HISTORY OF THE SIGNAL CORPS

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Military communications are essential to modern tactics. The larger the bodies of troops to be coordinated and controlled the more complex and extensive are the communications required. Back in the days of early history small armies did not require elaborate communications. As a matter of fact no satisfactory means were then available for providing rapid and reliable communications. This is one factor which then limited the size of armies.

Early history records the runners of Marathon, the pigeons of the Crusades, the semaphore of Napoleon, and the flag and light signals of navies. These were no doubt adequate in their time but they would not suffice today.

The growth of military communications has gone hand in hand with the development of commercial communications. As a matter of fact the Signal Corps was born about twenty-five years after the invention of the telegraph; and in the subsequent developments of the telephone and radio it has early participated in the employment of these inventions for military purposes. Many commercial practices and devices have been obtained from the Army; and likewise, we in the Army had adopted such commercial practices as were applicable to military usage.

In this brief talk there is not time to go into the details of the achievements of the Signal Corps in combat, so I propose to limit myself to telling you of that side of history of the Signal Corps which deals with the organization, the tactical units and the types of equipment. You will learn of our early contest to obtain telegraphy; of how we developed meteorology and the weather bureau; of how we obtained the balloon, the dirigible and the airplace; and how the Air Corps was organized; of how we were assigned photography, and many other interesting facts of the Signal Corps.

The United States army was the first to have a Signal Corps and in the first war in which it was employed, each opponent was so organized. Because of the successful organized use of signals in our Civil War, European armies promptly organized Signal troops but in almost every instance made them a branch of the Engineers. The outstanding achievements of the Signal Corps of our army in World War I caused both the British and the Germans to reorganize their Signal Units and place them under separate branch organizations. It will thus be seen that the Signal Corps of the United States Army has formed the pattern which other nations have copied.

James Albert Meyer was born in Newburgh, New York on 20 September 1827. In his youth he became a telegraph operator. After graduation from Hobart College, Geneva, New York, in 1874, he entered Buffalo Medical College. Upon graduation in 1851 he chose for his thesis the subject "A sign Language for Deaf Mutes." In this selection he was no doubt prompted by his experience as a telegrapher and his realization as a doctor, of the needs of the desf. In 1854 he became a contract surgeon for the United States Army and was ordered to station in the West. There he recognized that his sign language had application in communicating over the vast distances. He applied for a patent on his system in 1856 and offered it to the War Department. A board of officers was appointed in 1858 to test his invention and the tests were conducted between Fort Hamilton New York and Sandy Hook, New Jersey. In these demonstrations one of Meyer's assistants was 1st Lieut. E. P. Alexander, later Chief Signal Officer of the Confederate Army. After thorough test, the board reported favorably in January 1960 and General Order 17 of 2 July 1860 provided for the organization of a Signal Department and secured Asst. Surgeon A. J. Meyer as Signal Officer with the rank of Major from 27 June 1860 to fill an original vacancy. Major Meyer was sent to New Mexico and with the help of two assistants he taught signalling which was so successful in assisting in expeditions against the Navajo Indians as to draw favorable comment from the department commander. One of the officers who volunteered to assist in this work was Lieut. J. E. B. Stuart, later the famous Confederate Cavalry leader.

The Meyer code was a system of flag, wand or torch signalling where the staff was normally held vertically in front of the operator. There were three movements, namely, to the left and back to vertical, called "1"; to the right and back to vertical, called "2" and to the front and back to vertical, called "front." "A" was 22; "B" was 2112; "C" was 121, etc. One "front" indicated the end of a word, two "fronts" the end of a sentence, and three "fronts" the end of a message. When a torch was used, a marker light was placed at the feet of the operator for reference purposes.

The Civil War occurred in April 1861 and many of Meyer's pupils and assistants went to the Confederate Army where they formed

a Signal Corps. In May 1861 Meyer was attached to Army Headquarters, and on the 10th of June he opened a Signal School at Fort Monroe, Virginia, with eleven officers. As signal officer he recommended that: (1) the Signal Corps have charge of all telegraph duty with the Army; (2) for an army of 500,000 there be eight Signal officers, forty Warrant officers and forty Signal Artificers, and (3) a telegraph train be organized equipped with four telegraph sets, flags, rockets and flares. The recommendations were approved by Major General McClellan and Secretary of War Flloyd. Meyer's services were so highly considered by General McClellan that he had Meyer detailed to his staff as Signal Officer in addition to his duty as Chief Signal Officer. Meyer spread the gospel of Signals by organizing several camps of signal instruction, the central camp being at Georgetown.

Throughout the early Civil War all Signal personnel was detailed from other branches and the Signal Corps was responsible not only for transmitting information but also collecting it. This work was performed by Signal parties and by telegraph trains. In 1862 there were a total of 199 Signal officers. The equipment consisted of Signal flags and torches for use with the Meyer code, and thirty power telescopes with a focal length of 26 inches. There were also fireworks for signalling consisting of flares, rockets, Roman candles and Very lights. The field telegraph, because of shortage of Morse operators, employed the Beardslee printing telegraph with a range of from five to thirty miles. Both batteries and hand generators were used for power. The lines were wither bare or insulated wire on trees or on lance poles, which were devised for military telegraph lines. Cryptographic systems were crude and elementary and for the most part were ciphers employing either transposition or single alphabet substitutions. Meyer advocated the use of recognition signals whereby troops might readily identify friendly units. From August 1861 to May 1863 the Chief Balloonist resigned because of difficulties with the Engineer Corps, captive balloons were used as elevated signal stations.

On 3 March 1863 Meyer won his fight for permanent personnel and the Signal Corps was established as a branch of the Army. In the Fall of 1863 he lost his contest with the United States Military Telegraph Department, a civilian organization which operated all permanent telegraph lines, and that department was given all field telegraph work. In November 1863, Meyer succeeded in having Signal instruction introduced into the curriculum at West Point. As a result of a disagreement with Secretary Stanton over the allocation of field telegraph Meyer was relieved as Chief Signal Officer, in November, 1863 and was succeeded by Major William J. L. Nicodemus. Major Nicodemus was a disciple of Meyer and believed in the policies which Meyer advocated and which had caused his relief. After striving for

a year to make progress the new Chief Signal Officer prepared his annual report and was apparently quite outspoken about his difficulties. The report was published in October 1864 without having first been approved by Secretary of War Stanton, with the result that Major Nicodemus was dismissed but was subsequently restored to his commission but not to his position.

He was succeeded in January 65 by Colonel B. F. Fisher. At this time the Signal Corps was composed of 102 Signal Corps officers and 66 detailed officers with 1350 enlisted men of whom 84 were Sergeants. It was divided into 12 detachments.

Then came the end of the Civil War and in the reorganization the Signal Corps was a total causalty being survived only by the post of Chief Signal Officer to which Meyer was reappointed with the rank of Colonel in August 67. One of his first acts was to visit West Point and have Signal training revived at the Military Academy. He then caused it to be adopted at the Naval Academy at Annapolis. In G.O. 92 dated October 67, he secured the promulgation of four items, namely:

1. Two sets of signal equipment and two manuals were authorized for each company and post.

2. Telescopes and binoculars would be furnished companies on requisition.

3. All signal equipment would be accounted for by the Chief Signal officer.

4. The Chief Signal Officer would equip and manage field electric telegraph for use with active forces. Thus Meyer won his point by acquiring military telegraphy, and thus he first established the Signal Corps as a supply agency.

To implement the power over telegraphy he organized a field telegraph train. This organization had five officers; one for the Headquarters and one for each of four Sections. The Headquarters was equipped with a battery wagon which was arranged as a four line telegraph office and was provided with battery for the lines. Each Section was equipped with a wire wagon and a lance truck. The wire wagon carried ten to twelve miles of wire, the reel, telegraph instruments and office stationery. The lance truck carried 300 to 500 lance poles, insulators, digging and tamping bars, climbers and marking pins. The personnal of a Section included: One director and two markers for laying out the line; one surveyor and three pin men for locating poles; thirteen bar men for digging the holes and setting the poles; two wire men for paying out wire; seven lance

men for handling and fitting the poles and tying in the wire; and three drivers and one telegraph operator. This type organization persisted for about fifty years and functioned well.

In 1869 the Chief Signal Officer was breveted a Brigadier General. The central Signal School of Instruction was established at Fort Goeble, D. C., with one officer from each department. It was moved in 1870 to Fort Whipple, Virginia, just across the Potomac. In the first class there were thirty eight American officers including thirty-one from the Navy and also Danish and Swedish officers, the first foreign students.

By joint Resolution of 9 February 1870, Congress authorized meteorology and the Signal Corps, probably because of its wire lines for collecting the information, was given the responsibility for this new field of endeavor. By October 70 there were twenty-five observing stations; in 1873 there were ninety-three stations (78 being in the United States), and in 1878 the total had reached 224 stations.

Under the impetus of the needs of meteorology and to provide communications for the widely scattered Army posts in the far West, an extensive system of telegraph lines was built. There was a line from San Diego with branches to Prescott and Santa Fe. From a center at Fort Pancho, Texas, one line went Northeast to Fort Sill, Oklahoma Territory and to Denison, Texas, another West to Fort Davis, Texas, and a third South of San Antonio, Eagle Pass, Laredo and Fort Brown, Texas. There was a line from Bismark, N. D., to Fort Ellis, Montana via the Missouri and Yellowstone River Valleys with a river crossing span of 2500 feet at Bennett. By 1880 this network of lines had 5000 miles of pole line. These lines built in advance of all but the main railway lines accelerated the development of the West by providing communications and protecting the early settlers from the Indians.

By the Act of 3 March 1875 the permanent Enlisted strength of the Signal Corps was fixed at 150 Sergeants, 300 Corporals and 270 Privates.

The telephone was first publicly exhibited at the Philadelphia Centennial in 1875, and less than two years later we find the Signal Corps building at Fort Whipple, a forty mile telephone line using iron poles and iron crossarms. At about the same time a new heliograph was tested over a thirty mile range in the vicinity of Fort Whipple.

The crowning act of General Meyer's regime was the passage of the Act of 24 February 1880 which provided for a Chief Signal Officer with the permanent rank of Brigadier General, for the commissioning of Second Lieutenants of qualified Sergeant observers, for

a strength of 500 Enlisted men, and for the detail of sixteen officers from other arms. Brigadier General Albert J. Meyer died in Buffalo, 24 August 1880, aged 52. By his foresight and ingenuity military communications were first organized and many new equipments fully in keeping with scientific developments were perfected. By his courage and persistence and his indomitable will, he constantly improved the new Corps in spite of opposition and petty jealousies and held the gains he made. Greatly as were the benefits of his work recognized during his lifetime, neither he nor any of his contemporaries could appreciate the full influence that the science of military communication which he started would have on future tactics throughout the world. In honor to General Meyer the name of Fort Whipple was changed to Fort Meyer.

General Meyer was succeeded by Brigadier General William B. Hazen, an Infantry officer with a splendid war record, having attained the rank of Major General and the command of a Corps. He did not appear to realize the importance of his duty as Chief Signal Officer and his regime is one of retrogression rather than progress.

At the International Polar Conferences at Hamburg in 1879 and at Berne in 1880, ten nations agreed to participate in polar missions for one year beginning 1882. The purpose of these expeditions was to gain meteorological information. The United States effort was assigned to the Signal Corps jointly with the United States Coast and Geodetic Survey, with naturalists from the Smithsonian Institute and assistance by the Navy.

The expedition to Point Barrow, Alaska, was under the command of 1st Lt Phillip Ray and numbered ten persons. It left San Francisco on 18 July 1881, was supplied in the summer of 1882, and returned in October 1883 with its mission accomplished. The expedition to Lady Franklyn Bay, Grinnel Sound, under 1st Lieut Adolphus W. Greely with twenty-four persons, was not so uneventful and its report is an epic of adversity. It left St. Johns, N. F. 6 July 1881, and on 11 August it landed at its base with supplies of two years. Supply was attempted in July 1882 and ice barriers prevented getting through so the supplies were cached at Cape Sakins and on Littleton Island, and the relief ship returned. Relief in the summer of 1883 was now imperative. One of the relief ships sank with all of its supplies and the other picked up the survivors and returned, leaving none of its supplies. On 22 June 1884 a relief expedition under Commander Murfield S. Schley landed at Cape Sabine and rescued the seven who survived of the party of twenty-four. From a scientific standpoint the expedition was a success because its records were complete and accurate and covered a much longer period than had been planned.

On July 1 1884 the Signal Corps was composed of twenty Officers and five hundred Enlisted men who were disposed as follows: 181 in the Office of the Chief Signal Officer; 106 operating telegraph lines; 41 at the school at Fort Meyer, 163 at meteorological stations, and 9 on furlough.

In 1885 Congress closed the school at Fort Meyer and that post passed from the control of the Signal Corps. All signal instruction was to be given by the several branches of the Army.

Brigadier General Hazen died 16 January 1887, aged 56, and was succeeded by Capt A. W. Greely who had led the ill-fated polar expedition. Brigadier General Greely from his long and broad experience, was well grounded on Signal Corps techniques and policies. He had energy and force to implement his ideas. It was his aim to revive a decadent Signal Corps. He began by redesigning the field telegraph train with lighter wagons for increased mobility. He completed the field manual which had been begun by Meyer. He began experiments with pigeons. He replaced telescopes with the more compact binoculars. He caused the heliograph to be lightened to 14 pounds and fostered the Eccard Kit designed by Sgt Nels Eccard, and the forerunner of a long line of field buzzers and field telephones. The Signal Corps was again very active.

In his first annual report he set forth the importance of the Signal Corps in terms that are applicable today. He said, in part; "In these days of rapid military movements, the great value of sure, speedy and secret methods of communication between cooperating forces cannot be questioned, and it should be equally obvious that the personnel of an efficient military signalling establishment should be possessed of a high degree of technical skill which is essentially necessary to insure that extended use of electrical communication so essential between the various commanders of columns and lines of campaigning troops . . . . Unless drill in military signalling is carefully kept up under charge of officers peculiarly interested in the Service, two or three years will find the entire army without a party in it properly skilled in the use of modern appliances. The maintenance of Signal drill as at present throughout the Army, while subserving a most useful purpose . . . .can by no means be considered a proper substitute for a small but thoroughly efficient Signal Corps."

As the result of General Greeley's efforts, the Signal Corps was organized by the Act of 1 October 1890 which provided that "the operation of the Corps shall be confined to strictly military matters." The commissioned and NCO personnel comprised a Chief Signal Officer with the rank of Brigadier General, one Major, four Captains, four 1st Lieutenants, ten Serge nts First Class, and forty

Sergeants. This is the first time that NCO grades above Sergeant were introduced in the Army. As a result of the reorganization, all meteorology not military was transferred with personnel to the newly organized Weather Bureau of the Department of Interior.

A Signal Corps School for enlisted men was organized in 1891 at Fort Riley and continued there until after the Spanish-American war. In his annual report of 1892, General Greely stated: "The line of the Army has neither the time nor inclination to acquire anything more than the rudiments of telegraphy and signalling . . . It is evident, therefore, that either signalling or telegraphy, except that of the simplest character, must devolve on the Signal Corps."

By 1892 telephone systems had been established at 99 Army posts.

In 1894 the War Department Library was transferred from the AG to the Signal Corps. After it had been reorganized, systematized and expanded to double its initial size it was transferred to the General Staff in 1904. However, the Brady collection of Civil War photographs numbering over 5600 negatives was not transferred, so that as a result of its custody of the War Department Library, the Signal Corps acquired the duty of historical photography.

General Greely's administration early set upon a program of equipment development. There was a development in lanterns for signalling; a magnesium lantern being tested in 1892, but one burning kerosene and sperm oil was finally adopted. The so-called "flying cable cart" was developed. It had a capacity of two miles of paired wire, each conductor being composed of one #33 copper strand and seven #29 sted strands. This marks the beginning of a long line of reel carts and of stranded bi-metal field wires. A bicycle wire reel was developed in 1895. The new field telegraph train with nine wagons was organized in 1892, and by 1895 there were five such trains. In the early tests of this train thirty-five miles of lance pole line were erected in twenty-six hours using the new clamp and pigtail insulators.

Balloons were revived and in 1893 the Signal Corps exhibited a military balloon at the Chicago Worlds Fair. A Balloon Section was organized at Fort Logan, Colorado in 1896.

Then came the Spanish War, and by the Acts of 18 May and 7 July 1898 the Signal Corps was expanded to 138 officers and 1115 enlisted men, organized into 17 companies (4 officers and 51 enlisted men each), one balloon company and one field telegraph train. The commercial cable to Cuba was cut on 1 June and was repaired between 14-21 June by Colonel Allen, the Expedition Signal Officer. Colonel Greene, the Corps Signal Officer was required to leave his telegraph

train in Tampa and was able to lay lines only because Colonel Allen would lend him wire.

Rigorous censorship was maintained over the commercial cables and it was through this censorship that the information was learned that caused the attack on Santiago to be ordered.

Four volunteer and two regular Signal Companies were dispatched with the expedition to Porto Rico, and two Signal Companies were sent to Manila. After a brief encounter in which the Signal Corps played a far greater part than it did in the Civil War, the Spanish American War was ended. By the Act of 2 March 1899 it was required that all volunteers be discharged. This would have left the Signal Corps with 11 Officers and 50 Sergeants. The Act of 4 June 1900 saved the situation by authorizing 800 Enlisted men and the retention of 41 volunteer Officers until 30 June 1901; and was amplified by the Act of 2 February 1901.

With the cessation of hostilities in Cuba and Porto Rico the commercial telephonecommercial teleph ne and telegraph was turned back to private interests in 1901, after three years of military operations. Due to the Phillipine insurrection it was necessary to operate there longer. We constructed 1054 miles of telephone, telegraph and cable lines in the Islands. The telegraph lines there were returned to civil ownership in 1902. The cable from Jolo to Zambaanga was replaced by radio in 1902, being our first foreign radio channel.

Gold having been discovered in Alaska, and the question of a boundary dispute with England arising, there was a demand for communication with Alaska. Great Britain controlled the gutta percha market and we could not get a cable from the English manifacturers as early as desired. So Captain Edgar Russel was given the job of providing a cable from materials available to us. This first cable was made with rubber insulation. The Seattle to Valdez section was laid in 1903-4 and the Valdez Seward Section in 1905. In the meantime the Signal Corps was busy building telegraph lines within the Territory. By 1903 the telegraph mileage totalled 1740. The Valdez-Fairbanks line was built in 1908-09. In 1903, radio stations were established at Safety Harbor and Fort St. Michaels, and in 1910 at Nome and Fort Gibbons. This network was o iginally known as the Washington-Alaska Military Cable and Telegraph System and was called "WamCats." It is now known as the Alaskan Communications System and today is the communications system and outlet for this vast territory to the development of which it has proven sovital.

Out in China, due to the Boxer Rebellion, foreigners' rights were so jeopardized that a number of nations coope rated in the China Relief Expedition in 1900. Major George P. Scriven was the United States forces Signal Officer and through the use of British iron poles and American instruments and wire, the Anglo-American telegraph service to Pekin was established ahead of that of the Russians and the

Japanese. This expedition afforded an opportunity to compare communications equipment. Our telegraph instruments and circuits were superior, but we found the British 20-foot steel pole and associated hardware better than anything we had; and that is how we got the iron pole, iron crossarm and special pins that remained our standard for the next twenty years.

Back inside the United States, communications were not standing still. The settlement and development of the West had so progressed that our military telegraph lines could be disposed of to commercial interests. In 1900 only 900 miles of the more than 5000 miles remained. The Signal Corps center had moved from Fort Meyer to Fort Omaha and a Signal School was opened at Fort Leavenworth in 1905. The Signal Corps had garrisons at Fort Wood, New York; Benevia Barracks, California; Fort Leavenworth, Kansas and Fort Omaha, Nebraska.

It was time to resolve the lessons we had learned in our war with Spain and from our experiences in China where our armies first served alongside of foreign troops. The possibility of a well organized system of electrical communications for Coast Artillery was appreciated and the problem was given to Captain Edgar Russel for solution. In 1903 his first system was tested in the Harbor Defenses of Portland. As the result of these tests, changes were made and a system was installed for further tests at Fort Monroe. After extensive tests and further modification, this system was adopted and remained standard for the next thirty years --some of it surviving today.

Attention was also given to improved field artillery.

communications and the necessity therefor was emphasized by the reports of observers in the Russo-Japanese War. In 1905 the Field Artillery Board at Fort Riley tested and adopted the new system which included the use of field buzzers and field telephones.

In 1900 by establishing radio communication between Fire Island and Fire Island Lightship a distance of twelve miles, the Signal Corps opened the first regularly and publicly used radio channel in the United States. The same year radio channels were installed across San Francisco Bay. In 1903 a radio channel was opened between Fort Schyler and Fort Wright, a distance of ninety-seven miles. As previously mentioned, radio networks were established in Alaska in 1903 and in the Philippines in 1905.

All this development was the work of the newly established Development Section which was organized under Captain Russel in 1902. Some of its early accomplishments were radio equipment, fire control apparatus, field telephones, field buzzers, induction telegraph set, acetylene signal lanterns, and equipment for generating gas for balloons.

In 1906 General Greely was promoted to be Major General of the line and thus vacated the post of Chief Signal Officer. He was succeeded by Brigadier General James Allen who had particularly distinguished himself as the Army Signal Officer in Cuba and the Philippines. The technical activity and progress begun under General Greely continued under General Allen.

Fire control systems were begun for the Coast Artillery in Hawaii and in the Philippines. By 1908 the permanent radio stations ranged in power from 3/4 kilowatt to 10 kilowatt, and were installed as follows: 6 in the United States, 8 in Alaska, 1 in Cuba, 2 in the Philippines and 5 on transports.

Common battery telephone systems had been installed with government owned equipment on fifty-one army posts by 1911 but the Bell Telephone Company refused to give them trunk service on the basis that the equipment was inferior and that connection with them would lower the quality of Bell System service. A test case was made at Fort Meyer and the Signal Corps sued in the courts of the District of Columbia to force the Chesapeake and Potomac Telephone Company to provide trunk service. The suit was never tried but was compromised by the AT&T Company agreeing to connect with any Army owned system provided the Army rented from the AT&T Company at $.25 each per annum, the transmitters used on all of the telephones of the system. This arrangement continued until World War I when the AT&T Company was unable to supply the demand for transmitters; but the principle remained that any Bell Company would connect with any Army owned system. This is a privilege that is not enjoyed by any civilian organization or any other branch of the government including the Navy.

The Development Section turned out a complete set of equipment for target range telephone systems in 1908. It made a successful radio telephone transmitter in 1907. In the way of field equipment a radio pack set ($\frac{1}{4}$ kilowatt quenched spark) was developed in 1912. It employed an umbrella antenna and a hand driven generator; and the complete set packed on three mules. The field buzzer was redesigned and called the service buzzer in 1912. The first of the lightweight field telephones appeared as the Camp Telephone of 1913.

General Allen's administration was probably most noteworthy because of its interest in aeronautics. In 1906 the Army purchased a new balloon, and in 1908 it acquired its first dirigible. The dirigible was a responsibility of the Signal Corps because only the Signal Corps was equipped with machinery to make the gas to fill it.

The balloon station was moved from Fort Logan, Colorado, to Fort Omaha in 1908. The Wright brothers made their first successful airplane and the Army was anxious to acquire one if it met specifications. Since by virtue of the dirigible the Signal Corps was the only branch with experience with mobile gas engines and the vagaries of air flight, the duty of drawing the specifications, conducting the tests and of operating the airplane was given to the Signal Corps. The first specifications, drawn in 1911 required a speed of at least 40 miles per hour and a sustained flight of at least one hour. The Wright brothers' machine met these specifications and was purchased. The first military aviation school was opened at College Park, Maryland in 1911 and then moved to Augusta, Georgia. In 1912, a second aviation school was opened on North Island at San Diego, California, and a year later all aviation schools were concentrated there. The United States Army was a pioneer in military aviation and the Signal Corps was the branch responsible for it.

General Allen was retired for age in 1913 and was succeeded by Brigadier General George P. Scriven who had served twenty-two years with the Signal Corps after twelve years service in the line. He came to office just as conditions in Europe were reaching a climax and he was Signal Officer during the years of World War I, prior to our participation. Naturally these were years of progress and expansion.

The Coast Artillery fire control systems were completed in Hawaii and the Philippines and those in Panama were begun. The 2 killowatt truck-mounted radio set known as the radio tractor was developed in 1914. This was a quenched gap 2 kilowatt spark transmitter and a crystal receiver mounted upon a White or Jeffery quad two-ton chassis and housed in a special body. The generator was engine driven from a power take-off on the transmission. The antenna was an 80 ft umbrella with a sectional mast which was carried in brackets on the side of the body. A so-called wagon set was also developed. It was a caisson and limber vehicle with the transmitter, a 1 kilowatt spark set, and a crystal receiver, mounted in the

caisson. It too employed an umbrella antenna with a sectional mast. These sets were largely experimental and were manufactured by Marconi and by Telefunken.

In 1913 when General Scriven took office, there were five field companies, one telegraph company, and six depot companies. The first two types were tactical units and the last service units. In that year Signal Corps tactical garrisons were first established overseas by sending a field company to Hawaii and a telegraph platoon to the Canal Zone.

In July 1914 the Aviation Section was authorized with a strength of 60 Officers and 260 Enlisted men. By October the actual strength was 24 Officers and 115 Enlisted men.

Conditions in Mexico were in a turmoil and two field companies and two telegraph Companies were stationed along the border. After Huerto overthrew Madero as President of Mexico, he was unpleasant to American citizens in Vera Cruz and insulted the American flag. The result was the expedition to Vera Cruz and with it went Radio Company D. As a result of field experience with Signal Corps units and a consideration of tactical organization of the Infantry Division, the Field Battalion was organized for divisional use, to consist of one wire Company and one radio Company, each with four sections. One Section for Division headquarters, and one each for the two Infantry Brigade headquarters, and one for the Artillery Brigade; and each section was to establish communication with the next lower headquarters. For Army and Corps use, the telegraph battalion was provided of two Telegraph Companies, each having three telephone sections and three telegraph sections.

Conditions in Mexico remained in a turmoil and the conflict in Europe was growing in proportions, threatening to embroil us in it to save Europe from being subjugated by Germany. Then one night in 1916 Francisco Villa and a band of marauders crossed the border and raided Columbus, New Mexico. An expedition was organized under Brigadier General Pershing to pursue and capture Villa. To this expedition was assigned a field company and portions of a telegraph company and a radio company; total strength of 6 Officers and 300 Enlisted men. The equipment consisted of service buzzers, radio tractors, wagon sets, pack sets, camp telephones and Montgomery-Ward rural telephone switchboards. There was a demand for wire, but only small quantities of insulated wire were available from the San Antonio and El Paso depots, but plenty of No. 14 bare iron wire was on hand so that was used and was laid on the ground. It is a remarkable thing that with the service buzzer these lines worked from Columbus to Colonia Dublon, a distance of over 100 miles. Every evening the circuits went out with the setting of the sun but came back the next morning as soon as the sun had burned out the dew.

Early in 1917 the tactical organizations were reorganized. The Field Signal Battalion was set up with a small Hq & Hq Company a wire company, a radio company, and an outpost company, each of

75 men. The function of the outpost company was to provide communication within the Infantry regiments to include battalions. The field battalion was partly motorized but largely horse-drawn. The telegraph battalion was completely motorized and was changed to consist of a small Hq & Hq company and two telegraph companies, each with two telegraph sections and two telephone sections. There were initially in early 1917, two telegraph battalions (1st at Fort Sam Houston and 2nd at El Paso), two field Signal Battalions (1st at El Paso, 2nd at Brownsville, Texas) and four depot companies. The authorized strength, exclusive of the Aviation Section was 127 Officers and 4000 men; but the actual strength was but 55 Officers and 1570 Enlisted men. Based upon the experiences in Mexico and with the provisional drill of the new tactical units, a board of officers consisting of Major George Gibbs, 1st Lieut. Roy Coles and 1st Lieut. F. M. Jones convened at Fort Sam Houston Texas, and prepared a Drill Regulations for Signal Troops.

In February 1917, Brigadier General Scriven retired after a four year tour and on March 1st was succeeded by Brigadier General George O. Squier as Chief Signal Officer. General Squier was an officer of long service in the Signal Corps and had particularly distinguished himself as a scientist and inventor. Amongst his inventions was "Wired Wireless" which was the basis of modern carrier telephony and telegraphy.

Slightly more than a month after General Squier became Chief Signal Officer we declared war and joined the Allies. Our Signal Units were basically suited to our tactical organizations which were based upon our experience with small forces in opern warfare; but the experience of our allies with large, closely massed forces was to dictate changes in tactical units which were reflected in changes in organization of Signal Corps troops. Our equipment was quite well adapted to an open type warfare but not for integration with the already established communications network developed through experience with trench warfare and closely massed units. It was therefore decided that our Signal troops would use French and British equipment for the most part.

In this country, the initial steps were to organize training camps, induct National Guard units, initiate selective service from which National Army units were obtained, and to select an expedition commander and send him and his staff to France for observation and recommendation. Telephone systems at the division camps and the numerous air fields were provided under a contract with commercial telephone companies, the Signal Corps paying two-thirds of the cost of the outside plant and 30% of the cost of the inside plant, title remaining with the telephone company. Additional inside plant provided to handle toll and pay stations was entirely at Company expense. Operation of exchange was by commercial companies on a cost-plus percentage basis, under the supervision of the Post Signal Officer and a local manager from the telephone company, which was often a part time job. Under this plan the telephone systems were ready by the time the camps were complete. Initially there were four Signal Corps camps, namely: Fort Leavenworth; Camp S. F. B. Morse, Leon Springs near San Antonio, Texas;

Camp Alfred Vail, New Jersey, and Monterey, California. These camps were for the training of officer candidates and key specialists. Additionally, operator's schools were established at College Park, Maryland and at Fort Leavenworth and specialized technical training was begun at the University of Vermont; College of City of New York; Texas A & M and Maryland State Agricultural College. Later the list of colleges and technical schools providing Signal Corps instruction was increased to forty-five.

Colonel Edgar Russel went overseas in May as Signal Officer to General Pershing. With Colonel Russel were a number of assistants. Amongst them Major J. J. Carty, Chief Engineer of the American Telephone and Telegraph Company. The American staff, after conferring with the leaders of our allies and after observing the war at close range, came forth with many recommended changes. The telegraph battalions were unchanged, but the Outpost Company of the Field Signal Battalion was increased to 280 men; and Railway Telegraph Battalions and Depot Battalions were new organizations required. Field Service buzzers because of their ease of intercept and high interference were to be left at home in favor of the British Fullerphones. The radio pack set was also left behind in favor of the lightweight vacuum tube transmitters and receivers developed by the French. Within the units of the Division, use was to be made of the very simple and flexible French monocord switchboard. Our own gas and electric signal lamps and the heliograph were abandoned for the French battery operated Signal lamp. The American equipment retained included field telephones, field wire, camp switchboard, various dry batteries, radio tractor, tools and tool kits, signal flags, wire carts and field glasses.

There was such a shortage of equipment and so much change over that originally authorized, that units were mobilized and trained with the equipment on authorized tables but they were moved to the Port of Embarkation without equipment or vehicles.

At the outset, the expansion provided by the National Defense Act of 1915 was fully implemented, bringing the Signal Corps units of the Regular Army to 5 Telegraph Battalions, 10 Field Signal Battalions and the necessary Depot Companies, and of the National Guard to 17 Field Signal Battalions. The Bell Telephone Companies and the Western Union Telegraph Company contributed 16 16 Reserve Signal Battalions. There were but few Signal Corps Reserve Officers enrolled so the initial augmentation was achieved through commissioning selected senior non-commissioned officers and by giving direct commission to some particularly well qualified civilians. After selective service was organized the Officers Candidate Schools were fed from qualified selectees. By July 1918 there were 30 Field Signal Battalions, 18 Telegraph Battalions, 6 Depot Battalions, and 14 Service Companies. At the time of the Armistice the distribution of Signal Corps personnel was as follows:

	US	AEF	TOTAL
Field Signal Battalions	6	50	56
Telegraph Battalions	5	28	33
Depot Battalions	1	11	12
Training Battalions	6	0	6
Service Companies	21	19	40
Officers	1250	1462	2712
Enlisted Men	20239	33038	53277

ploying vacuum tube oscillators, detectors and amplifiers), Signal projectors (electric filament type Signal lamps of simple construction.) Through our development programs we obtained the following equipment; EE-5 telephone (basically the 1375B Western Electric portable telephone developed for the Forestry Service), VT1, VT2, and other vacuum tubes (these low voltage heavy current oxide filament tubes were largely the result of contracts with Western Electric), SE-1420 receiver (developed by Prof. Hazeltine for the Navy), BC-44A (detector two-stage amplifier with variable gain), outpost wire (alighter version of field wire utilizing seven instead of eleven strands) EE-3 (an attempt to combine a buzzer telegraph into a field phone and not used extensively because of interference and intercept), SCR-67 and 68 (ground-to-air and air-to-ground, 5 Watt radio phone transmitter receiver sets (the first military radio phone set developed under contract with Western Electric), SCR-82 (gasoline driven 2 kw battery charging set developed by Franklin Automobile Company and Dyneto Electric Company), Rep construction (a field open wire system with lightweight material developed by Colonel Rep an American officer), storage batteries (several designs with non-spill features developed by Willard, Gould, USL, etc.,), panels (adapted from designs of our allies), Multiplex telegraph equipment (Western Electric commercial design), five-position multiple local battery switchboard (developed by the Signal Corps Laboratories), superheterodyne receiver (invented for the Signal Corps by Major Armstrong for transatlatic reception), and many other less important equipments new to our service such as gas alarms, etc.

From the first extensive use of communications integrated into a more or less homogeneous system, with a multiplicity of types of equipment and channels and fully coordinated with these systems of our allies, many new procedures, practices and techniques were evolved, many of which survive today. First there were the Signal Operating Instructions for dissemination

of key technical information to insure coordination of operation. Then there was the Signal Annex and Signal Orders, an expansion of the standard five paragraph field order system to control the installation and changes in communication. With the extensive use of wire systems, line route maps, circuit diagrams, traffic diagrams and military telephone directories came into being. For the encoding of radio and telegraph traffic division field codes were prepared. For the control and coordination of the flow of traffic through the several means simultaneously available, the message center was evolved. The value of the message center records for checking delays and errors of message routine was early recognized and its influence on the system of records was such that the requirements of recording incoming and outgoing traffic began to impede dispatch in order to insure ability to check. This defensive attitude is an ill to which message center procedures today are subject; and every once in a while it is necessary to clean out and simplify the procedures just as one pulls weeds out of a garden.

Prior to World War I, the Signal Corps doctrines, training information, regulations and general specifications were to be found in several manuals of varying size, covering such subjects as "Property & Disbursing", "Regulations", "Visual Signalling", "Coast Artillery Fire Control Systems", "Technical Equipment of the Signal Corps", "Photography", etc. What little information there was on field wire and radio communications was to be found in one brief chapter in Manual #3, a book devoted primarily to Post systems. During World War I, the Chief Signal Officer, American Expeditionary Forces, caused the publication of the first manual exclusively for all field communications. It was initially called "Liaison for All Arms" and in subsequent revision received the name, "Signal Communication for all Arms." Major Owen S. Albright and Clyde Eastman are credited with a large part of the authorship. It was also during World War I that the Signal Corps inaugurated the practice of publishing descriptive pamphlets for each type of set, now known as technical manuals.

In the year and a half of participation in World War I, the Signal Corps had built for the United States Army a tremendous network of communications. It had erected 2000 miles of pole line carrying 28,000 miles of wire. It had strung 3,200 miles of wire on French pole lines and leased 20,000 miles of French circuits. It had provided 40,000 miles of combat lines. In this system there were 134 telegraph offices, 273 telephone exchanges, and 9,000 telephones. In July 1918 our message traffic was 50% more than that of the British forces with messages twice as long. Military use of pigeons, meteorology and photography was first extensively organized and employed by our Forces in that war. The strength of Signal Corps troops amounted to only about 4% of the total troop strength but the branch certainly proved itself under combat conditions and provided military communications which were far more extensive, reliable and efficient than any prior army had employed. The casualties of the Signal Corps were second only to the Infantry in percentage; being 301 killed and 1721 wounded.

Just before the end of World War I the entire supply system of the Army, including that of the Signal Corps, was consolidated under one head under the name of Purchase Storage and Traffic. This reorganization was headed by General Woods, an ex-Regular Army Officer back on temporary duty from his position as President of Sears Roebuck and he was assisted by

Major General Goethals whose claim to fame was that he had built the Panama Canal. Apparently neither of these officers was cognizant with the basic requirements of military supply and the resulting system of supply was chaotic. For no useful purpose, complexity succeeded simplicity. Years of post-war service were spent in trying to make the system work and the changes introduced year by year caused the system to approach yet never reach the efficiency of the old pre-war supply system.

With the close of World War I came the problem of demobilization which is more than just getting the troops back home. As a matter of fact we had Signal Corps troops in France until 1920, and in Germany until 1923. The recovery of installations, disposal of surpluses, and the reorganization of what is left are the big problems of demobilization. Then, as now, there were contract terminations, claims boards and sales of surplus equipment. The War Department planned in 1919 for one Field Signal Battalion for each of six Infantry Divisions, one for the Cavalry division, one each for the Canal Zone, Hawaii and the Philippines, (a total of 10) and for two telegraph battalions. The General Staff and the Infantry and Artillery did not like the organization system that permitted Signal Corps troops to operate within divisions to front lines on the basis that it violated the military principle of command. As a result the National Defense Act of 1920, although providing for a Chief Signal Officer with the rank of Major General and establishing the strength of the Corps at 300 Officers and 5000 Enlisted men, cut to 10 Field Signal Battalions to 10 Division Signal Companies placing communications within the division in the hands of Infantry and Field Artillery troops. Similarly it reduced the two Telegraph Battalions to one Signal Battalion. Under this reorganization there were 5 Division Signal Companies (Canal, Hawaii, Philippines, 1st Division and 2nd Division); 1 Division Signal Troop (1st Cavalry Division); 1 Signal Battalion (the 51st); and 16 Service Companies (1 at each of 9 Corps areas; The Signal School, Washington, D. C., Alaska, Porto Rico, Panama, Hawaii, and the Philippines). The National Defense Act strengthened the reserve over its pre-war basis and organized the CMTC. Post-war planning provided for the paper organization and reserve training for construction battalions, pigeon companies, photographic companies, meteorological companies, GHQ Signal Service and Army Signal Service. These days of retrenchment, reorganization and rationalization of post war planning were hectic and trying ones.

In 1924, General Squier was succeeded by Major General Charles McK. Saltzman who had been Executive Officer to the Chief Signal Officer throughout the war. General Edgar Russel who had been Chief Signal Officer, AEF, was given a B. G. of the line and before his retirement had been promoted to the grade of Major General.

General Saltzman's administration saw the production and adoption of many new equipments, the development of which were begun during World War I or immediately thereafter, employing the lessons of combat. The SCR-97 employing 250 Watt tubes replaced the 2 Kilowatt tractor utilizing the same chassis, auto body and umbrella antenna. The SCR-77 emerged as a hand generator CW telegraph set for forward units. This was the first loop

German equipment. It is related that a German observer seeing the set remarked upon its similarity to the German set and asks how satisfactory it was in operation. When told that it did not function any too well he is said to have remarked that the German set like it was the least reliable of all German radio sets. The SCR-105 was the last of the spark sets used by our Army.

In the way of wire and wire equipment there was the RL-16 wire cart, the first light hand-drawn wire cart. The EE-65 test set placed testing equipment at forward field switchboards. The BD-9-10 and 11 switchboards were improvements and refinements of the French 4, 8 and 12 line monocord switchboards employing American Switchboard Units EE-2. The EE-64 was an operators set to be used with these switchboards and was an improvement upon the use of the field phone for use as an operators set. The EE-76 was a simplex telegraph station equipment all mounted in a single case. The TN-84 was a field terminal strip to facilitate terminating, cross-connecting, and testing.

Those were the days which saw the issue of the BB-29 battery and the M-94 cylindrical cipher device. These were not all of the equipments which became available in this period but they were probably the major items and they indicate the range and intensity of the development program. It is not until some time after a war that military equipment can fully reflect the lessons of the war; thence it is not unusual for the best equipment to reach the troops after the war has ended and before the full effect of post-war economy hamstrings development and production.

Post War activities in training are reflected by the establishment of the Signal School at Camp Alfred Vail, rechristened Fort Monmouth in 1925. Reserve officer training courses on a correspondence basis were begun. ROTC units were established at selected engineering colleges. Summer ROTC and CMP camps were held annually for practical training. The Army was alive to the necessity for as widespread military training as was possible. The Signal Corps bore its share of this program and added some features of its own. The Signal Corps Association was formed to maintain the interest of Reserve and National Guard personnel. Chapters were organized in all of the larger cities but interest soon lagged, principally because of the lack of a national organization. The New York Chapter maintained a sporadic existence but only the San Francisco Chapter continued with a regular meeting. The Army Amateur Radio System was formed to enlist the interest of the Hams. Through their participation we were assured of a wide supply of operators trained in all military procedure and they profited by being afforded an organized network with operating

schedules which insured the passage of their traffic to destination without haphazard CQ-ing.

Other accomplishments of this period were the commissioning of the United States Army Cable Ship Dollwood, the replacing of the original rubber insulated cables from Seattle to Alaska with gutta percha cable manufactured by Seimens in England. Washington was connected with all Corps areas and with the overseas stations by the Army Radio net utilizing 2 kw transmitters and 10 kw power amplifiers.

The subjects of procurement planning was inaugurated and the enormous task of surveying and cataloging the potentialities of manufacturing plants was begun. Surveys of sources of materials were likewise made and an effort to stock pile strategic materials was begun. This work, begun with inexperienced personnel and developed by cut and try from nothing at all, was to pay incalculable returns a score of years later when the task was still unfinished.

After a tour of four years, General Saltzman was succeeded in 1928 by Major General George Gibbs who had been the Deputy Chief Signal Officer of the AEF. General Gibbs was an alert and energetic officer who was a happy balance of the tactician and the technician. He was largely implicated in the technical and organizational developments of his predecessors; and as Chief Signal Officer, he did a splendid job of continuing the program in spite of decreases in personnel and funds. He was responsible for the development of Wire W-110 to replace the old field wire. The BD-9, 10 and 11 switchboards were replaced by the BD-71 and 72, 8 and 12-line boards. The I-56 test set was developed for electrical testing.

The program of radio development continued with the issuance of new and better sets. The SCR-130 for use within the Infantry and Cavalry Divisions was the first military set employing the master oscillator. By certain quick changes it could be converted from a battery and dynamotor powered set to a hand generator set using dry batteries for the receiver sets. The SCR-131 for Infantry regiments, the SCR-171 for Infantry brigades, and the SCR-161 for Artillery units was a family of hand-generator sets to replace SCR-77, 105 and 109. SCR-132 replaced the SCR-97 radio tractor. The SCR-136 ground-to-air and the SCR-134 and 135 air-to-ground sets were the first field sets to utilize the superheterodyne receiver. Failure to provide an oscillating second detector limited these sets to Voice and 1 cw. This was rectified by the developments of the BC-132, the first TRF military receiver. This set designed for airplane installation was provided with a heterodyne oscillator for the detector and therefore could receive cw as well as voice and I cw.

Under General Gibbs, radio nets in Alaska and the overseas stations were expanded. The ORC, ROTC, CMTC, and the procurement planning programs were continued with unflagging interest.

In 1931 General Gibbs was succeeded by Major General Irving J. Carr as Chief Signal Officer. General Carr had been an Army Signal Officer in the AEF and had considerable service with the General Staff. He was more tactical and strategic than technical. Under his administration the outstanding equipment issues were RL 26, engine driven wire reel. EE-8

[illegible] graphic systems. Studies were also made of methods of working through deliberate interference with our frequencies by Japanese transmitters.

As the result of maneuvers in Texas, the present system of unit panel identifications was evolved to replace that used in World War I. As the result of experience in joint maneuvers in Hawaii, the system of authentication for plain text messages employed universally by our forces in World War II was evolved. This system was earlier rejected officially by the Chief Signal Office in favor of more complicated and less practical systems on the basis of alleged lack of security.

With the establishment of the WPA, funds became available with which to install the necessary defense cables in Hawaii, the Canal Zone and the Philippines, and to extend the fire control cables of seacoast installations in the United States. This work was begun actively and was carried forward intensively on a gigantic scale in accordance with plans developed and on file.

In 1935, Major General James B. Allison succeeded General Carr as Chief Signal Officer. General Allison, during World War I had commanded the Signal Corps Training Camp, first at Fort Leavenworth and later at Franklin Cantonment, Camp Meade, Maryland, when the camps at Fort Leavenworth and Leon Springs, Texas, were consolidated there. His experience on the General Staff in connection with budget matters marks him as an expert in organization and administration. His tour of duty although not strongly marked by new developments was important in the prosecution of the wire and radio projects begun by his predecessors.

Major General J. O. Maughborne became Chief Signal Officer in 1936 succeeding General Allison who retired because of age. General Maughborne is an outstanding scientist and engineer. His long service in the Signal Corps had had emphasis on the technical side. He was the first operator to transmit by radio from a military airplane. During World War I he was in charge of technical developments in the office of the Chief Signal Officer. During his tour as Chief Signal Officer, radar was born, and the SCR-170 and SCR-268 radio sets developed. SCR-194 and 195 Walkie-Talkie sets came out soon to be replaced by SCR-300 and Handy-Talkie set SCR-536. SCR-193 and 245 vehicular radio sets were developed. Wire W-130 was developed to replace W-110 in forward areas.

Tactically, communications were developed for the new triangular division; air warning nets in the East employing commercial telephones lines and in the West largely utilizing power company and railway circuits were organized and tested. Experiments were conducted in simplification

of message center procedure.

Europe was against war and again it appeared that we would eventually be drawn into the conflict due to the fact that the German drive across Europe and the bombing of British industry greatly reduced the industrial potentialities of France and England. It was then that the fruits of procurement planning began to pay dividends in enabling American industry to promptly and efficiently retool for war.

Major General Dawson Olmstead became Chief Signal Officer in 1941. He was an Artillery officer who was in charge of the Finance School in World War I and who transferred to the Signal Corps in 1921. Previously he had served a four year detail with the Signal Corps as a junior officer. General Olmstead was drawn into the midst of the expansion of the emergency period and was Chief Signal Officer when he entered World War II. His was a difficult role calling for an officer of broad vision and outstanding executive ability. His path was not made easier by the establishment of the Army Service Forces whereby the supply matters of the Army were again placed in the hands of an Engineer officer with little experience in military supply; and along with it came complete reorganization of supply practices. Only a year or so before becoming Chief Signal Officer, General Olmstead had been very seriously ill and he had not fully recovered when he was faced with the burdensome duties of a wartime Chief Signal Officer.

Under General Olmstead, the development program continued at an accelerated pace. There were still more radio and radar sets, and by the time any of these equipments reached the hands of troops they were obsolescent because of new sets in development. The outstanding sets of this period were the 99 series, namely the 299, 399 and 499.

With the expansion for war came numerous new Signal Corps units amongst which were construction companies, and battalions, telephone installation companies, repair companies and various Air units, regiments, battalions and companies. Then came the cellular table of organization conceived by the Signal Corps, first for Air units, Table 11-400, and then expanded for all communications, Table 11-500.

 Major General H. C. Ingles replaced General Olmstead as Chief Signal

Then came V-E Day for which some plans had been formulated, and V-J Day for which little planning had been done. Planned demobilization is difficult but the problems of a plan-as-you-go demobilization are still greater. It was General Ingles's problem to inject as much order as possible into the demobilization program as it applied to the Signal Corps while still providing for the execution of the Signal mission of communications.

At the close of a four year tour of duty, Major General Ingles was succeeded by Major General Spencer B. Akin as Chief Signal Officer. General Akin had served with the Signal Corps in World War I and in the post-war years had served on the faculty of the Signal School, in the Chief Signal Office and on the War Department General Staff. At the time of Pearl Harbor he had just reported to General MacArthur for duty in the Philippines, and throughout the war served as his Signal Officer.

It is General Akin's problem to resolve the lessons of the war as pertains to the Signal Corps and to adjust the equipment and personnel of the Signal Corps to the reorganizations that are certain to follow throughout the Army. We will have new and better equipment and there will be many new ideas with which to solve our personnel and organization problems. There has never yet been a war that was not followed by extensive reorganization. All of this he must do with reduced appropriations for there has never been an instance when drastic cuts in military appropriations were not made in an effort to reduce the overall governmental expenses. His is not any easy task but he is well equipped both in experience and ability to cope with it.

In the future of the Signal Corps I predict a closer tie with both science and industry. I hope for saner and sounder personnel management and control; and for a better organized readily expandable supply and maintenance system which we can use in peace and enlarge to wartime needs without entire reorganization.

You have seen how our Corps originated and you have followed its growth. You have every right to be proud of being a member of such an outstanding and progressive organization that has so ably performed its mission and has been responsible for so many new and important developments in the way of equipment, organization and techniques.

It should be your aim to fit yourself to best do your part to so serve that the Signal Corps can be proud of you. You cannot be a good Signal Corps officer and be a supply man, an administrator, an engineer, or a photographer to the exclusion of the other phases of the Signal Corps field. A Signal Corps officer should first be a communicator and as such, he should be familiar with Manuals 11-486 and 11-487 to such an extent, that he can design, requisition, install, supervise, and operate any kind of a communication system that will best meet the situation with the equipment that is reasonably available. After a Signal Corps officer has gained this basic knowledge and is able to employ it, then he is in a position to specialize by acquiring more extensive knowledge in any particular phase of Signal Corps work for which he feels the greatest interest and for

which the Signal Corps most needs him. The ideal Signal Corps officer is a nice balance between the executive, the administrator, the engineer, the technician, and the logistician. The field ahead of you is broad and interesting; and your country will most profit if you explore it diligently and exhaustively.