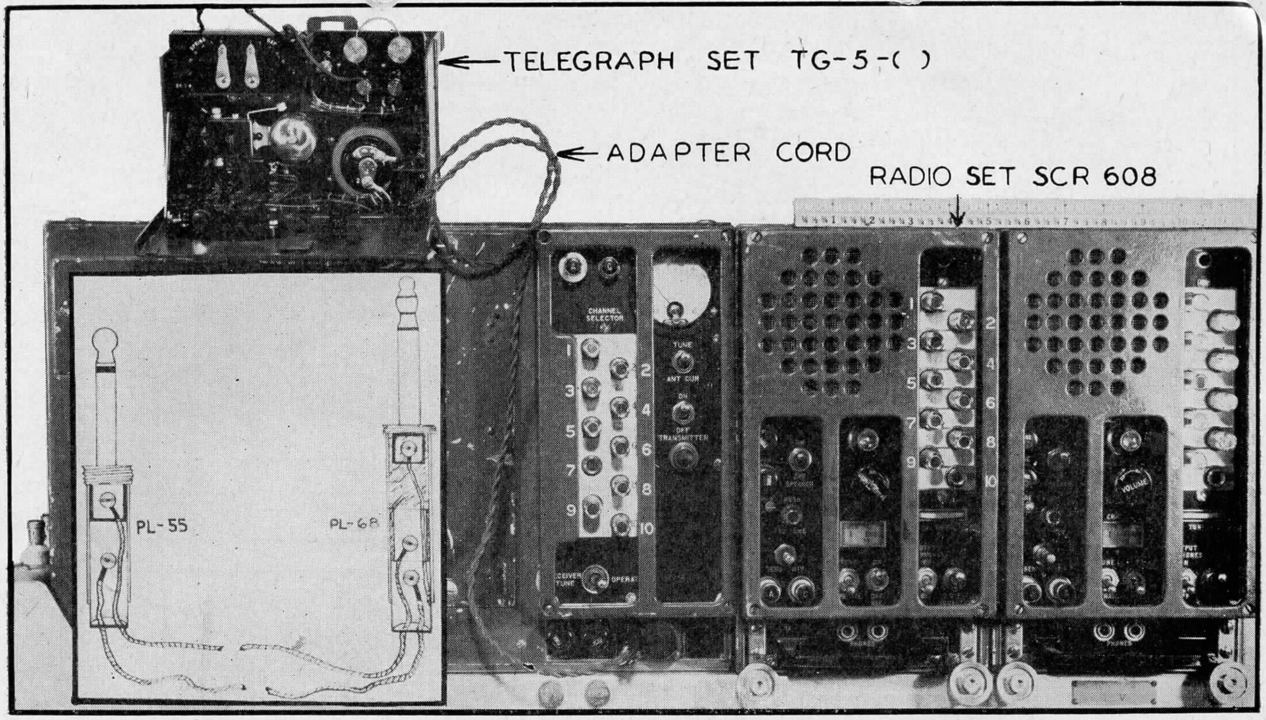
To Disconnect on a Connection

Release printer ground key.

Operate key to talk or monitor (front) position.

Challenge connection as specified.

Grasp the plugs of both the answering and called cords and pull them from their respective jacks simultaneously.



TG–5 CONNECTED TO SCR–608 FOR TONE KEYING. INSET INDICATES METHOD OF WIRING PLUGS FOR USE AS ADAPTER CORD

TONE KEYING THE SCR–608–( )

For the past several months, the Field Artillery Board has been transmitting meteorological data to Field Artillery units stationed at Fort Bragg. using Radio Set SCR–608–( ) with an elevated antenna. Each voice transmission has been preceded and followed by a code transmission. The code transmissions have been accomplished through the use of Telegraph Set TG–5 ( ), with an adapter cord.

The adapter cord is a simple 2-conductor cord, mounted with Plug PL–55 on one end and Plug PL–68 on the other, so wired that the tip and sleeve of Plug PL–68 are connected to the tip of Plug PL–55, and the sleeve of Plug PL–55 is connected to the ring of Plug PL–68.

To operate the TG–5–( ) as a tone keyer with Radio Set SCR–608–( ), SCR–610–( ), SCR–619–( ), three steps are necessary: a shorting connector is placed across the line terminals of the TG–5–( ); Plug PL–55 is inserted into the TG–5–( ) receiver jack; Plug PL–68 is inserted into the microphone jack of the radio.

This connection automatically turns on the radio transmitter and the equipment is ready for code transmission. Upon completion of the transmission, Plug PL–68 should be removed from the microphone jack of the radio and Plug PL–55 from the TG–5–( ) jack.

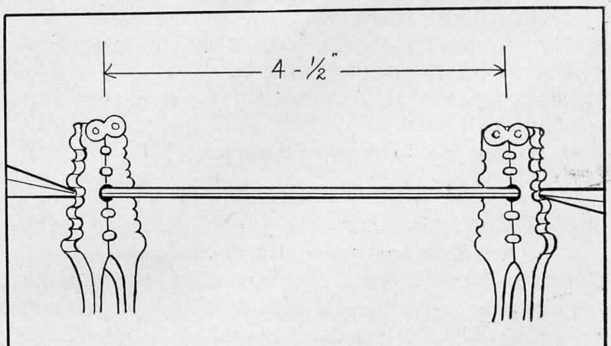
A provision to modify FM radio sets for tone transmission is desirable since it increases the speed and accuracy of enciphered or clear messages.

The adapter cord is a simple device and can be duplicated by field signal personnel.

MAINTENANCE

MODIFIED WESTERN UNION JOINT

The Western Union Joint, made by twisting two wires together, has on occasions been found to pull out when heavy strains were placed on it.



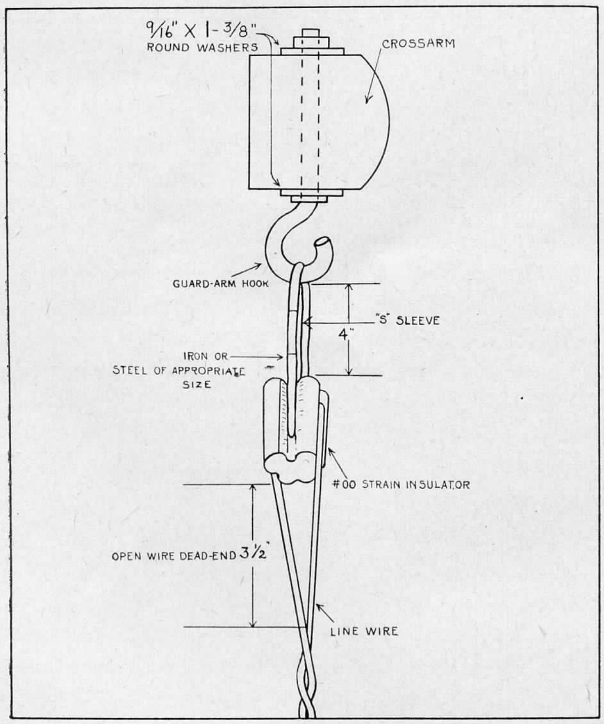
REINFORCED WESTERN UNION SPLICE

This splice can be reinforced by using a short piece of seizing wire included in the twist, first making 2½ twists, then 5 close turns of both wires at each end.

A signal construction battalion has used a similar type splice which was called a "Three-Way Western Union Splice," using a short length of wire of the same size as the line wire and made part of the splice. The "neck" of the splice is about 4½ inches long, consisting of four complete turns made with Clamps LC–24 and terminated with five "buttons" at each end of the splice.

OPEN WIRE DEAD-ENDS

A signal construction battalion has suggested that open wire dead-ends, especially when copperweld, high strength steel, 0.128 copper or larger wire is used, be made on guard arm hooks and #00 strain insulators. This battalion recently replaced a dead-end pole where 0.128 wire had just about pulled the pins out of the crossarm, although the wire which had been in place for less than a year was not even pulled up to the specified sag. It is claimed that the use of the hook places the strain on the side of the crossarm where it will hold over a long period of time.



OPEN WIRE DEAD-END WITH GUARD-ARM AND INSULATOR

UNSATISFACTORY EQUIPMENT REPORT

W. D., A. G. O. Form No. 468, Unsatisfactory Equipment Report, states:

1. It is imperative that the Chief of Technical Service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in matériel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.

2. This form will be used for reporting manufacturing, design or operational defects in matériel with a view to improving and correcting such defects and for use in recommending modifications of matériel.

One theater submitting these reports to the Office of the Chief Signal Officer has added the following statements to the back of each form:

Total Number of equipments covered by this report ——.
Number of failures due to this cause ——.
Over a period of —— months.
Discussion and recommendations: (Any drawings necessary.)

This information is of considerable value to the Signal Corps laboratories in determining the priority of the investigation of the report. It is recommended that the above information be furnished whenever it is available.

REMOVAL OF LEAD DEPOSITS

Gasoline engines as used in Signal Corps power units are operated at nearly constant speeds and under a load which may be compared to the load on vehicular engines operated at a speed of 30 mph and working against a 7 percent grade. As a result of this steady speed, the engine has no opportunity to clear itself of the deposits resulting from incomplete combustion of the fuel. The use of the high octane leaded gasoline as a fuel aggravates this condition, building up deposits in the combustion chamber and on valves at a rate of approximately $1/32$ inch in 50 hours of constant operation.

As these deposits reach certain thicknesses, a cracking off and flaking process takes place. This however does not clean out these deposits entirely from the combustion chamber or valves. When this flaking process occurs, particles of the deposit are caught between the beveled seat of the exhaust valve and insert and become embedded. This causes a leakage of exploding gases at these points and the flame of combustion will blow through causing burning of the exhaust valves. This process of building up and partial flaking continues until a point is reached where the operation of the engine is affected. Since it is imperative to remove these deposits before this point is reached to avoid premature engine failure and consequent shut down, the preventive maintenance plan as outlined in SCTIL No. 30, May 1944, should be followed. The only approved method for removing these deposits is the mechanical method which allows for the inspection of valve and cylinder walls and necessary valve grind in for good operation.

The use of the oxygen from the Oxy-Acetylene Welding and Burning Set for the removal of these deposits should be prohibited as experience has shown that: In the hands of inexperienced personnel, burning of the valves and melting of holes in the cylinder head or piston head can result; the incomplete removal of the remaining ash which contains dust and other grit particles can result in the scoring of the cylinder walls of the engine; there is no check possible on valve and cylinder condition; the valves are not cleared of embedded particles, and the possibility of their overheating due to imperfect seating can still result in unforeseen engine failure.

SPARE PARTS CATALOGS

The Army Service Forces Signal Supply Catalogs Sig 7 and Sig 8 cover the spare parts portion of the Signal Supply Catalog system described in Signal Corps Technical Information Letter No. 30, May 1944.

These spare parts catalogs are being printed for ground radar equipment, tactical ground (non-

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ref. No. TM 11-242	Illustration fig. No. TM 11-242	Equipment item No.	Stock No.	Nomenclature	Unit of measure	Quantity per assembly	Echelon stocks (operating levels)					Depot stocks (to maintain 100 equip.)			
							3d			4th	5th	Field		Base	
							Equipment to be maintained					Period of time			
							11-30	31-70	71-130	100	100	1 month	3 months	6 months	1 year
				PART I											
107	25	BC1000/1	6L421-4.1N	BOLT, ¼″-20 x 1⁵⁄₁₆″, brass, nickel plated, Galvin #3A4 1546.	ea	1	0	0	1	1	1	1	2	3	5
103	18	BC1000/2	2Z1234	BRACKET, tube shield (holds tube shields), Cinch #1006.	ea	18	0	0	0	4	2	7	14	22	35
101	25	BC1000/3	2Z1406	BUSHING (antenna mounting), bolt and pin assembly, Galvin #1X41966.	ea	1	0	0	1	1	0	1	2	3	5
C5	33	BC1000/4	3DA10-159	CAPACITOR, fixed, paper; 10,000-mmf, +60%, −20%, 400 VDCW, molded bakelite, C-D 1-D-M-4S1.	ea	2	1	2	3	2	2	5	10	15	25
C8	33	BC1000/5	3DA10-160	CAPACITOR, fixed, paper; 10,000-mmf, +60%, −20%, 120 VDCW, molded bakelite, Micamold 338.	ea	46	6	12	20	20	10	6	12	180	300
C72	33	BC1000/6	3DA6-48	CAPACITOR, fixed, paper; 6,000-mmf, +60%, −20%, 400 VDCW, molded bakelite, C-D type 1-D-M-4S1.	ea	1	1	1	2	2	1	2	4	6	10
305	9, 27	BC1000/7	6Z1747-3	CATCH, hold-down clip; metal (holds chassis to case), Galvin 55A41977.	ea	12	30	60	100	10	0	40	80	120	200
110	19, 18	BC1000/8	2Z2646	CLAMP, crystal, 4300 K. C., spring steel, zinc plated, Galvin 42B40614.	ea	1	0	0	0	2	0	2	4	6	10
111	19, 18	BC1000/9	2Z2646.1	CLAMP, crystal, #6815 K. C., spring steel, zinc plated, Galvin #42K40616.	ea	1	0	0	0	2	0	2	4	6	10

FIGURE 1.—SAMPLE PAGE, SIG 8

radar) signal equipment and ground photographic equipment. The spare parts catalog for fixed plant equipment is being published under Sig 10.

One of the purposes of these catalogs is to furnish to the field a list of spare parts with proper stock numbers and nomenclature together with pertinent references as to technical manual, schematic circuit symbol and illustration figure number, where available. This information will assist organizations maintaining, storing, and issuing this equipment to expedite identification of items needed to keep the equipment in proper operation.

These Signal Supply Catalogs are supplemental to Tables of Equipment, Tables of Basic Allowances, Tables of Allowances, and Tables of Organizations.

In accordance with Section IV, War Department Circular No. 107, 7 June 1944, the first and second echelon lists (Sig 7) consist of the current authorized allowances of spare parts and major components to be issued to these echelons. This circular also provides that third and higher echelon lists (Sig 8), will be used as guides in making initial issues of spare parts and major components to third and higher echelon maintenance organizations and to tactical supply organizations. It is the responsibility of the third and higher echelons of maintenance and supply to analyze spare parts items and quantities and adjust their stocks to reflect actual usage as disclosed by experience. Recommendations may then be made to the Chief Signal Officer (SPSMA), that consideration be given to changing quantities of parts in the next revision of the catalog.

The spare parts catalogs for ground (nonradar) equipments for each radio set or Signal equipment and for major components are now being printed. As indicated in sample page for Sig 8 BC–1000, shown in figure 1, the spare parts are listed in alphabetical order for easy reference. The Signal Supply Catalog Sig 8 SCR–300 however, lists the Radio Receiver and Transmitter BC–1000–( ) as a major component only, without its corresponding spare parts, and a reference is made in a note that Sig 8 BC–1000–( ), Sig 8 HS–30 and Sig 8 TS–15 are also necessary for higher echelon maintenance of Radio Set SCR–300–( ). Some components, for example Radio Transmitter BC–610–( ), are used in several different radio sets. By publishing the list of spare parts for each component separately and not including such spare parts in the catalog for the basic radio set, a large amount of duplication is avoided.

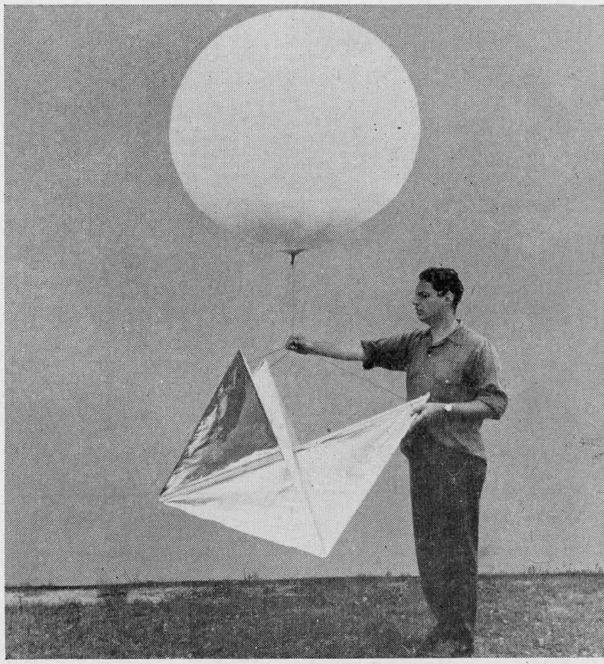
Several spare parts catalogs for radar equipments have been distributed to the field and others are being published. Since radar supply catalogs, in general, contain in the neighborhood of 1,000 or more items, and the major components are generally used only with a particular equipment, spare parts for all components have been included in the one catalog covering the basic equipment.

ELECTRONICS

AAA RADAR TARGETS

Radar reflector targets, balloons and rubber bands for the assembly of an airborne target to be used in the collimation of antiaircraft artillery radar equipment, together with chemicals for generating the hydrogen gas, are now available in Signal Corps depots. These items are listed in Army Service Forces Catalog Sig 4–1 in the antiaircraft artillery section. The hydrogen generator ML–185 is listed in T/O & E 44–16 and 44–116.

The collimation of radar equipment (alignment of the mechanical axis with the electrical axis) is accomplished by sighting through the telescope while tracking a target and adjusting the telescope until the target is centered in the reticle.



PILOT BALLOON TARGET FOR RADAR COLLIMATION

It is recommended that the procedure outlined below be followed if the telescopes on SCR–545 of SCR–584 are to be adjusted. Prepare the set for automatic tracking. Release the inflated balloon with target attached. The preferred condition for adjusting the telescope is, that the target is moving directly away from the radar so that little or no movement of the antenna in azimuth is necessary to follow the target. Upon sighting through the telescope, if its axis agrees with the electrical axis of the radar, the target will be visible in the telescope and will be centered in the reticle. If it is not so centered, the position of the telescope must be changed.

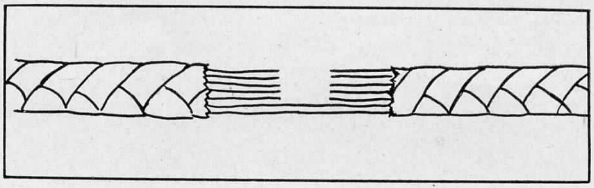
After all adjustments are made, lock nuts should be tightened making certain not to disturb the alignment of the telescope.

JAPANESE WIRE CUTTING

A REPORT from an overseas observer contains some interesting information of Japanese wire-cutting technique. The British forces in the Arakan in the China-Burma-India Theater have been troubled recently with telephone lines being cut by the Japanese in such a way that they appeared to be satisfactory for ringing, and yet the conversation is so weak that it is not intelligible. Inspection of the lines did not reveal tampering by the enemy.

When the trouble was located it was found that the Japanese had cut out a quarter-inch section from five of the conductor strands. The remaining two strands were left intact. This section was then covered with tape to give the appearance of a wire splice.

This technique increased the line resistance as in a poorly made splice, thus causing the transmission to be weak. Clearing such troubles requires more time than if the wire cutting was complete and methods must be devised to counter this practice.



JAP WIRE CUTTING TECHNIQUE AS REPORTED FROM CBI

STOP JAMMING SUPPLY CHANNELS

A FEW years ago most attics had their complement of old radios. Buying radios got to be a national pastime. Let so much as a resistor go on the blink, or a new model come out with more tubes and less dials, and Mr. and Mrs. America went out and got a new set. The old one was saved for "the summer cottage" or because it "would make a nice sewing cabinet for grandma."

Today, a feather merchant with a crystal set is the luckiest man alive—or so it seems to the one whose radio goes off the beam and who has to try to find a replacement part.

Yet, in the Army, these precious items of equipment are not always receiving the care they should, especially when it comes to handling slightly damaged ones. There is a tendency to regard damaged equipment as permanently useless and to treat it like junk. The result is that it soon becomes junk.

Radios destined for the repair shop are loosely packed in shipping crates, or thrown into piles on warehouse floors, or shipped and stored without adequate protection from the weather and rough handling. Telephone equipment gets the same treatment. Cannibalization sets in long before it is justified—simply because someone sees a piece of equipment that looks like scrap only because it's been treated like scrap.

It isn't deliberate—it's just an American habit. The "Land of Plenty" still hasn't gotten used to the idea of having to be thrifty.

And it isn't just the cost of the equipment that makes this condition so deplorable. It's the time that is lost, the unnecessary work that is created, the men who are tied up with needless hours of repair work that has gone from minor to major repair with a shrug of the shoulders.

Neglect through ignorance of proper procedure can easily be overcome. If there is any question on the part of responsible personnel as to how equipment should be stored and packaged for shipment, they may refer to the publication, "Army-Navy General Specifications for Packaging and Packing for Overseas Shipment" or to ASF manuals M402 and M406, both of which contain information on the subject.

MILITARY PERSONNEL

INSTALLATIONS TO CLOSE

THE DISCONTINUANCE of certain Signal Corps installations which have played a major part in the training of communications personnel has been announced. These are the Southern Signal Corps School, the Western Signal Corps Training Center, and the 803d Signal Training Regiment.

The Southern Signal Corps School, Camp Murphy, Fla., on or before 30 November 1944, will be discontinued as directed by ASF Circular No. 243, dated 31 July 1944. Part of the training formerly given at this school will be conducted in the future at Fort Monmouth. This will include certain officer and enlisted courses in radar. Camp Murphy was originally established in February 1942 and was named after Col. William H. Murphy, a Regular Army Signal Corps officer, who had been active in aircraft warning activities in the Pacific up to the time of his death in the Far Eastern theater. Originally known as the Signal Corps Radar School, the name was later changed to the Southern Signal Corps School. Training was conducted not only for Signal Corps personnel but also for Air Corps and Coast Artillery personnel, and in recent months unit training was conducted at this post.

Effective on or about 31 October 1944, the Western Signal Corps Training Center will be discontinued. The WSCTC was established at Camp Kohler, Calif., on 28 July 1942. Buildings, which had been built for use in the evacuation of the Japanese from the West coast, were utilized, and the camp was named after 1st Lt. Frederick L. Kohler, a Regular Army officer, who was killed while serving in the Far Eastern theater. The Western Signal Corps Training Center was set up to supervise and coordinate the activities of the Western Signal Corps School at Davis, Calif., and the Western Signal Corps RTC and later Unit Training Center at Camp Kohler. Most of the property at Camp Kohler will be disposed of as surplus but it is possible that the Kohler laundry will be maintained. This laundry is one of the largest installations in Northern California and serves other military posts in that section as well as Camp Kohler. Also possible is the retention of the Kohler hospital, a 334-bed institution, which may be used by returning veterans through the Veterans' Administration. Appropriate action will be initiated prior to the discontinance of this center to transfer units, personnel, and training activities from the school and the training center to Fort Monmouth and Camp Crowder.

The 803d Signal Training Regiment, which is presently stationed at Fort Monmouth, is being absorbed by the 15th Signal Training Regiment. When war broke out, the 15th Signal Training Regiment, then known as the 15th Signal Training Battalion, was able to care for training needs of Fort Monmouth. When the Officer Candidate School was increased to a capacity of 6,000 students, the 802d and 803d Signal Training Regiments were activated to aid the 15th Signal Training Regiment in administrating training requirements. Later, as the OCS capacity decreased, the need for training regiments lessened. The 802d Signal Training Regiment was the first of the 2 supplemental training regiments to be disbanded, and its personnel was absorbed by the 803d Signal Training Regiment. Thus, with the disbandment of the 803d Signal Training Regiment, Fort Monmouth now returns to the use of only 1 training unit, the 15th Signal Training Regiment.

OFFICER PROMOTIONS

Of interest to all Signal Corps officers is the opportunity that exists for promotion. In every promotion there are two basic requirements that must be fulfilled; first, there must be a vacancy in the organization to which the officer is assigned in the grade for which promotion is recommended either as a position in a table of organization or an authorized allotted position; and secondly, he must have fulfilled the minimum time in grade requirements. The matter of the existence of a vacancy in an officer position is normally common knowledge—often as simple as the fact that the grade of a company commander is authorized as a captain. The matter of minimum time in grade, however, is something entirely different.

Since the national emergency, the expansion of the Signal Corps has been extremely great. Throughout this expansion period, involving numerous assignments and reassignments of officers, the minimum time in grade requirements have assumed considerable importance in the promotion of officers. As the war progresses, however, it is noticeable that the length of time in grade increases. In general it is expected that this trend will continue. From time to time Army Regulations are changed to increase the time in grade to prevent inequities that would otherwise arise in places where there are more vacancies, as opposed to those places where there are no vacancies. These Army Regulations cover only minimum time in grade and in no way indicate that promotion is automatic.

Of interest is the following Signal Corps table which represents the "age in grade" of the middle officer (median) in each grade at three different dates. Expressed another way the table shows, in the instance of Signal Corps colonels, on 1 July 1944, that half the number had less than 1 year 8 months 29 days in grade, and half had more. On 1 January 1943, this time in grade was only 8 months and 17 days.

Rank	Median time in grade						1 July 1944		
	1 January 1943			1 January 1944					
	Years	Months	Days	Years	Months	Days	Years	Months	Days
Colonel	0	8	17	1	4	16	1	8	29
Lieutenant Colonel	0	6	6	1	0	6	1	3	7
Major	0	5	31	0	10	11	1	0	16
Captain	0	4	25	0	10	5	1	0	6
First Lieutenant	0	5	7	0	6	22	0	10	27

Often an unwritten consideration in recommending an officer for promotion is that he should be in the upper third of the relative rank of his grade. A table for determining whether an officer is in the upper third of his grade is furnished below. This table uses 1 July 1944 as the control date. To use this table, take the case of the promotion of a first lieutenant to captain. An officer might not be considered for this promotion unless his date of rank was prior to 4 August 1943 (reading opposite first lieutenant) even though he had served the minimum of 9 months' time in grade, as required by existing Army Regulations.

Rank	Time in grade for upper third			
	As of 1 July 1944			Date of rank
	Years	Months	Days	
Colonel	1	11	18	13 July 1942.
Lieutenant Colonel	1	6	19	12 Dec. 1942.
Major	1	0	15	15 June 1943.
Captain	1	0	5	25 June 1943.
First Lieutenant	0	11	27	4 Aug. 1943.

To summarize, the minimum (and the word "minimum" should be emphasized because the average time in grade is much higher) differs as shown in the following table, current at the writing of this article. This table compares the upper third relative rank measurement with Army Regulations and with ASF requirements for overhead.

Grade	Upper third relative rank as of 1 Oct. 44	Months in grade, AR 605–12—Change 1	ASF Cir. 59, 1944
	Months	*Months*	
Lieutenant Colonel to Colonel.	22	18	22 months.
Major to Lieutenant Colonel.	16	15	AR governs.
Captain to Major	15	12	12 months.
First Lieutenant to Captain.	15	9	AR governs.
Second Lieutenant to First Lieutenant.	--------	6	6 months.

It should be pointed out here that Army Regulations credit officers serving outside continental United States and Alaska with time and a half of established time-in-grade requirements. It will be seen from the above table that the application of the "upper third" yardstick sets a somewhat higher restriction than Army Regulations or ASF regulations. Very likely, as the 1 October 44 date is passed, the "upper third" figure will tend to increase almost directly with the elapsed time. This is because the Army has reached its authorized strength. Officer positions are filled by officers in grade and vacancies occur only as officers are retired, returned to inactive status, or demoted.

Recent changes in AR 605–12 have not only affected the time-in-grade requirements but also have affected Signal Corps officers assigned to the Army Air Forces who have Air Corps promotions. Air Corps promotions (as differentiated from AUS promotions) have been discontinued; and officers with Air Corps promotions will be given a corresponding temporary grade in the Army of the United States with date of rank as of 1 August 1944. This alters considerably the relative rank of Signal Corps officers.

A surprising observation is the fact that in the Signal Corps, second lieutenants serve a longer time in grade than first lieutenants. This is because a considerable number of Signal Corps second lieutenants have been trained in long-term specialist courses, such as aircraft warning, radio, etc., to the extent that the average is affected.

Now a word of caution: Time in grade is only a minimum requirement in the promotion of officers. The important considerations are: (1) Merits of the individual; and (2) importance of the position. Unless these items are paramount in making promotions the efficiency of the Army will suffer. Also, as a matter of morale, it must be recognized that opportunities for promotion are becoming limited throughout the entire Army and advancement in grade will be a matter of displacement and not a matter of expansion.

REGULAR ARMY OFFICERS

The number of Regular Army officers in the Signal Corps has remained almost constant throughout the war. As of the date of this writing, there are slightly more than 400 Regular Army officers in the total officer strength of the Signal Corps. A few of these are on branch immaterial duty. The only increase in Regular Army officer strength that is authorized at the present time comes from the graduates of the Military Academy. Of the June 1944 graduating class, the Signal Corps received 6 students, who have been given duty assignments.

Considerable addition to the Regular Army strength probably could have been expected in this war except for the fact that WD Circular No. 121, dated 17 May 1943, discontinued all appointments in the Regular Army except for those from the Military Academy, and in the Medical Department, and the Corps of Chaplains. There were probably several reasons for the issuance of this directive. The first was that there is no way of determining the strength to be authorized in the future. A second reason is that the matter of determination of grade is difficult. No set procedure has been promulgated as to the reduction in grade that may be made for Regular Army officers at the conclusion of hostilities. At the close of the last war most Regular Army officers received a substantial reduction in grade.

It is expected that the United States will, in the future, maintain a larger armed force than ever before to insure supremacy at all times over any potential enemy or enemies. The Regular Army will have to be sufficiently large to man adequate defense garrisons both inside and outside the continental limits of the United States. In addition, the Regular Army must provide instructors for the civilian components, such as the National Guard, conduct military schools, and attend to such matters as the development, procurement, production, storage and issues of matériel.

Not only may the Regular Army be enlarged and strengthened, but the civilian components of the Army may also be built up to and maintained at an approved level. In order to bring these organizations up to such a level, the training programs of the civilian components would be lengthened and intensified. Post-war plans would also contemplate holding annual field exercises and maneuvers on a far larger scale than formerly.

It is assumed that there will be formulated prior to any partial demobilization in the Army, plans whereby certain AUS and Reserve officers will be permitted to apply for appointment in the Regular Army. This plan will cover the requirements of the application including the recommendations of the commanding officers as well as covering such reduction in grade as may be indicated. Presumably, too, this plan will indicate officer grades in age groups inasmuch as previous applications have had age restrictions. Any such plans for appointment will be widely publicized in order to secure the selection by the Army of the best qualified officers.

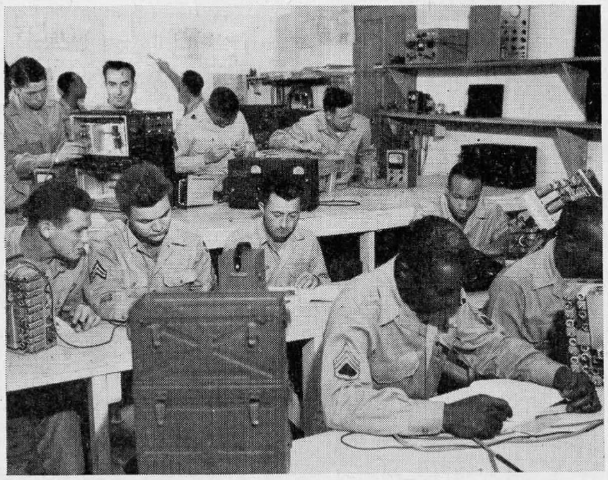
MILITARY TRAINING

THE 6660TH SIG. SCH. CO. (PROV.)

On 25 February 1943, the Commanding General, NATOUSA, directed the establishment of a signal school in the Mediterranean Base Section. This directive provided that courses be set up in: radio operation, message center procedure, telegraph printer operation, radio maintenance, and wire construction and maintenance. The school was activated on 11 March 1943 and instruction of the first students began on 22 March 1943.

The primary purpose of establishing the school was for the training of Signal Corps communications specialists, both British and American. At that time, when Allied armies were actively engaged in North Africa, the shortage and inadequacy of training of signal specialists was evident. Since trained replacements were not available and since neither the units committed to operations nor those undergoing reorganization or intensive tactical training in rear areas (Fifth Army) could operate "unit schools," the signal school afforded unit commanders an unusual opportunity to train basics whom they knew were capable of becoming specialists and to give new specialists to or refresh those men already skilled.

The site selected for the school was a building on the outskirts of Oran known as the Institute Mouterde. It was an ideal location, close to the signal installations of the base section in which the on-the-job phases of training were to be conducted. The building had been used as a combination residence and school for children and was



RADIO MAINTENANCE CLASS AT SIGNAL TRAINING SCHOOL

well suited for school use. It had two disadvantages: it continued to be occupied in part by French civilians and lack of space constituted the principal limitation upon the size of classes.

Prime doctrine of the school has been that instruction should be practical. To this end, use is made of every facility possible in the signal installations of the base section. Students in operations courses in their final phases handled live traffic in the signal centers. Students in maintenance courses work on the maintenance of damaged sets in depots and beside the wire line crews of operating units. Theoretical instruction is held to the minimum consistent with the intelligent use of test equipment and machines. Stress is upon operation under simulated field conditions.

Operating policy of the school has been influenced by necessity for rapid training. Minimum requirements have stressed interest, aptitude and, for some technical subjects, previous training or experience. All courses are shorter than their counterparts in the schools of continental United States. This is made possible by:

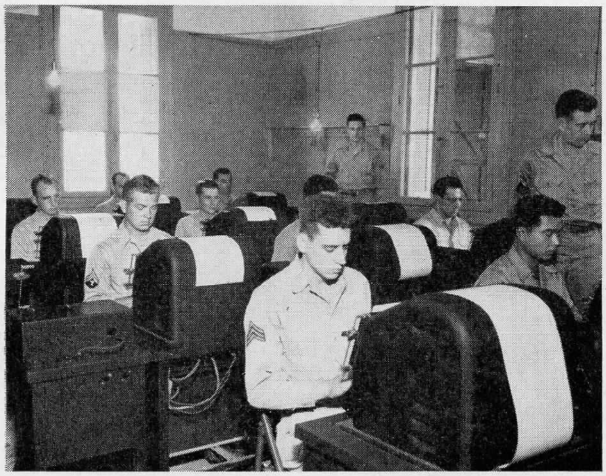
Limiting purely military (as opposed to specialist) training to that necessary for organizational control.

Freedom from company details.

Lenient pass policy and ample recreational activity. The disciplinary record of the school has been phenomenally good, indicating generally careful selection of students by unit commanders.

Like other units, the signal school itself was a victim of the personnel shortage that it was set up to remedy. Personnel requisitions submitted repeatedly went unfilled. Specialists, particularly instructors, were not available. Attempts to transfer competent students as instructors were invariably unsuccessful, regardless of whether the individual requested was a private or a noncommissioned officer.

Equipment, like personnel, was difficult to procure. Priorities for training were, for self-evident reasons, low in comparison to those of tactical units. As a consequence, many items were made available by the depots on loan basis, subject to instant recall. In this category for a time were Switchboard BD–100, Radio Set SCR–300 and Maintenance Equipment ME–40–( ), a test set for the SCR–300. Some training aids requested



STUDENTS PRACTICING TELETYPEWRITER OPERATIONS

were never obtained. Although an adequate amount of equipment is now on hand, much use is still made of salvage parts and improvised training aids.

Status reports submitted monthly by the school reveal that in more than a year of its operation from 11 March 1943 to 1 May 1944 it had trained 1,076 officers, enlisted men and WAC's from the U. S. Army and Navy, and from the British and French Armies. This personnel had come from 162 different organizations and from the remotest parts of the theater. Not included are 19 whose grades were unsatisfactory and 160 who were relieved prior to completion of courses for various reasons.

BLASTING POLE HOLES

Officer students in the Long Lines Outside course at the Officers' School, Fort Monmouth, now receive as part of their training 4 hours covering the proper use of explosives in setting poles in swampy ground, blasting pole holes in rock, and demolition of poles.

The conference phase, lasting an hour and a half, is held in the classroom, where the actual equipment to be used together with visual aid charts are demonstrated. The general requirements of explosives are considered, stressing: high velocity of detonation, high power per unit of weight and volume, sensitivity to shock or friction, stability in respect to deterioration, and availability. The use and application of prima cord and electric blasting caps are discussed. Explosives found to best meet the desired requirements are TNT, nitrostarch, dynamite. Since dynamite is used in the outdoor demonstrations, its characteristics, uses, and procedure for handling are covered in detail before leaving the classroom. Particular emphasis is placed upon the precautions necessary for the handling of the explosives.

The demonstration phase, lasting two and one-half hours, is held in a suitable area and consists of setting a pole by dynamite; blasting a hole in rock and destroying poles by dynamite.

To show how dynamite can be used in setting poles in soil too unstable to dig holes in the conventional manner, a pole, normally 75 feet in height, is placed in a swampy location, raised to a vertical position on top of the ground and held in position by three or more rope guys. The rope guys are attached near the top of the pole before it is raised. They are firmly anchored but have only enough tension to hold the pole upright. The charge of dynamite is placed as shown in figure 1 by use of the bore pipes, as shown in figure 2. The main bore pipe of 1½-inch galvanized iron pipe is pushed into the soil to the desired depth of the hole and directly under the pole as shown in figure 1. The smaller 1-inch pipe with a pointed end is pushed down inside (fig. 2c) to clean out the main bore pipe by forcing out the soil. The small pipe is withdrawn, the charge placed in the larger pipe and pushed firmly to the bottom where it is held by a tamping rod until the larger pipe is withdrawn.

When the charge is fired the expanding gases

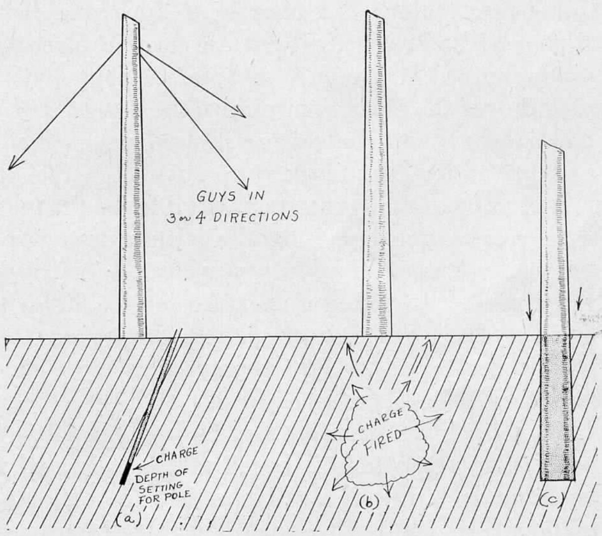


FIGURE 1.—SETTING A TELEPHONE POLE BY BLASTING

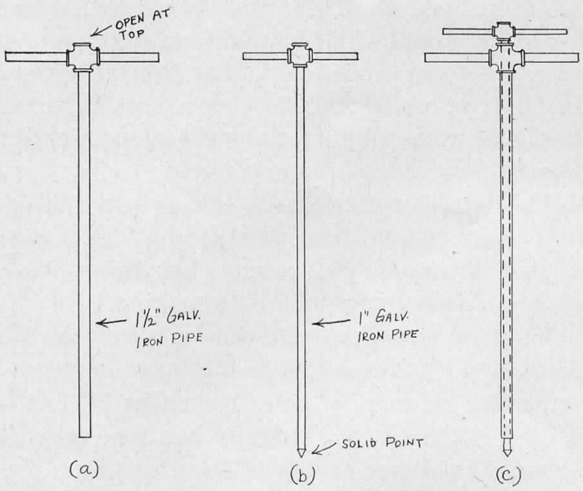


FIGURE 2.—BORE PIPES USED FOR PLACING CHARGE

from the explosive opens a hole at the point where the charge was placed and the pole drops to the desired depth, held upright by the rope guys. If the pole fails to go into the ground to the desired depth on the first charge, a second charge may be placed in the same manner as the first, though care should be taken not to fire a charge nearer than 18 inches to the base of the pole as damage to the pole may result.

To show how to blast a pole hole in rock such as encountered in constructing pole lines in rocky terrain, 20-inch holes are dug with the K–44 earth borer to a depth of 4 feet and concrete blocks are poured approximately 4 weeks prior to the demonstration. An air drill is used to bore a hole 1½ inches in diameter and about 18 inches deep in the concrete block. A charge of dynamite consisting of one cartridge and an electric blasting cap is tamped firmly into the hole. A rope mat is placed over the block to minimize the danger from flying debris and the charge is fired which completely shatters the block.

A slow burning dynamite is suitable for the pole setting operation but dynamite with a nitroglycerin content as high as 75 percent can be successfully used. In using faster explosive there is greater danger of shock action damaging the pole in setting operations though it is more successful in demolition work.

To show how dynamite can be used to destroy poles, a 1¼-inch hole is bored to the center of a pole and a charge of about one-third of one cartridge of dynamite with an electric blasting cap is placed in the hole and fired. Any pole, class 5 or smaller, will be severed completely by a charge placed in this manner.

Demolition of a pole by dynamite may also be accomplished without boring a hole, by tying a charge consisting of one or more cartridges of dynamite in a bundle to the side of the pole. If a sufficiently large charge is used the pole will be broken at the point where the charge was fastened. The size of the charge will be dependent upon the size and type of the pole. In general dynamite of at least 60 percent nitroglycerin content is used and two or three cartridges fastened against the pole.

Strict control of all safety practices are observed during all demonstrations.

ANTENNA DEMONSTRATOR

An antenna demonstrator was designed for the purposes of showing the various electrical phenomena associated with antennae and transmission lines, such as voltage and current relationships, standing waves, radiation patterns, loading effects, etc. Prior to its development the instructor found it difficult, using only a blackboard to explain and conclusively demonstrate his subject matter, particularly when simultaneous interdependent actions were involved. The need for a demonstrator was further evident by the disappointing student reaction to the lecturer's efforts when using only a blackboard to explain his points.

The design of such equipment presented many problems. Antennas and feeders had to be miniature in size, so that they could be housed in a lecture room, visible to a rather large audience, and available for checking voltage and current distribution on any portion of the system. The transmitter to energize the antennas had to be of a common design so as not to confuse the students, and the antenna coupling circuit had to be versatile enough to permit feeding all types of Hertz and Marconi antennas. Various types of antennas had to be designed and made to operate efficiently and consistently. The counterpoise used with the Marconi antenna had to be portable so that the demonstrator could be moved about and operated without the necessity for running out a ground wire.

The major components of the demonstrator are a high frequency oscillator and power supply, and a movable Hertz antenna, mounted on wheeled frames to facilitate movement. Physical construction of the equipment is shown in figure 1.

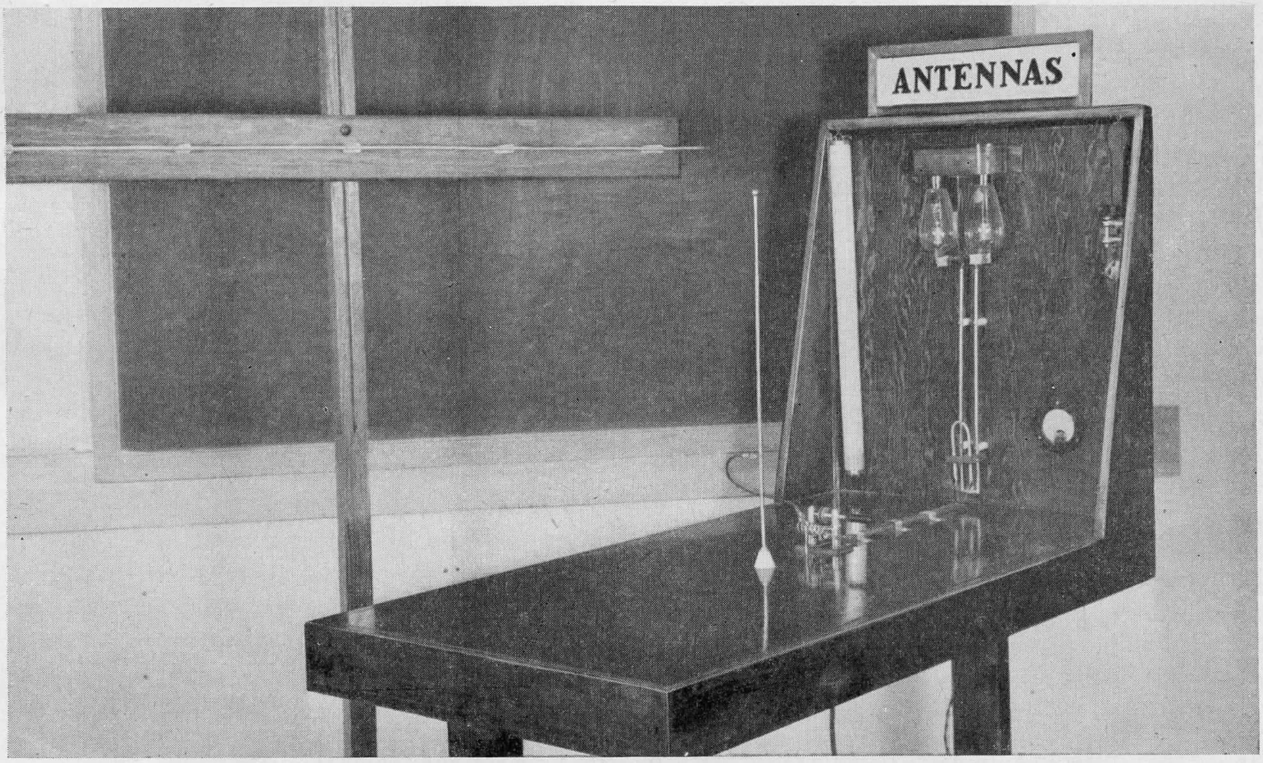


FIGURE 1.—DEMONSTRATOR USED TO SHOW ELECTRICAL PHENOMENA ASSOCIATED WITH ANTENNA AND TRANSMISSION LINES

The oscillator is a Colpitts (fig. 2), using two RCA 834's in push-pull, operating at a frequency of 120 megacycles. The particular tubes and frequency were chosen because of the large power output and extreme stability obtainable. A half-wave antenna for this frequency is approximately 4 feet long, and for convenience is placed 5 feet high.

The plate tank circuit is made of ¼-inch copper rod. At the frequency used the rod itself resonates and behaves like a tuned circuit. Since the tuned circuit has no variable components, the resonant frequency will be determined principally by the length of these plate tank rods, which, for 120 megacycles, are 15 inches long and spaced 1¼ inches apart, center to center. Connection between the tank circuit and the plates of the tubes is made by means of flexible braid and clamps (supplied with the 834's). The free end of the braid is flared, forced on the ends of the rods and soldered. Plate voltage is obtained from a 500-volt, 200-milliampere power supply, which is mounted beneath the table, and is applied to the plates of both tubes by center tapping the two rods at their base.

The grid tank coil consists of seven turns of No. 24 enameled wire, spaced so that the entire coil is 1 inch long with a diameter of ½ inch. This coil is supported by the clamps attached to the grids of the tubes. Excitation to the grids of the oscillator may be varied by either squeezing the turns on the grid coil closer together or by spreading them further apart. The proper adjustment is not too critical and may be considered approximately correct when the plate current is 120 milliamperes.

The support for the oscillator tubes was made

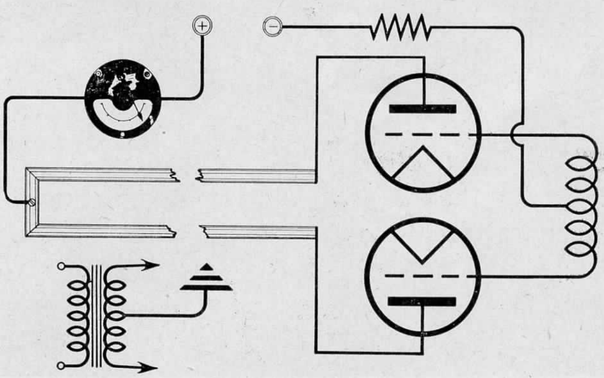
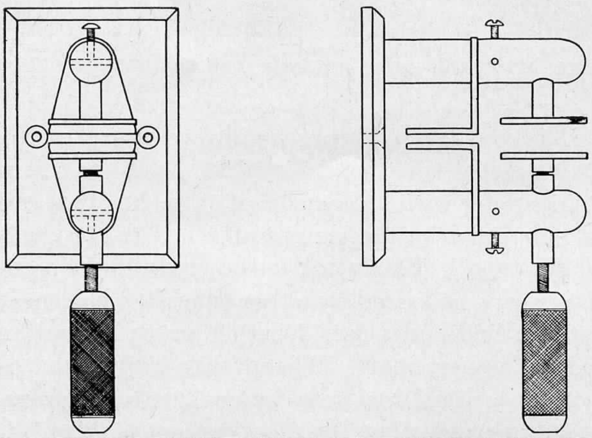


FIGURE 2.—CIRCUIT DIAGRAM OF 120 MC OSCILLATOR

from 2 by 4 finished stock cut 7½ inches long. Two holes were drilled in the block just large enough to pass the bases of the tubes. The wood block was hollowed out to facilitate the installation of the tube sockets, making it possible to cover the wiring and sockets with a piece of ¼-inch bakelite. It is preferable to use soft pine as it handles easier during the hollowing out process.

The output of the oscillator is transferred to the antenna coupling circuit by means of a "hairpin coil" and a coaxial cable. The "coil" is made of a 6-inch length, ¼-inch copper tubing, bent into the shape of an inverted **U**. It is spaced 1 inch from the plate tank rods and is held in position by means of a bakelite block. Coupling between the hairpin coil and the plate tank is variable, and the proper adjustment must be determined by experiment. Tight coupling will result in the "double hump," characteristic of tuned coupled circuits, while loose coupling will result in insufficient excitation to the antenna.



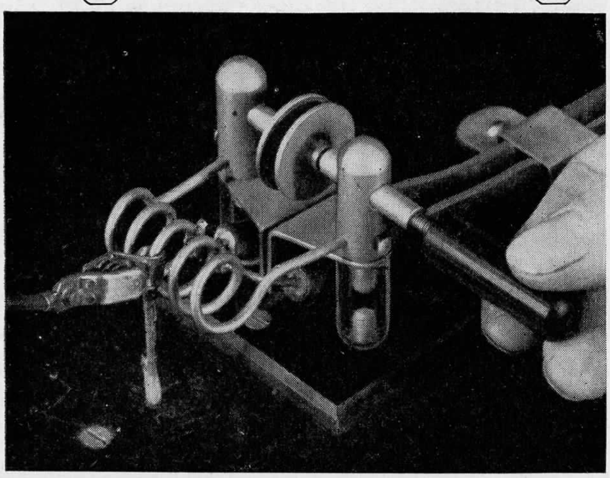


FIGURE 3.—CAPACITORS USED TO OBTAIN RESONANCE

A good grade of commercial low-loss coaxial cable should be used in the antenna coupling circuit. However, a good substitute can be constructed from ⅜-inch soft drawn copper tubing, some No. 12 copper wire, and ceramic beads. The beads are threaded on the wire at 2-inch intervals and set by means of a crimping tool. The No. 12 wire is then strung into the copper tubing resulting in a suitable 73-ohm coaxial cable.

During the experimental stage it was difficult to obtain resonance in the antenna coupling circuit because of the critical sharp adjustments that were necessary. This situation was remedied by the use of two capacitors, one being adjustable, the other, variable (fig. 3).

With this arrangement it is possible to load either Hertz or Marconi radiating systems.

The horizontal Hertz antenna consists of a length of copper tubing measuring 3.8 feet, fastened to the cross arms of its support by means of ceramic round post insulators (fig. 4). Either quarter wave, half wave, or matched impedance (single or two-wire delta) feeders may be used to feed energy into the antenna.

The Marconi antenna is made from copper tubing having an inside diameter of ⅛-inch and a length of 16 inches. Twelve inches of rod, brass or copper, ⅛ of an inch in diameter, is then inserted into the copper tube. A snug fit should be maintained so as to allow the antenna to be variable in length and still possess a fairly low RF resistance. This will result in an adjustable antenna having a minimum length of 18 inches and a maximum of 25 inches. Having the antenna length variable allows the instructor to demonstrate the effects caused by antennas which are too short or too long. The porcelain insulator at the base of the antenna is employed as a support and not as an insulator. Actually the antenna passes through it and is soldered to a counterpoise underneath the table top. The counterpoise consists of a copper wire screen approximately 30 by 60 inches fastened to the under side of the table. It is advisable to use screening which has not been enameled or otherwise insulated.

To visually indicate to a large audience the current distribution in the antenna and feeder system, the device shown in figure 5 was constructed. Basically, it consists of a tuned circuit with a two-volt flashlight bulb connected across a portion of

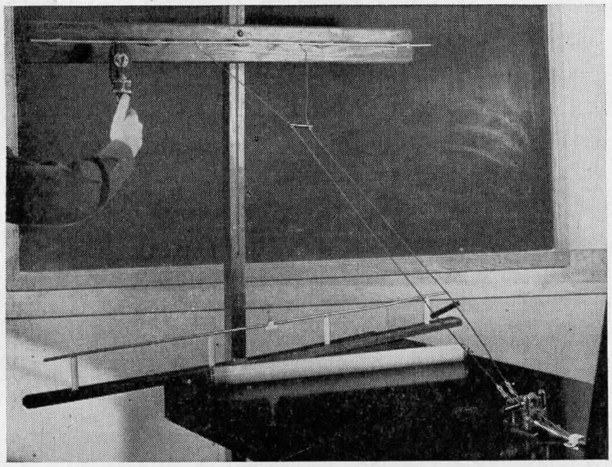


FIGURE 4.—HERTZ ANTENNA. RECEIVING ANTENNA BELOW

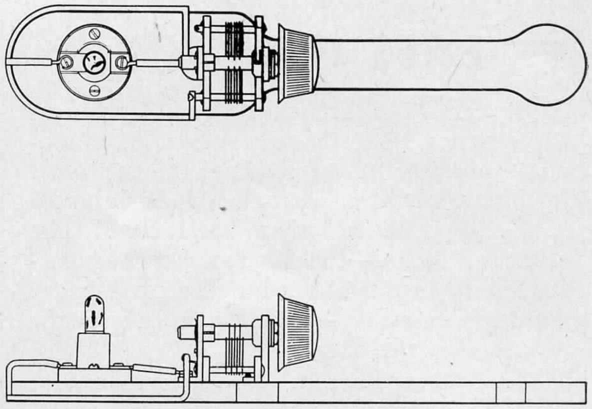


FIGURE 5.—TUNING WAND TO SHOW CURRENT DISTRIBUTION

the inductance. The "tuning wand" is tuned to resonance by a 50 mmf variable capacitor, resonance being indicated by maximum brilliancy of the bulb. The components are mounted on a piece of 1/4-inch plywood in the shape of a paddle which enables the user to manipulate the unit without appreciably detuning the circuit due to hand capacity, and acts as a protection against RF burns. For accurate and comparative results it is necessary to hold the tuning wand at right angles to the radiating element.

Indication of voltage loops by means of the ionization of a 1/2-watt neon lamp was found to be unsatisfactory as large audiences had difficulty in perceiving the small glow. A substitute was found in the fluorescent lamp, which is also a more sensitive indicator. This lamp may be defective as far as ordinary lighting service is concerned but as long as the tube remains intact it can be used as a voltage indicator for this demonstration. It is advisable not to use a fluorescent lamp with a rating greater than 20 watts, if full sensitivity is to be realized.

Another development which was found quite convenient was a "receiving" antenna. It consists of a plywood panel upon which are mounted two copper rods and a flashlight bulb. The total electrical length of the rods and bulb is such as to make the entire assembly resonant to the frequency of the oscillator. With a 2-volt bulb in the center, the sensitivity of the antenna is such that the bulb will light if the antenna is within a radius of 20 feet from the transmitting antenna. By means of this antenna it is possible to trace the radiation patterns, show polarization of radio waves, and indicate relative field strength (fig. 4). In use, the receiving antenna should not be held closer than 1 foot to the transmitting antenna as capacitive and loading effects between the two will cause erroneous results.

Properties of reflectors and directors are shown by use of a rotating array. This array consists of two banks of antennas, each consisting of three directors, one driven exciter, and one reflector. The whole system is mounted on a tripod having a 360° axis of horizontal rotation. Excitation for the array is obtained from the Colpitts oscillator by means of resonant feeders. In use, the array is placed in the center of the lecture room and small receiving antennas, similar to the one described in the previous paragraph, are placed in various locations around the room. The radiating system is then excited and made to revolve and as each receiving antenna is caught in the radiation field its bulb will light. Antennas which are not on the path of the radiations will not be excited and therefore will be inoperative. This demonstrator is definitely a most effective and conclusive means for showing how radio beams can be focused.

From July 1, 1943, to June 30, 1944, the Signal Corps accepted deliveries of 2 billion, 355 million dollars worth of communications equipment, an increase of 71 percent, after adjustment is made for the lowering of contract prices, over the previous fiscal year. Tonnage handled at signal depots during this same period totaled 1 billion 683 millions, an increase of 92 percent over the same period the year before.

PASS IT DOWN!

NOW THAT the Signal Corps Technical Information Letter has changed from photo-offset to letter press printing, the increased legibility should make it even more valuable to signal personnel than heretofore. The reduction in size—the same amount of information is now contained in half the pages formerly necessary—should also help get it down to key personnel.

There is an item in this issue that may spell the difference between fair and excellent communications for your outfit. But this difference will only take place if your junior officers and noncoms get an opportunity to see this copy.

Pass it along.

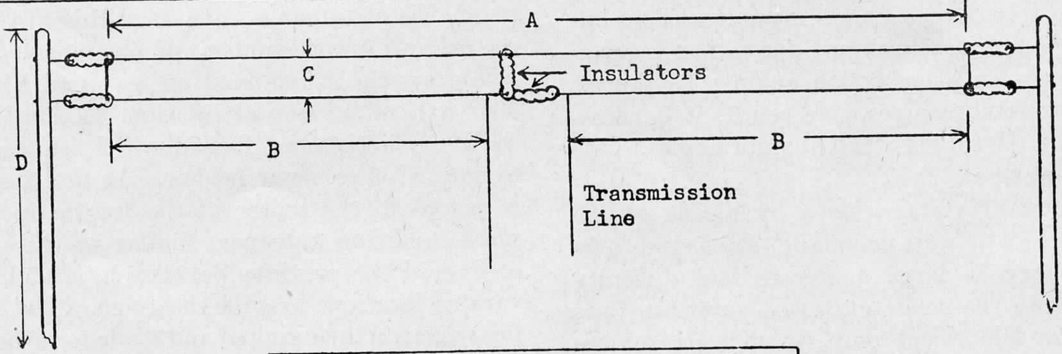
MODEL SIGNAL CENTER

(Continued from p. 33)

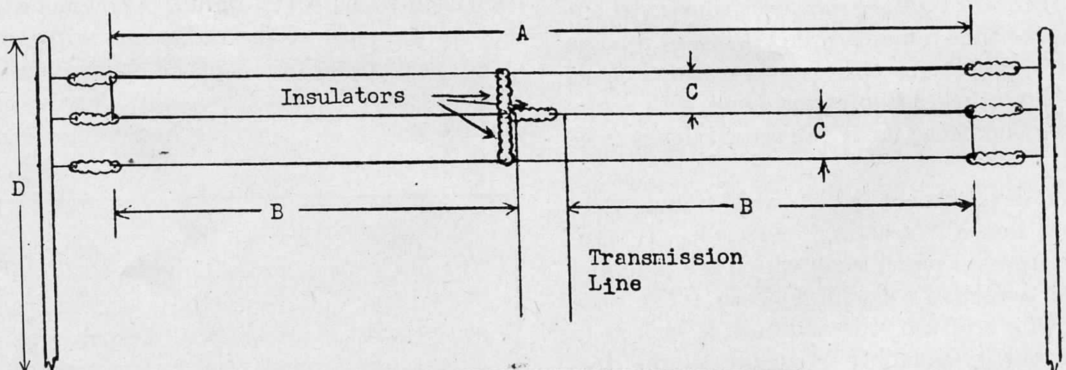
largest being 3 feet by 8 feet. The under table folds up in sections fastened together by hinges. The terrain table, built on a 3/4-inch plywood base, is in six sections which set down into pins on the under table.

The terrain, consisting of wire screening shaped by tacking to wooden contour blocks and then covered with newspaper soaked in paste, has a surface of coarse and fine sawdust which was built up and painted. Vegetation was made of steel wool dipped in glue, sawdust, and paint, with wood and paper materials used where necessary. The buildings, constructed of 3/4-inch and 3/8-inch plywood, were built as separate units designed to fit into spaces left in the terrain. The bomb blast walls, which surround parts of the buildings were also built to be set in place separately.

FOLDED DOUBLET ANTENNA



TWO WIRE TYPE



THREE WIRE TYPE

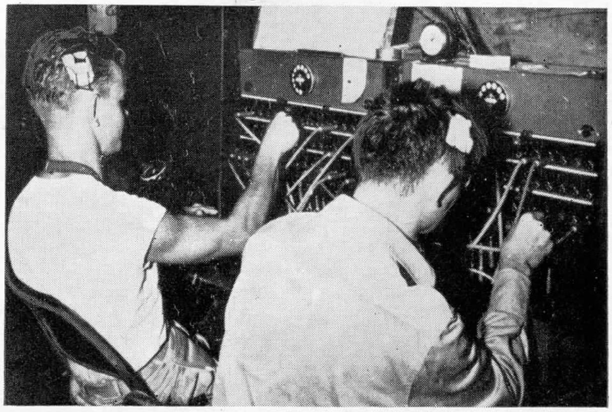
Dimensions

A - 1/2 Wavelength less 5%
B - 1/4 Wavelength less 5%
C - 6 to 8 inches
D - 30 ' approximately

Note The plane of the antenna wires may be either horizontal or vertical

THE CHART PUBLISHED LAST MONTH OMITTED CERTAIN CONNECTIONS AND DIMENSIONS; HERE IT IS AGAIN, CORRECTED

OUR EQUIPMENT IS THE BEST IN THE WORLD



YOU CAN HELP THE ENGINEERS AT THE LABORATORIES IMPROVE IT

WHEN REPORTING EQUIPMENT FAILURES, **BE SPECIFIC, GIVE DETAILS**

Here Is Why It Helps

The engineers at the Signal Corps laboratories produce the best signal equipment in the world after extensive research and thorough field tests. But, field tests are not combat tests. Bugs develop in the best of equipment that were not encountered in design or test. The only way the Chief Signal Officer can tell whether or not a certain piece of equipment is satisfactory is by reports from the field. Obviously, information on equipment failures must be complete to be useful. A report that "the PE–75 failed" is of little value since there are now more than 25 models of this power unit in existence and what failed is not told.

DON'T SAY:	SAY:
PE - 95	PE-956
RELAY	RY - 1
W - 130	W-130-A

Here Is What We Want-

In addition to the complete nomenclature of the equipment concerned, the serial number and manufacturer are important. We also need to know the specific component part that failed, its part number, and how many sets failed from this cause out of the total number of sets being used. It is easy to see that one failure out of 500 sets may be regarded as an isolated instance while 250 failures out of 500 would be a matter of major importance. Details of the climatic conditions and geographic location also assist the engineers in determining the cause of the trouble. Reports of defective packing are much easier to use when they include photographs of the damage received.

Use AGO Form 468

To assist personnel overseas in the preparation of reports on unsatisfactory equipment, AGO Form 468 has been developed. Equipment defects should be listed on this form wherever applicable, or information should follow the pattern indicated on this form. Of course, it is perfectly all right to supplement the information listed on the form and describe the failure in complete detail.

This Is What You Can Do

When equipment fails or you feel an improvement can be made, report this to the Chief Signal Officer, attention SPSOI, and forward it through your theater Signal Officer. Report in detail, give all possible information, use Form 468 for specific items, and REMEMBER we can't fix it unless you tell us what is wrong.

REMEMBER, What, When, Where, Why, How, Applies to Equipment Too!