

WAR DEPARTMENT
Office of the Chief Signal Officer
Washington

Land Division

April 18, 1918.

311.9 Pigeon Instruction

From: Office of the Chief Signal Officer.

To: Division Signal Officer, Camp Sevier, Greenville, S.C.

Subject: Confidential Instructions.

1. Enclosed herewith are three (3) copies of Confidential Instructions entitled -

"INSTRUCTIONS
ON
THE USE OF CARRIER PIGEONS IN WAR
U. S. SIGNAL CORPS".

2. The purpose of this manual is for the use and instruction of the Pigeon Section Detachment on duty at Loft D-S-100.

3. Compliance with these instructions, and acknowledgment of receipt, are requested.

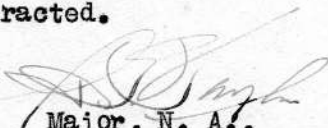
By direction of the Chief Signal Officer:

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Colonel, Signal Corps.

To C. O., 105th Field Signal Battalion.

1 inclosure extracted.

3 Encls.


Major, N. A.,
Division Signal Officer.

WAR DEPARTMENT
Office of the Chief Signal Officer
Washington

I N S T R U C T I O N S

on

THE USE OF CARRIER PIGEONS IN WAR

U. S. SIGNAL CORPS.

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Compiled from
AMERICAN
ENGLISH AND FRENCH SOURCES

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Rec'd Division Signal Officer
30th Division.....

APR 2 2 1918

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INTRODUCTORY

A circular letter of Instructions on "Reception, Care and Training of Homing (Carrier) Pigeons in Newly Installed Lofts" dated Feb. 7, 1918, was designed to govern the settling of young pigeons in the new lofts and did not treat of the employment of pigeons by the Division or Military Unit to which the loft may be attached. Pigeons have already been placed in these lofts and their training is in process. The birds should soon be available for demonstration and instruction.

Advices and instructions which follow are intended for the guidance of Division Signal Officers in organizing and directing the preliminary instruction and demonstration work. Subsequent instruction will cover the use of special apparatus based upon experience with apparatus tested at the front.

THE MILITARY IMPORTANCE OF PIGEON COMMUNICATION.

A. Between Men on the Ground:

When an enemy barrage is successfully laid down behind an advanced position or an advancing force, pigeon communication may be the only feasible liaison with the artillery control and higher command in the rear. The following extracts from a French Army report (Confidential) will be found instructive --

From a report on the Battle of Verdun. It is sufficient to quote the end of this report:

"Experience has proved that:

- 1.- Telephone liaison is always interrupted in the zone of attack;
- 2.- Information sent by runners is always delayed on account of the state of the terrain and the violence of barrage fire;
- 3.- Visual signals are obscured by smoke and dust and are often inefficacious;
- 4.- Aerial observation is often subject to unfavorable conditions on account of bad weather or the distance of the objectives, and is not able to give the command accurate information concerning the progress of the battle.

Pigeons only, can work regularly, and in spite of bombardments, dust, smoke or fog, can bring accurate details concerning the situation of the troops in action within a relatively short space of time.

Liaison by pigeons has rendered inestimable services ever since the beginning of the battle of Verdun. It has won the approbation of the high command and line officers, and its general adoption is advisable."

From a more extended report on the Battle of the Somme:

"Liaison was effected by means of pigeons on the Vth Army, during the course of the Battle of the Somme, from July 1st to November 30th, 1916, with the birds of:

- 7 Mobile lofts,
- 2 Stationary lofts,

making a total of 1000 pigeons, all young birds, hatched between March and May, 1916.

The total number of pigeons sent to first line stations is 5,107 pigeons.

The number of practical messages concerning the operations, is 267.

The total losses of pigeons are as follows:

120 pigeons reported killed at the stations;

100 pigeons disappeared or lost, buried or abandoned;

100 pigeons lost or killed during the return flight, released but did not return.

The rate of total losses is therefore, 6.4%.

The rate of losses of released pigeons is only 2.1%.

The rate of total losses increased after Oct. 15, from 5 to 15%.

Independently of the almost continuous bad weather, the reasons for this increase are:

The great exhaustion of the birds who could not be relieved and who had only a few days rest during the moves of the lofts;

The lack of shelters in the first line stations: the trenches were non-existent and both birds and men were in the mud.

The losses caused by the moving of the lofts were very low, almost nil.

The rapidity of liaison by pigeons varied considerably as the birds were often used under very unfavorable conditions. Distances of 12 to 30 kilometers were nearly always covered in 10 to 30 minutes.

Messages were generally sent by two pigeons, but as the losses were very small: 2%, it is perfectly admissible to send messages by only one pigeon, in fact, it has been done many times with success.

These few remarks and figures plainly show the great services rendered by carrier pigeons and mobile lofts to the VIth Army during the battle of the Somme, and the almost absolute safety of this method of liaison at all times.

The results obtained on the Somme may be considered as very good, but they would have been better still if all the units in action had known how to benefit by the services which can be rendered by this means of liaison.

A certain amount of negligence and bad management were noted, such as: too long and unnecessary internment of pigeons in first line stations, bad use of rest and transportation material, supplies for pigeons assured under bad conditions, overfeeding of the pigeons in the stations, messages sent without mentioning the time, sender or addressee.

These errors are always caused by a lack of conviction, an imperfect knowledge of conditions concerning use of carrier pigeons, or else a too frequent use of this liaison. They will be eliminated as soon as the troops and staffs become familiar with this liaison and learn to use pigeons efficiently, for they will quickly realize their necessity.

In short:

The necessity and possibility of maintaining liaison by means of pigeons, has been demonstrated during the battle of Verdun and confirmed during the offensive on the Somme. This method of liaison has always been able to operate regularly. In many cases it was the only one which was able to resist the weather and the means of destruction of the enemy.

It is no longer possible to have any doubts about a means of liaison whose chances of success, based on calculations of five months of good and bad season have been practically 98%.

When a well trained and expert personnel has been obtained in the Army Corps and Divisions, the command which knows how to make proper use

of the pigeon material and the pigeons which have been allotted to them, will always be assured, during the daytime, of close, constant and rapid liaison between the first lines and the rear, both during offensive and defensive operations, in spite of bad weather and the means of destruction employed by the enemy."

A British report has recommended one pigeon man for every platoon.

B. Between Aviators or Balloonists and the Ground:

Information which is not transmissible by wireless, e.g., maps and photographic negative up to the amount of 15 feet of moving picture film, can be sent safely by pigeon carrier from either an observation balloon or an airplane. The birds will get back at a rate which may equal a mile a minute. The balloon or plane may continue its observations or may be prevented from returning. Few airmen are expert wireless operators. Pigeons may profitably be used for the verification of important communications sent back during a prolonged reconnaissance. One pigeon loft in France reported (covering seven months of the year 1916) that it had received 24 pigeon messages from airplanes that had met disaster or capture. These messages gave information concerning the last observations, location, or fate of between 40 and 50 aeronauts.

In a series of trials at one of the American Aviation Schools birds were recently released from moving planes at varying altitudes up to 6,000 ft. Every bird returned. One bird released 8,000 ft. failed to return, but the report concludes that the failure was purely accidental. The following conclusions were reported on the basis of 30 releases from airplanes - (1) Pigeons can be released while a plane is travelling at 40 to 100 miles per hour, but at such speeds a certain percentage of the birds will suffer injury until aviators become thoroughly familiar with the handling of the birds. It was found perfectly satisfactory to slow the engine for two or three seconds. This check in speed allowed the bird ample time to escape. A full stall was found to be unnecessary.

A bird released from a plane or balloon makes a rapid "stepping" descent until it comes to its customary flying height (300 to 500 ft). It then circles or takes its homeward direction without circling.

C. CONCERNING THE NON-EXPERT PERSONNEL.

The pigeon experts detailed to the pigeon sections will be charged with the care and training of birds, at the lofts and with their transportation to points near the front, but probably not with the care of the birds at the front nor with the despatch of messages. These duties will devolve on men who are not all-round pigeon men. It will be observed that the principal failures at the front have been due to ignorant handling in the trenches. It must be understood that certain precautions are to be observed in the trenches. The men who carry birds in the trenches and over the top must be competent to (1) feed and water birds without overfeeding; (2) understand how to affix messages and to hold and launch the bird without injuring, and, (3) must realize the importance of returning birds before they are exhausted.

Line officers should have a general understanding of the possibilities and limitations of the work.

These ends may be accomplished by arranging with the Commanding General or otherwise, for the inclusion of pigeon work in the mock combat exercises and practice hikes at the cantonments. Pains should be taken to place these demonstrations and exercises under the charge of an officer or non-commissioned man who understands how to give explanations

and instructions, - who has some aptitude as a teacher.

D. CONCERNING THE EXPERT PERSONNEL.

The expert personnel understands that the efficacy of pigeon communication depends on the birds entering the trap and so delivering its message, not merely on its returning to the neighborhood of the loft. A bird is poorly trained until it homes straight into the trap.

The expert personnel realize that the intensity of the pigeons' homing instinct as referred to any particular loft is dependent upon habit and familiarity. It is therefore most important to avoid changing or re-arranging little things about the loft and inside it. A loft must be fully and carefully prepared for the birds before they are put in, and must be kept in such an excellent state of order and cleanliness that no extraordinary or disturbing renovations and disinfections have to be made.

Throughout the training of the pigeon personnel it should be remembered that the men are to be made expert and that it cannot be assumed that they are expert to start with, no matter how they may represent themselves. Opportunities should be sought to test and check their familiarity with the usual practices to be observed, their grasp of the principles underlying these practices, their kindness and firmness in handling birds, their cleanliness and promptness, their accuracy and honesty in keeping records and making reports. These men are to be links in a chain of communication on whose perfection success in battle will depend.

Pending the receipt and distribution to camps of detailed instructions and apparatus from overseas, the instructions dated Feb. 7, are again referred to.

I. THE HOMING (CARRIER) PIGEON.--ITS ORIGIN.

The pigeons constitutes such a perfect mechanism for flight that engineers of the aeronautic service consider it a subject for serious study. Because of their remarkable qualities, pigeons are very valuable as messengers, and great use has been made of them in modern warfare.

Military men of every rank who have knowledge of the use of pigeons in messenger work and admire their capabilities without thoroughly knowing them will be interested in reading this brief study of the special characteristics of the Homing pigeon, its principal qualities and their development.

The homing pigeon is the result of several centuries of intelligent cross-breeding between various races derived from the bizet or rock-pigeon. This crossing, which was only made with the perfect specimens of each race, has produced an amalgam; the Homing pigeon of today, a variety of the pigeon family noted for its superior intelligence and physique.

While the carrier pigeon is an entirely distinct species of pigeon, larger than the Homer, with large wattles and eye ceres, bred for show purposes, and without homing ability, custom and usage of our allies in the present war have designated the Homing pigeon by the term "carrier pigeon", and therefore, to avoid confusion of terms, and to secure a universal nomenclature, the Homing pigeon will in this Manual, be designated as a "carrier pigeon".

II. ITS PRINCIPAL PHYSICAL CHARACTERISTICS.

The modern carrier pigeon is able to cover distances of 500 to 700 miles in a single day; its intelligence and physical characteristics are transmitted to its young. The following are some of these characteristics:

The shape of the head is convex, the forehead developed on both sides and the back of the head deep.

The bill is strong and deep-set.

The complexity of the eye requires a brief description:

Great mobility in every direction is assured by six muscles. In addition to the two ordinary lids there is a third lid consisting of a transparent membrane which covers the eye-ball from front to rear. This is the "blinker" which protects the eye during flight without closing it. The eye can be focused for long or short vision by means of an accommodation muscle which dilates and contracts the pupil, and by means of the ciliary muscles which modify at will the crystallin lens.

The following qualities are apparent in the eye of a first class specimen: the blinking is rapid; the action of the ciliary muscles is quick and strong; the pupil is very brilliant and appears to be placed slightly in front of the iris; the latter, well encircled by the membrane of the eye is very deep in color and quite brilliant. The eye is very expressive, that of the cock being frank and stern, and that of the hen-bird more gentle and lively.

The neck is well feathered, the base of the neck of cock-birds is very strong.

The chest is broad and full in front without the extreme depth of breast bone found in squab breeders, the shoulders heavily reinforced with muscles, the back strong and well feathered, the sternum solid, arched in front and tapering behind where it joins the back, the belly reduced to the smallest proportions.

The wings are firmly attached to the shoulders. When outspread, they curve slightly inwards. The large feathers are sensitive, long and wide, the small feathers abundant and soft. The feathers on top of the wing overlap each other like the shingles of a roof, while the feathers underneath the wing, which are fine and soft, facilitate the passage of the air during flight.

The bones of the pelvis are very firm and join each other.

The rump continues the lines of the back. It is well covered on all sides with fine, soft feathers.

The twelve tail feathers are rather short and wide and overlapping. They constitute a mobile, supple and strong rudder.

The legs and feet are strong and sensitive; the claws are strong, hard and deep-set.

The plumage is rich, abundant and soft over the whole body; the color is of no importance, but in every color the darker shades are always preferable, because of decreased visibility while in flight.

The weight varies from 15 to 18 - 1/2 ounces for a cock-bird, and 13 - 1/2 to 17 ounces for a hen-bird.

The respiratory channels of the pigeon are wonderful, they enable the pigeon to fly uninterruptedly for 12 to 15 hours. The importance of their role justifies a brief description; the air circulates through the pigeon through the tracheal artery, the bronchial tubes and lungs, and also through nine air pockets, from which other small irregular cavities extend under the skin, between the muscles and even into the inside of

the bones. The curious little air pockets contain a reserve of warm air which feeds the lungs during flight, when the muscular apparatus consumes a large amount of oxygen. They inflate and collapse alternately, acting as a lift and force pump which renews the air in the lungs.

Not only do these air pockets constitute a source of supply for the lungs, but the warm air which fills them reduces the specific weight of the pigeon, and reduces the effort required for propulsion.

III. INTELLIGENCE OF THE PIGEON, ITS HOMING INSTINCT.

The "homing instinct" of the pigeon is the result of certain faculties, partly innate, partly acquired, which have been developed, modified and exploited by men for practical purposes.

This wonderful faculty, generally known as instinct of orientation, has been the subject of more or less contradictory explanations. The remarkable improvements in the race obtained during this war by means of intensive training has undoubtedly proved that it cannot be explained by some special, mysterious and unchanging instinct, but by the greater acuteness of certain senses and faculties. The history of the use of Carrier pigeons and scientific theory agree on this point.

The ensemble of the pigeon's intellectual faculties constitute its intelligence. The principal faculties manifested by the pigeon's return to the loft are: attention, observation, memory, will and the sense of direction.

These faculties have been developed by constant stimulation, but they are, nevertheless, largely dependent on the pigeon's general condition, and the relative perfection of certain organs.

When in poor condition the pigeon's attention cannot be held during flight; he is inattentive, unobservant, his memory receives only a few impressions and they are not lasting. His will is weak and his physical strength is also greatly diminished.

This explains why the same pigeon is often unable, during certain periods, to perform satisfactorily, in spite of progressive training, while at other times two or three exercise flights are sufficient to produce good results.

The organs most closely related to the efficiency of the pigeons faculties are: the eye, the ear, the cerebral hemispheres and the cerebellum.

The peculiar structure of the eye, the remarkable play of the accommodation muscle and the ciliary muscles, of the pupil and the cristallin lens give the pigeon great power, clearness and penetration of sight.

During flight the eye is an indispensable aid for the observation of objects and visual memory.

The ear appears to play an essential part in the sense of direction. It includes three parts; the external ear, the middle ear and the inner ear. At the top of the inner ear there are three semicircular canals which appear to be the nerve conductors of orientation.

It is probable that their great sensitiveness enables the pigeon to perceive magnetic and atmospheric impressions and to determine the direction of the loft either at departure or during the flight when he has lost his way on account of atmospheric disturbances. This explanation of the sense of direction appears to be correct. Experience proves that any lesion of the semicircular canals, whatever its cause, destroys the sense of direction.

In the cerebral hemispheres are located motive sense, instinct, desire, and continuance of effort.

The cerebellum co-ordinates the movements of flight when the pigeon, after taking his bearings pursues his course, registering the topography of the route over which he flies.

Although the pigeon is a meteorologist and a powerful athlete, his value is not stationary like that of a machine which feels no fatigue, and needs practically no rest. The pigeon is extremely sensitive, and his efficiency varies considerably according to his diet, and the affections and desires which draw him to the loft at the various periods of his life.

IV. THE PIGEON SPECIALIST. HIS RESPONSIBILITY - HIS QUALITIES.

Every pigeon man who is given charge of a loft should realize the importance of the work intrusted to him, and should feel that he is morally responsible for the operation and efficiency of the instrument in his hands.

When he is put in office, his superior officers instruct him somewhat along the following lines:

"I am placing you in charge of 100 little messengers. They are intended to be used by your comrades in the trenches; you must train them to be strong and intelligent, capable of carrying the last, urgent call at critical hours. Your best care will be required for them so they will be ready to speed the messages which will mean life or death to the men who are withstanding the enemy's hardest blows."

The results obtained largely depend on management, but they vary considerably with the personality of the pigeon man. As the army needs good pigeons, good pigeon men are required, and mediocrity cannot be tolerated.

A pigeon man must have the following qualities: gentleness; patience; prudence; cleanliness; judgment; firmness and observation.

A great love for pigeons generally gives the specialist the greater number of these qualities when he enters his loft.

The roughest and most impatient fancier becomes gentle and patient when he is with his birds, the most careless takes precautions for cleanliness which he neglects for himself. His prudence is often excessive; judgment, firmness and observation are rarer qualities, which in sporting contests make the best pigeon fanciers.

Judgment: The confidence shown in him by the command, and the hope which is put in him by his comrades in the trenches, together with the help which these latter have the right to expect of him, should be constantly remembered by the pigeon man, and should strengthen each day, his desire to be worthy of his trust.

Observation: This faculty is indispensable for a good pigeon man. Every man possesses it to a varying degree, but if he trains himself to observe each day, and uses all his faculties for this purpose, he will become sufficiently observant for ordinary purposes.

A pigeon man can do whatever he likes with pigeons provided he does not ask anything which is contrary to their faculties and the natural laws governing them; mobile lofts are a proof of this. The science of pigeon-fancying is so little known that the experts who believed they knew all there was to be known on the subject were the most sceptical concerning the possibility and efficiency of these lofts, and have been more astonished than anyone else by the undeniable results. The foalings of our birds, their qualities, faults, their faculty of accommodation are not yet well known to us, but one thing is certain: we have not

estimated the measure of their intelligence. We must overcome this ignorance, and everyone must contribute what he can to the study of the Carrier pigeon. Every pigeon man must observe as attentively as he is able and make note of all remarks in the Loft Journal which was created for the purpose of keeping a record of events and observations.

Firmness: The love of fanciers for their pigeons is often a source of weakness, and this is a great fault. It is a mistake for pigeon men to believe that the birds will be tamed and become attached to their loft, if they are given lots of dainties. Although affectionate, the authority of the pigeon man should remain firm and be well understood by the birds.

Pigeons, like children, repay weakness with ingratitude. Dainties should be earned either by work or by obedience to the master. The pigeon man must follow the program which is made out for him and conform to the exigencies of the service, in regularity of diet for the birds, regularity of their exercise, scrupulous attention to cleanliness in the lofts and paniers, and observation of details.

He must always think of the object to be attained and strive for it earnestly. He must observe and understand the countless details of the pigeon's life and note them in the Loft Journal, even when he does not understand their cause.

V. TRAINING CARRIER PIGEONS IN THE ARMY.

The homing instinct is not entirely instinctive and unchangeable; it can be modified and developed, within certain limits, by careful training.

The study of the most efficient methods of training and the testing of their efficiency by experience have made it possible to establish certain rules which should be used as the basis of a rational system of training.

Physical and intellectual development largely depends on the regularity and scope of training. The latter should be continual, regular and gradual.

Before giving the principles of good training, it is necessary to explain the natural faculties of the Carrier pigeon. The brain of the young pigeon is not a blank ready to receive impressions of every kind; it already contains deep inherited impressions which limit the effects of training. It is an organ which has characteristics and qualities of its own and which is subject to hereditary influences; these characteristics, qualities and influences form the foundation which can be developed, modified or neutralized by good training.

Training can perfect but cannot create, consequently, the pigeon must have a certain amount of natural intelligence. On the other hand, the physical and intellectual training should be given simultaneously, because all organs are correlated and the perfection of one organ has a good influence on the others and improves the general condition.

These facts enable us to lay down the following fundamental rules:

1. Stock the lofts with young birds of a strain which has given proof of good qualities.
2. Make a first selection. Only keep birds which appear to be physically well formed.
3. Complete this selection by a second one based on work.
4. Do everything possible to develop the intelligence of the pigeons selected. The work of selection is closely connected with the work of training of which it is the practical conclusion. Both begin when the birds are hatched.

The physical training possibilities of the young ones depend on the diet and care for cleanliness which is given the parents. When young birds are sickly and do not grow regularly, they should be killed.

Young birds which have received no individual impressions and have had no personal experience are more sensitive to new influences than the old birds, and are easier to perfect than at a later age. This is why the training of young pigeons is of such capital importance.

VI. SUPERVISION.

Supervision should be constant, two loft specialists relieving each other in turn. The birds must be watched constantly, while at rest and while flying. The slightest ailment must be noticed; every sick bird must be taken out and cared for. The master's authority must be vigilant and firm. Familiarity and confidence should be in evidence in the loft.

VII. FOOD-FEEDING AND WATER.

Familiarity and docility are easy to obtain inside the loft where the pigeon feels the authority of the master. Although it is more difficult outside where the pigeon is at large, it should not be less great. Even outside he must answer the master's call and trust him. The pigeon man on duty must watch the pigeons closely. When the flock flies lower and in decreasing circles, showing an inclination to alight, he calls the birds, offering them a few dainties. The first arrivals are the only ones served, consequently after the first few flights and when they have learned the call rattle represents feed inside the loft all endeavor to be the first to arrive inside, which is of great value later, when the pigeons are in actual service. The fact that the birds must enter the loft before a message can be removed from their legs, is of paramount importance.

On no account must the pigeons be allowed to alight anywhere else, than on their own loft nor are they to be permitted to loaf on the roof or landing board of the loft. "Prompt Trapping" must be the slogan of every loft if the pigeons are to serve the purpose for which they are intended. Alighting in fields must be carefully guarded against. Access to a box containing pounded brick, egg shells, plaster, salt or in the absence of the foregoing, a hopper containing a quantity of any of the commercially prepared pigeon grits will lessen the birds' desire to fly to the fields. Small quantities of tender green stuff are also greatly relished. Once the pigeons form the habit of loafing in any manner, all training schedules are valueless. Discipline is as necessary in the pigeon loft as it is in the line of the army, if satisfactory results are to be obtained.

The diet most widely used in America is a mixture of 50% Canada Field Peas, 25% Kaffir Corn (or Milo Maize, a similar grain) and 25% Argentine Corn, the proportions of the various grains to change with the seasons of the year. In warm weather, cut down on Argentine Corn (which is heating) and add peas; and vice versa in cold weather add on Argentine Corn and cut down on peas. The peas, which contain a large amount of nitrogenous matter, are the muscle builders.

In addition to the 3 varieties of grain mentioned above, a small amount of hemp seed should be fed, as it is rich in fat (about 32%), greatly relished by the birds, and is most helpful in aiding the moult. Hemp should always be fed sparingly as injury will result if too large an

amount is given the birds.

Although there are many other varieties of grain that may be fed with success, the rations above are looked upon as a standard by the great majority of successful fanciers in America.

The quality of the food is a most important consideration to be carefully observed. Musty or scoured grain will always cause sickness of some sort. Be sure that the food is never damp, musty smelling or dirty.

Grain for each meal should be carefully sifted in order that dust, dirt and chaff will be eliminated.

A Carrier pigeon (averaging those breeding and those not breeding) will consume about 1 pound of food per week.

Good grit, with which the food is ground in the bird's gizzard, should be kept constantly in the loft; except during twenty-four hours before the birds are to be sent away to a liberation point fifty or more miles distant, for immediate liberation. The grit contains salt and minerals which cause thirst and the bird might land en route for water thereby losing valuable time, and being more exposed to the danger of being shot or captured. There are many good grit mixtures on the market, most of which contain crushed oyster shells, gravel sand, small sea shells, crushed limestone, salt, charcoal and other ingredients.

Well formed eggs may be obtained by giving the pigeons pounded bricks, old plaster, oyster and egg shells. When eggs are irregular or when the shell is too thin, they are destroyed.

In connection with food, it must be remembered that in order for the bird's organism to properly function, it must receive a certain amount of green stuff. Nothing is better than crisp young lettuce leaves or chickweed. About once a week, while lettuce is in season, the birds should be given as much as they will readily clean up. In very warm weather, it may be fed three times a week. In seasons when green stuffs cannot be raised outdoors, the birds will require none.

A good tonic and appetizer applied in the drinking water is compound tincture of Gentian. This can be given once a week with beneficial results, but where proper exercise is given the birds will not require any sort of tonic.

Water: If there is any one consideration, upon which depends the health of the birds, more than another, it is the drinking water. Plenty of cool, fresh water is necessary to keep the birds in the pink of condition. The water should be changed three times a day, and the container thoroughly cleaned each time. Drinking water should be supplied in a receptacle which will prevent bathing, never under any circumstances in a pan or other open container. If in any case fresh water is unobtainable and impure water must of necessity be given the birds, a small amount of potassium permanganate (enough to make the water a rich claret color) should be introduced into the impure water. The impurities will be precipitated and oxidized and the danger to the birds' health, incident to the drinking of impure water, is greatly minimized.

Feeding: The most effective check we have upon the bird's action is through his appetite. In order to successfully manage a loft of flying birds, they should be kept in such a condition that at no time will they refuse food. Too much food will cause a pigeon to become sluggish, dopey and listless; whereas, if they are always kept a little sharp, they are alert, active and happy, and much more manageable.

In the morning the birds should be sent out for their exercise around the loft. While flying the water receptacles should be filled and the morning feed put in readiness. As soon as they pitch on the roof of the loft, the feed rattler (a can containing peas or buck-shot) should be rattled briskly and the morning meal placed in the loft. They soon

learn that the noise produced by the rattler is a signal for mess and they will cultivate the habit of trapping immediately upon returning to the loft. Each time the birds return to the loft, either from a flight or from their exercise, food should await them and the can should be rattled. The advantage of the feed-rattling over a whistle by the attendant is that the same noise will issue from the can irrespective of who operates it, while no two men whistle alike. This tends to promote uniformity in the lofts so that one man could be taken from any loft and placed in charge of another without abrupt change in the life and routine of the birds. This uniformity applies to feeding and in fact to everything connected with the training of the birds.

As to the amount of feed, it might be said that the birds should be fed only what they will clean up in about 10 minutes from the time the first bird traps. Again, at noon, the birds will be flown and upon their return, a few handful of hempseed (enough so that they are not tricked by the rattling can) should be fed.

At 4 or 5 o'clock, according to the length of the days, the birds should again be exercised and fed upon their return as in the morning.

The actual manner of feeding outlined above does not apply to birds used exclusively for breeding purposes. Pigeons used exclusively as breeders are called "stock birds" and are not flown. The feeding of stock birds is a study in itself. Many successful fanciers prefer hopper feeding because the old birds can feed their young and return to the hopper for more grain for themselves. Although this method is of advantage in simplifying work in large commercial lofts, it is by no means the preferable way to produce feathered athletes of value for military work.

Where constant supervision is available, as it is in military lofts, the correct procedure is frequent feeding in small quantities throughout the day with a liberal allowance at the final daily feeding period.

Each time the old birds are fed they are reminded of their duty to their offspring. Close observations will demonstrate that with this method in use, the youngsters will be fed many times oftener in a day than if the old birds were hopper fed. Incidentally, it eliminates the young birds being over crammed with feed and they do not become loose feathered, fat burdened market squabs. It is a simple matter for the attendant to determine the exact quantity of feed necessary to keep the old birds in prime feeding condition and the youngsters growing. A liberal feed at evening will insure full crops overnight. A flying pen is often of value in connection with a loft of stock birds.

The old birds will fly about the pen exercising during the hours they are not on duty with the youngsters. The aperture through which the birds pass when they leave the loft and enter the flying pen should be well up on the wall of the loft and near the roof of the loft. This will prevent the youngsters from getting into the flying pen during the period elapsing from the time they leave the nest until they are removed from the breeding loft.

The following table shows the length of the interment needed for observation and to accustom the young birds to the new loft:

Squeakers 5 weeks old:				Interment 3 days	
"	6	"	"	"	4 "
"	7	"	"	"	5 "
"	8	"	"	"	6 "

VIII. TRAINING METHODS.

The following directions are designed primarily for movable lofts, which are largely used on the battle front, but apply equally to stationary lofts in all particulars except moving of loft, and training of birds on such change of location.

1. FIRST FLIGHTS.

The first flights should be left to the initiative of the young birds themselves. Each one tries his wings without flying, then a short flight is tried, and the birds finally venture further away and for longer periods.

The first flights are jerky, and the birds alight very suddenly. Little by little, however, they learn to manage their body, wings and tail and practice increasing, sustaining and decreasing their speed. They soon acquire the grace and regularity which characterize old pigeons when flying and alighting.

There may be one or two timid birds in the loft which are afraid to fly. The pigeon man can take them 100 yards away from the loft and throw them into the air. After a few experiences of this kind, their timidity will be overcome.

2. GROUP FLIGHTS - SINGLE FLIGHTS - MOVES.

Carrier pigeons like to keep together and are instinctively inclined to fly in groups.

When the young birds have learned to fly perfectly, they begin to fly about the loft in groups. As they are strong and eager, free to come to their master or to evade him, they show an inclination to be independent. This should be checked immediately. As soon as the young birds "take up the group" the trainer must step in and regulate the flights.

There is no definite rule for this; it varies with the attitude of the birds, on account of the moves of the loft.

During the first days after the loft has been moved, the pigeons are anxious and careful. They go off on long exploration flights which are better than any forced flights. The latter are discontinued as long as the birds continue their investigations.

This period of exploration generally lasts two, sometimes three days. The pigeons have then become acquainted with the new situation of the loft and have located every detail of the surrounding country. They become quiet and sure of themselves and are inclined to stay at home. The regular flights should then again begin.

Physical and intellectual training should be carried on simultaneously. For this purpose the daily exercise should include two flights around the loft and one practice release.

Flights last half an hour at the least, an hour at the most, they are given before the pigeons have been fed, the morning flight as early as possible, the other early in the afternoon. They are followed by a distribution of grain and half an hour's rest in the loft. Once a week a flight is made late in the day, in order to gradually increase the length of the birds' day of flight. Every pigeon in good condition must take part in both flights, except those which have eggs or whose young are not yet feathered out, when the weather is very cold. One of the pigeon men must watch the flight of the group while the other one cleans the loft, washes out the fountain and changes the drinking water.

The trainer must see that the pigeons fly quite high. If a hawk threatens the group, he must fire a shot in order to kill or frighten it and then call the birds.

When the flight is about to end, he calls the birds by rattling the feed tin and scatters the grain inside the loft. The birds answer his call and trap promptly to get the grain put down for them.

Generally speaking, two practice releases should be made each day, one after the morning flight, the other after the afternoon flight. All the pigeons should take part in them, the cock-birds in the morning and the hens in the afternoon, in order not to interfere with the hours of setting of each sex.

The pigeons are released singly in order to correct their tendency to fly in groups and also to force each bird to use the instinct which will enable him to get his bearings and find the direction of the loft.

The pigeon men have a bicycle and a large training basket for this part of the training. One man goes out in the morning, the other in the afternoon. The one who remains at the loft receives the birds and gives them a few dainties when they return.

The hours at which the pigeons are released vary according to the season and the temperature. The pigeons are taken away after the hour's rest which follows the flight. Once a week, however, they are released very late in order to accustom them to releases of this kind.

The distance from which they are released varies according to the atmospheric conditions and the length of time during which the loft has been in the same place. The release must always take place unless there is heavy mist, strong wind, rain or snow.

The direction from which the birds are released is of little importance in the case of short distances. As soon as the distance is increased, they should always be released from the direction of the front,

IX. OPERATION OF MOVABLE LOFTS

1. FREQUENCY OF REMOVALS.

At the present stage of their development, pigeons appear to need two or three days after each move in order to become acquainted with and locate their zone of habitation. If the loft is moved frequently within this delay it is impossible for the birds to explore a very extensive zone and they are obliged to limit the use of their instinct to the immediate neighborhood of the loft.

For these reasons, the loft should be moved first every four days, then every six, eight, ten and twelve days. When the pigeons are to be used they may remain in the same place for four weeks without inconvenience.

2. CHOICE OF LOCATION.

Choose a quiet spot. Avoid the neighborhood of buildings, hay-racks, rows of trees and telegraph wires. High ground is always preferable. The pigeons naturally prefer it, and it enables them to explore the country without flying very high, and increases the visibility of the loft, which is of great advantage when training pigeons to home to a new location.

3. PRECAUTIONS TO BE TAKEN UPON ARRIVAL.

1. The loft must be so oriented that the back will form an angle of 45 deg. with the direction of the wind. The trap and one of the sides will thus be completely sheltered from the wind; harmful dampness will be avoided and perfect ventilation assured.

2. Be sure that the supports of the trailer-loft keep the floor level. This precaution is indispensable for the proper working of syphon-system drinking-troughs; it prevents the spilling of water and dampness.

3. Put up the tent (or hut) if one is available, against the loft, where it will be sheltered by the latter.

4. Clean out the loft. One of the pigeon men cleans the inside, the other the outside. Window panes, if any, must be carefully washed on both sides.

5. Dig a ditch 15 to 20 yards away from the loft and tent. Over this ditch the grain is sifted and all refuse from the loft is thrown, the accumulation in the ditch being thoroughly covered with earth.

6. Give the pigeons a heavy feed inside the loft. This will be the only meal of the day. If they are well fed, the pigeons will spend the rest of the day in observation.

7. Make certain that the drinking-troughs are filled with clear, cool water. If it is considered advisable to allow the pigeons to bathe, the bath pans should be withheld until the birds have had their fill of drinking water from the fountains, in order that they will not drink from the bath pan.

4. TRAINING PIGEONS TO HOME TO NEW LOCATION.

The day after the loft has been installed in its new location the pigeons become hungry and perch on the observation platform waiting to be fed. A distribution of dainties in the morning will amuse and refresh them. The attendants take their mid-day meal together and one leaves for the former loft location so he may drive away any pigeons that might return and show a desire to alight.

The training of pigeons to home to a new location includes two parts divided by an observation period of a few hours.

The first part is sub-divided into five successive phases:

1st. Phase - The pigeon man fills his pockets with favorite grains and only a little grain in the grain box, so it will make more noise when he calls the birds. He talks to the pigeons, shakes his box, scatters a handful of grain on the trap entrance, and slowly opens the sliding door wide enough to let a quarter of the pigeons out. The birds rush out and eat every grain. The keeper does not scatter any more, but distributes the remaining grain bit by bit and each bird tries to get it. The hungry birds beg for more and fly from the landing board to the roof for more. The distribution is prolonged in this way.

While the birds are being fed, two things may happen:

1. A few birds may leave the group and fly away, while the others continue to feed. A few calls with the grain box, and the sight of the others eating fresh grain will bring them back.

2. If the group is frightened by an unexpected noise, or startled by the sudden departure of a few birds, it may fly away suddenly in a flock. Some of the birds in the loft should then be brought out to be used as decoys; scatter a little grain on the sand box, open the slide and let about ten pigeons out, just when the group is flying facing the trap. The newcomers flock to eat the grain and squabble

over those which are distributed by the master one by one. The other flock is called by the shaking of the grain box. They notice what is going on, and after circling a few times more, they return to the loft.

2nd. Phase - The second quarter of the stock is then let out and treated as above. This is the second phase of the first part.

3rd and 4th Phases - The first flock, consisting of half the total stock, circles around and then returns to the loft. The 3rd and 4th quarters are then let out and treated in the same way as the first.

5th. Phase - The birds, having been liberated in installments, have flown around the loft. As the grain was distributed very sparingly, the birds are still hungry. The keeper leaves his ladder and enters the loft. After calling the birds, he distributes the heavy grain; and a few grains of maize. All the birds come in. The first part is then over. After having been given a drink of pure water, the pigeons return to their perches, nests and walking ledges. The rest of the day is spent in observation. The trap remains closed, and the birds are not fed again.

After a little practice in moving, the pigeon men are able to estimate the time needed for the first part of the training, and as soon as this time has passed, the second man returns to the loft.

The second stage takes place the next day, at 10 or 11 o'clock, according to the season. The pigeons are left hungry, and are given only a few dainties. This part includes two phases, the same precaution being observed as the day before. The birds are liberated in two groups, each containing half the total stock. The pigeons are called back inside the loft and rather lightly fed. The trap remains closed during the remainder of the day.

The second stage is rather short, and the second man can return to the loft for his mid-day meal.

During the afternoon the same process is renewed with all the pigeons at once, the trap is left open and the pigeons are free to do as they like. After this the pigeons and men resume their regular life. The pigeons are accustomed to the new location.

There are always a few exceptions to this general rule. It is possible that a few refractory birds may continue to return to the old site. The keeper must notice this and make a note of it, but it is forbidden for him to go back to get them. They will obey a stronger will than their own and return to the loft of their own accord. They are able to do this if they are of medium worth, if not, they are worthless and should be gotten rid of as soon as possible.

The refractory birds are not necessarily the worst ones. The pigeon man makes note of those who return to the loft, and in order to correct them and prevent them from leading others to follow their example, he only releases them after two days of regular flights, that is to say, the fourth day after the move. By this time, the rest of the pigeons will be accustomed to the new location, and their example will have no effect. The same precautions should be taken for the two succeeding moves.

5. PRECAUTIONS TO BE TAKEN BEFORE DEPARTURE.

After a few days of flights, training or trench service, according to the stage of training, the time comes for the loft to be moved again. The day and the new site is decided on by the officer or non-commissioned officer in charge.

Before leaving:

1. Clean the place which is about to be left for the last time.
2. Fill the trench which was dug at the time of arrival.
3. Carefully take down the tent.
4. Put some branches and pieces of paper on the abandoned site in order to disturb the refractory birds which might return later.

6. BRIEF PLAN FOR THE ORGANIZATION OF A TRAILER LOFT.

Stocking the loft. - Train the young birds to home according to the method required by their age.

1st and 2nd week. - Move every four days. - First flights and absolute freedom.

3rd and 4th week. - Move every six days. The pigeons are left free to make exploration flights during the three first days of each halt. Regular practice flights and daily releases during the last three days. The first two releases are made in a single group, the next two in groups of four. After this, the birds are released singly at distances not exceeding 1 mile in any direction.

5th and 6th week. - Move every eight days. At each halt: Exploration flights during the first three days: regular flights and releases during the next five days. Single release at distances of as much as 5 miles at the end of the sixth week.

7th and 8th week. - 12 to 15 days halt. Exploration flights during the first two days, then regular flights and releases. The latter can be made from distances of as much as 15 miles, weather permitting.

9th and 10th week. - Drills of a practical order. Internment in the trenches.

7. INCREASING THE STOCK OF TRAILER LOFTS WITH BIRDS FROM STATIONARY LOFTS.

It is possible, but extremely difficult to train the pigeons of stationary lofts to home to mobile lofts. It requires great prudence and numerous precautions, which are indicated in the following rules:

It is necessary:

To place the mobile loft or lofts which are to be stocked, or of which the stock is to be increased, in the immediate neighborhood of the stationary loft.

Make the pigeons endure certain deprivations in their old loft.

Distribute them among the mobile lofts, if there are several.

Make them like their new loft.

Show them that the old loft is uninhabitable.

Prevent the pigeons of the stationary loft from coming together during releases.

Be very strict with all refractory birds.

Close up the entrance to the old loft and place scarecrows on the roof.

Regulate the training by a few drills.

Accustom the new pigeons to be moved from place to place.

8. INCREASING THE STOCK OF TRAILER LOFTS ALREADY ESTABLISHED.

A. Installation of Mobile Lofts.

Three or four trailer-lofts are installed around the group in which is situated the stationary loft to be emptied. The site is chosen and the

birds are accustomed to their new surroundings as described above.

B. Privations in the Stationary Loft.

As soon as the trailer-lofts arrive, the pigeons of the stationary loft are made to endure certain privations.

The birds of the mobile loft will not become accustomed to their new surroundings until the next day, the birds of the stationary loft are deprived of food during this time.

They are also forced to endure other deprivations: the perches and boxes are taken down and left pell-mell in the loft. The pigeon man abandons the birds completely, only returning to the loft in the evening to give them a little water.

On the third day, the pigeon man enters the loft dressed in an extraordinary costume. He screams, gesticulates, and seizes the birds in order to put them in baskets. As the birds are already greatly disturbed by three days of isolation and deprivations, they are completely dumbfounded by this performance, and carry away a very bad impression of their old home.

C. Distribution of Pigeons in the Trailer-Lofts.

By this time the pigeons of the 3 or 4 mobile lofts have become accustomed to their new surroundings.

In order to give a definite idea of the method of procedure, we shall suppose that the stationary loft contains 100 pigeons, and that they are to be divided between 4 trailer-lofts.

The number of trained pigeons, since they are to be used as decoys, should be greater than the number of those to be trained. A suitable proportion is 2 to 1; the 4 trailer-lofts should therefore contain 50 pigeons each, at least. The 100 pigeons of the stationary loft are divided into 4 lots of 25, without separating pigeons which have mated. Each lot of 25 is given a celluloid band of a different color, so that the pigeon men will make no mistake in distributing the birds between the various lofts and will not confuse the old and new birds of a same loft.

D. Comfort in the trailer-loft.

The 25 pigeons which have been transferred from the stationary loft are placed in the trailer during the afternoon flight of the third day (3rd flight). The pigeon man enters the loft in his ordinary clothes, talks to his new pigeons, and takes them out of their basket one by one. They are still frightened, and remain stupified and timid for a few minutes. The pigeon man then sits down in the center of the loft, calls the birds and offers them some of their favorite grain. The hungry birds flock to him. In order to avoid indigestion after such a long fast, only the most easily digested grain is distributed; maize, and rice, and not too much at a time.

Food is the most important factor in training pigeons to home to a new loft. Nature demands her rights; and as the birds have become thin from lack of food, they are pleased by the plentiful distribution of grain and wait for it anxiously; they grow used to the new loft and become attached to it.

Ownership, and affection for their mates are also important factors. A perch and nest box should be reserved for each squeaker, where he can live and which he can consider his own property. For the young birds,

which are old enough, mates should be chosen among the regular inmates of the mobile loft which are willing to accept them. If the latter have already chosen a nest of their own they will willingly share it, and thus new ties will be formed by the birds' affection for their mates and the ownership of their home. If there are already old mates among the trained birds, they should not be separated, but should be given a nest box of their own where they can live happily together.

This method should be adopted for eight days during which time the birds become accustomed to life inside the loft, to their surroundings, and to the return from flights of the old inmates.

E. First Flights.

The first flights are intended: to show the pigeons that their old loft is uninhabitable.

They should be so arranged that: The pigeons of the stationary loft will not find themselves back at the loft together.

On the morning of the ninth day, the birds are released for the first time at one of the mobile lofts. As soon as they are free to go where they will they are attracted by their old home, and the greater number return to it. It is better for the pigeons to do this than to adopt their new home without difficulty. When they return to the old loft, they will not find their former companions, and must realize that:

1. The greater number of them have definitely abandoned the quarters.
2. The loft is really uninhabitable; that there is no feed, no water and no place to perch.

For this purpose, the pigeons are released before being fed, and from a single loft at a time. All the fittings are taken out of the stationary loft.

The pigeons are caught and carried back to the mobile loft where a distribution of their favorite grain, the kindness of the attendant, together with the comfort of the perches and nesting boxes make them realize the contrast between the two lofts.

A first flight is thus given at each loft, in the morning. The second flight takes place in the afternoon in the same order. This time in addition to the privations mentioned above, the pigeons are also punished. Those who return to the old loft are frightened by the cries, gesture and costume of the pigeon man; they are beaten with a handkerchief, pushed and rolled into the corner, and not caught until, completely worn out, they no longer try to avoid the blows.

The operation is repeated the next day, the morning and afternoon flights taking place at the various mobile lofts in succession. The severe punishment of the day before is repeated for all the refractory birds, and instead of being carried back to the loft they are thrown out of the trap.

At the end of the second day's flight it may be estimated that two-thirds of the pigeons will have definitely adopted their new loft.

Important remark: Care must be taken to keep the trap of the stationary loft closed during the whole performance, so that it will be impossible for the birds to escape when they hear the attendant coming to punish them.

F. Severity towards the refractory pigeons.

After the third day of flight, the pigeons of the 4 trailers are released simultaneously. The refractory pigeons are treated in the same way as the day before. Great severity is shown at the old loft and the attractions of the new loft are increased. At the end of the fourth day

it may be estimated that 85% to 90% of the birds will have definitely adopted their new quarters.

G. Closing the old Loft.

After the fifth day the entrance of the loft is closed up by some device which is very noticeable, such as sacks or boards. Scarecrows are placed on the trap and on the roof. The pigeon man of the stationary loft must drive away any pigeon which returns to circle around it. By the evening of the sixth day the training is generally completed. The total loss, if any, will not exceed 5%.

H. Training Pigeons which have been taught to home.

In order to regulate the training of the new birds, the pigeon man of the trailer begins to give a few drills, in groups and singly, after the seventh day. The pigeon man of the stationary loft keeps watch and drives away any birds which persist in returning to their old quarters.

I. First Practice in moving.

On the morning of the tenth day, move 10 yards and turn the loft in the opposite direction. Release the birds in the afternoon.

On the morning of the eleventh day move 25 to 50 yards. Release the birds in the afternoon.

On the morning of the thirteenth day move 100 to 150 yards. Release the birds in the afternoon.

On the morning of the fifteenth day move 500 to 600 yards. The next day (sixteenth) accustom the old birds to the new location, and the new birds the day after that (seventeenth) when the old ones are already trained.

The birds are accustomed to new locations in this way, according to the rules given in the special chapter devoted to this subject, the two classes being treated differently. The first class, which includes the old birds are trained to home to the new site in the usual way, and the second class, including all the new birds, a few days later, when the training of the others is finished.

After a few moves under these conditions the pigeon man gradually transfers the pigeons of the second class to the first class, as soon as they are sufficiently well trained.

J. Ordinary Method of Training Pigeons to Home to a Trailer Loft.

In this case an empty trailer loft is sufficient. The problem consists in training all the pigeons of the stationary loft to home to the trailer.

The method used is the same (for later training it is advisable to distribute the birds between trailer lofts which have already been established).

X. NIGHT TRAILER LOFTS.

A. General Remarks.

The efforts made in 1916, to create lofts were entirely successful, thanks to the untiring devotion of the loft specialists.

1,200 pigeons were chosen and distributed among 15 lofts, where they were given a special training. 400 of these pigeons went through the tests successfully, and proved themselves capable of assuring liaison by night between their loft and the firing line.

Under the same conditions, this first selection should make it possible to obtain much better results during the second year's work. But, however interesting these results may be from the point of view of pigeon fanciers, they may be of no military value if they are obtained in stationary lofts attached to the terrain. It is, therefore, necessary to establish night trailer lofts in which the pigeons trained in the armies may be carried to the districts where they are needed.

The problem is of difficult, but seemingly not impossible solution. In fact, we know that the operation of mobile day lofts is entirely satisfactory, and that stationary night lofts are also able to operate. In order to obtain these results, difficulties of a different order had to be overcome. It is, therefore, permissible to hope that the same pigeons carefully selected and well trained, will be able to overcome all these difficulties combined.

Each army should, therefore, endeavor to organize one or several trailer lofts for night work.

B. Arrangement of the Lofts.

Trailer lofts are well adapted for the purpose. All that is necessary is to add movable panels of red calico to cover all openings and a walking ledge at the exit trap. These arrangements must be made in the army.

C. Stocking the lofts.

Night trailer lofts will be stocked:

With young pigeons bred from highest grade pedigreed flying parents.

XI. TRAINING OF NIGHT PIGEONS.

1. General Rules.

A. Time Schedule.

The morning is devoted to accustoming the pigeons to mobility.

The afternoon is devoted to night training.

The pigeons are trained to mobility according to the rules given in the chapter specially devoted to this subject.

Night training is begun by a period of rest lasting until nightfall, and terminated by a practice flight or release, first at twilight, then at night.

B. Diet.

Two feeds a day. - The first, very light, must leave the pigeons fairly hungry. It is distributed half at a time, after the morning flight and practice release; only a few grains are given each time to each pigeon.

The second feed is very plenteous. It is given each day by artificial light, at night not at twilight. All the red panels are put up for this purpose. When the pigeons fly or are released at nightfall, the grain is distributed after the flight or release. However, when the

pigeons have become accustomed to night flights they must not be left too hungry; their flights will then last longer.

C. Light. - Rest for the Pigeons.

The pigeons are exposed to the sunlight in the morning. The red panels are put up about noon, and the pigeons are kept as quiet as possible until twilight. The keeper must avoid disturbing the birds. They must rest and keep their strength and energy for the night flights.

Artificial light is supplied at twilight and is kept until half an hour after the night feed, in order to give all the pigeons time to drink.

2. Brief Program.

1st and 2nd week. Move every four days. First flights and absolute freedom. Full light in the morning. In the afternoon the red panels are put up on the side from which the wind is blowing.

3rd and 4th week. Move every six days.

Time schedule for each period of six days.

A. The first three days: full light in the morning. At noon put up the red panels on the side from which the wind comes. Free exploration flights.

B. The last three days: full light in the morning, red panels on two sides in the afternoon. Regular practice flight early in the morning. Practice release before noon as described on pages 12 and 13. Rest period until twilight. Practice flight at twilight lasting until nightfall.

5th and 6th week. Move every 8 days.

Time schedule for each period:

A. The first three days: full light in the morning, red panels facing the wind at noon. Free exploration flights.

B. The last five days: full light in the morning, red panels at all windows at noon. Regular flight early in the morning, one hour's rest, practice release before noon. Period of rest until twilight, then night drills: every other day a flight around the loft; every other day a practice release: the first time in groups of four, the second time in groups of two, the third time singly.

At night the pigeons are released from the same point as in the morning, at a distance exceeding 1/2 mile.

7th and 8th week. Fifteen days halt.

A. The first three days, same as above.

B. The last twelve days: the night flights are given fifteen minutes later each day, so that the pigeons may be released after dark. The distance from which the releases are made is gradually increased to 3 miles.

9th and 10th week. Three weeks halt.

Distance of release gradually increased to 10 miles.

11th and 12th week. Three weeks halt. Drills of a practical and useful nature. Interment and releases in the trenches.

XII. DISEASES AND AILMENTS.

A. Medicines.

The following table of medicines with their doses and therapeutic actions will be of value to the attendant in treating diseases.

Laudanum: Dose 1/2 to 3 drops - useful in allaying pain and to arrest the discharges of diarrhea, etc.

Alum: (Astringent) - Dose 1/2 to 1 grain - useful in treating canker.

Cod Liver Oil: Excellent in treating wasting diseases such as Going Light, etc. Give 3 to 5 drops in capsule three times a day.

Epsom Salts: 1 to 5 grains - used as cathartic.

Phosphate Soda: 1 to 5 grains as gentle aperient and stimulant to the liver.

Castor Oil: (Purgative) 1 to 5 drops given in a capsule.

Beneficial in healing the bowels after a severe case of diarrhea.

Compound Tinc. Gentian: (Tonic) 1/2 to 1 drop. Can also be given in drinking water. 1 tablespoonful to gal.

Sulphate of Soda: Dose, 1 to 5 grains. Same action as Epsom Salts.

Alum: (Burnt) - Used to dust throat of cankered bird. Helps dry up canker.

Tinc. Iodine: (Antiseptic) Used on open wounds and pox-marks on body and legs. Do not apply to eyes or throat.

Potassium Permanganate: (Eye strength solution). Drop enough in one pint of water to color a rich claret shade and apply to affected parts (roup and colds) with feather or swab.

Hypophosphites Lime and Soda: (Tonic and tissue builder). Very useful in treating birds going light - Dose 1/2 grain 3 times daily.

Dalmation Powder: Dust feathers of infested birds thoroughly. Hold bird by wings with the left hand and apply powder with blow-gun.

Tincture of Iron: Dose 5 drops to 1 gallon of water. Useful as a tonic.

Peroxide of Hydrogen: (Antiseptic). Used on open wounds and for canker. Apply with swab or dropper.

Bicarbonate of Soda: (Baking Soda) Dose 1 tablespoonful to half glass of water. Useful for purification of crop after attack of sour crop or indigestion.

Boracic Acid Crystals: Useful as an eye lotion. Solution of 1 to 100. Apply frequently.

Carbolated Petrolatum: For application to open wounds, bruises, etc. Healing and soothing. Apply liberally.

Zinc Ointment: For application to open wounds, bruises, etc. Healing composition. Apply liberally.

Nitrate of Silver: Throat wash. Apply with a swab. Solution - water 4 ounces - nitrate of silver GrXX.

Quassia Chips: For eradication of feather lice. A handful of chips soaked for twenty-four hours in the water for the bath. About twice a month will be efficacious.

B. Treatments.

In all cases where a bird is observed to be out of condition or ailing in the least the attendant should immediately isolate it from the rest of the flock and observe the symptoms of its ailment.

Whenever from the symptoms, the attendant is unable to ascertain the form of sickness, he should immediately confer with the Post Veterinarian; and if in need of medicines or drugs, he should likewise go immediately to the Post Veterinarian and state his needs.

It will usually be possible to obtain drugs and medicines in small quantities from the Post Veterinarian if there be one, and if not, from the Post Hospital.

(In connection with diseases it might be said that immediately upon the discovery of a stray bird in the loft, it should be taken out and given

its liberty, as a precautionary measure. If the bird again returns to the loft, kill it unless it be a government banded bird, in which case it should be separated from the rest of the flock and a notice of its presence given to the proper authority. In any event isolate it while awaiting disposition. The bird may carry infectious disease germs.)

CANKER (Contagious)

In throat: This disease is frequently caused by scoured or soured grain, foul water, crowded loft, etc.

Symptoms: When canker begins to form in the mouth, the mucus membranes begin to grow paler each day and finally a substance resembling cheese forms on either side of the throat, gradually growing in size until the bird can hardly breathe. About this time the cheesy matter, if not removed, changes, and minute ulcers form, which if allowed to run will destroy the membranes and rapidly cause the bird's death.

Treatment: Wash out the mouth with a mild solution of salt water. Then take a small pinch of Burnt Alum and dust down the bird's throat. Moisten throat with a little sweet oil once a day after the operation. In all cases the cheesy matter must be first removed with a pointed stick.

On Eye Cere: Take five cents worth of red sage and five cents worth of burnt alum. Put into about 1 pint jug and pour boiling water over it. When cold, strain and put in jar. Quickly pull out pustule and apply above to spot, with camel hair brush or soft feather.

In Ear: The cheesy matter here gathers in the bird's ear. Remove as much of the matter as possible without injuring the surrounding flesh and wash with a solution of Peroxide of Hydrogen. Great care must be taken to avoid making the affected parts bleed.

POX (Infectious)

Pox is an infectious disease that shows up in the form of a warty looking lump breaking out on the eye, and nose wattle, the neck and legs. It will spread through the entire loft in a remarkably short time.

Swab the affected parts 2 or 3 times daily with tincture of iodine. Give Gentian tonic in drinking water.

COLDS

When the bird takes cold the symptoms will be sneezing, slight discharge from the nostrils and watering of the eyes.

A little potassium permanganate in the drinking water will be sufficient treatment.

ROUP (Infectious)

This is the name given to diseases of the mouth, throat and nose where the membranes become inflamed and the secretions somewhat thickened. Roup is usually caused in the beginning by poor ventilation of overcrowded loft and seldom appears when the loft is kept in a good sanitary condition. The bird affected will have a high fever and an offensive breath, with the breathing constricted by secretions of the mucus membranes. Offensive discharges come from the nostrils and bubbles appear in the mouth and sometimes in the corner of the eyes.

Treatment: Feed the most tempting and nutritious food, such as hemp, and give tonic in drinking water. Give 1/4 grain 3 times daily

of Hypophosphite of Soda and Lime. Wash out the mouth and eyes twice daily with a solution of Potassium Permanganate (eye strength).

SOUR CROP (Infectious)

This disease is caused by wet, sour or scoured feed or by the bird's eating some foreign element that completely upsets its system. The bird becomes sick, vomits frequently and usually contracts diarrhea. Sometimes a large amount of gas is formed in the crop and it becomes greatly swelled.

Gently work out all matter in the crop. Change the diet and put a little tincture of Gentian in the drinking water. Feed rice for a few days to check the diarrhea.

If the sickness is in an advanced stage, take a pinch of Venetian Red, such as is used by painters and mix it with a half gallon of water. Remove all other water from the sick pen and force the birds to drink this.

GOING LIGHT (Infectious)

The disease usually starts with diarrhea and the bird soon begins wasting away. It refuses to eat and finally dies, having wasted away to a mere skeleton.

Remove ailing bird and pull each feather from his tail, starting at the middle and working toward each side. Feed plenty of hempseed and give capsules containing 3 or 4 drops of Castor Oil 4 times a day. (This may also be given with a medicine dropper).

When the bird is convalescing, the tonic (tinc of gentian) should be given in the drinking water.

(N.B. - It must be borne in mind that a bird, after having gone light, will seldom amount to much, either as a flier or as a stock bird, unless it is of a blood line, especially wanted in some mating or is an exceptionally valuable bird, it should be killed.)

WOUNDS

In case of a wound (gunshot wound for instance) it will be necessary to locate the shot or any other foreign matter and extract it. Cleanse the wound with tincture of iodine, applying the solution twice or three times a day. Be sure that all dirt, feathers, etc., are removed from the wound or blood poisoning is liable to set in.

UNFED YOUNGSTERS

When the young are neglected in the nest and the old birds refuse to feed them, it is often the case that the squeaker's throat is coated with a slimy scum. Use a throat wash, nitrate of silver gr. xxx-water 4 oz. This wash can be applied with a camels hair brush.

MITES

In every loft, no matter how well regulated or cleanly kept it is, mites will eventually make their appearance upon the birds. There are two kinds, the feather louse, which is simply an annoyance, and the small bloodsucking parasite which greatly injures the health of the bird.

The infested bird will be noticed kicking his feet and nervously flapping his wings.

Hold the bird in the left hand by the wing butts, with both wings extended from the body. Dust thoroughly with Dalmation powder. After dusting place bird in a nest or some other place for 5 to 10 minutes, where there is not flying room, so that the powder will have a chance to get to work.

Feather lice may be eradicated by supplying a handful of quassia chips (obtainable at any medical dispensary) to the bath. They should be allowed to soak overnight before the bath is put down for the birds. The solution is not injurious to the birds in anyway, and will destroy feather lice.

C. Prevention of Disease.

It is much easier and more important to know how to prevent disease than it is to cure it. Cleanliness is the most vital precaution against disease. It should be remembered:--

1. That insect parasites cause disease indirectly by sapping the bird's strength.

2. Directly as germ carriers by transmitting microbic infection either from pigeon to pigeon in the same loft or from poultry yards or pigeon lofts in the vicinity.

3. That sparrows and other birds which enter the loft may import parasites and disease.

Accordingly it is impossible to lay too much stress on the following:--
Nests, perches and landing shelf must be kept clean and disinfected. This is best accomplished by liberally applying whitewash to which has been added small quantities of kerosene or crude carbolic acid to the entire interior of the loft and fractures.

Loose or scattered grain is at no time to lie in the loft. Such grain becomes fouled and when eaten by the birds causes serious internal derangement.

If there are sick birds to be handled, the attendant must be careful to wash the hands and brush the clothes after handling them. Whenever practicable one man should be detailed to handle them and he should not come in contact with healthy birds immediately afterwards.

XIII. IDENTIFICATION

A. Loft numbering and Pigeon Marking.

All lofts, stationary and mobile, will be numbered.

The lofts being similar in structure it may happen that a few pigeons will return to and enter the wrong loft in error; but if the precaution has been taken to stamp the pigeon's wing with the number of the loft to which it properly belongs, the errant bird can be identified and restored to its proper loft. This method of stamping the wing has proved of value in the French Pigeon Service and its adoption where a number of lofts are in use is advisable.

In addition to the metal identification band on each pigeon's leg, and which is for the purpose of pedigree breeding, and to identify birds in case of loss of wing feathers, through moult, accident or otherwise, every pigeon will be stamped on the fifth or sixth large feather on the right wing with the letters U.S.A. and with the letters and numbers designating the particular loft to which it belongs as per the following designations. It is desired that this marking be done by means of the rubber stamps and ink pads designated as part of the loft equipment.

B. Serial Numbering and Designation.

Dept. Hdqrs. & Military Posts and Camps.
(Exclusive of Overseas Lofts)

Serials: 1 to 70

Division Cantonments

Serials: 71 to 175

Training Camps or Schools

Serials: 176 to 186

Aviation Section Flying Schools & Fields.

Serials: 187 to 237.

Loft Designation Letters:

H: Dept. Headquarters Loft.
P: Military Post Loft.
D: Division Loft.
T: Training Camp or School Loft.
A: Aviation Section Loft.
S: Stationary Loft.
M: Mobile Loft.

Example:

D-S: Division Stationary Loft.
D-M: Division Mobile Loft.
A-S: Aviation Section Stationary Loft.
A-M: Aviation Section Mobile Loft.

The following serial numbers are assigned to lofts at:

O.C.S.O., Washington, D. C.	- - - - -	H-M-1
Dept. Hdqrs., Northeastern Dept.,	- - - - -	H-S-2
" " Eastern (Gov. Island)	- - - - -	H-S-3
" " Southeastern Dept.,	- - - - -	H-S-4
" " Central Dept.,	- - - - -	H-S-5
" " Southern Dept.,	- - - - -	H-S-6
" " Western Dept.,	- - - - -	H-S-7
" " Panama Canal Zone,	- - - - -	H-S-8
Fort H. G. Wright,	- - - - -	P-S-9
Fort Hancock, N. J.,	- - - - -	P-S-10
Fort Dupont, Del.,	- - - - -	P-S-11
Fort Monroe, Va.,	- - - - -	P-S-12
Fort Slocum, N. J.,	- - - - -	P-S-13
Fort Amador, Panama Canal Zone,	- - - - -	P-S-14
Taboga Island, Panama Canal Zone,	- - - - -	P-S-15
Corozal, Panama Canal Zone,	- - - - -	P-S-16
Empire, Panama Canal Zone,	- - - - -	P-S-17
Gatun, Panama Canal Zone,	- - - - -	P-S-18

San Lorenzo, Panama Canal Zone, - - - - -	P-S-19
Fort Sherman, " " " - - - - -	P-S-20
Fort Randolph, Panama Canal Zone, - - - - -	P-S-21

MEXICAN BORDER LOFTS

Brownsville, Texas, - - - - -	P-S-22
Fort Ringgold, Texas, - - - - -	P-S-23
Fort McIntosh, Texas, - - - - -	P-S-24
Del Rio, Texas, - - - - -	P-S-25
Eagle Pass, Texas, - - - - -	P-S-26
Marfa, Texas, - - - - -	P-S-27
Fort Bliss, Texas, - - - - -	P-S-28
Hachita, N. M., - - - - -	P-S-29
Douglas, Arizona, - - - - -	P-S-30
Nogales, Arizona, - - - - -	P-S-31

DIVISION CANTONMENTS

Camp Greene, N. C., - - - - -	D-S-74
Camp Saml. F. B. Morse, Leon Springs, Texas, - - - - -	D-S-75
Camp McClellan, Ala., - - - - -	D-S-76
Camp Wheeler, Ga., - - - - -	D-S-77
Camp Fremont, Calif., - - - - -	D-S-78
Ft. Bliss, Texas, - - - - -	D-S-85
Camp Wadsworth, Spar tanburg, S. C., - - - - -	D-S-97
Camp Hancock, Augusta, Ga., - - - - -	D-S-98
Camp McClellan, Anniston, Ala., - - - - -	D-S-99
Camp Sevier, Greenville, S. C., - - - - -	D-S-100
Camp Wheeler, Macon, Ga., - - - - -	D-S-101
Camp Logan, Houston, Texas, - - - - -	D-S-103
Camp Cody, Deming, N. M., - - - - -	D-S-104
Camp Doniphan, Ft. Sill, Okla., - - - - -	D-S-105
Camp Bowie, Ft. Worth, Texas, - - - - -	D-S-106
Camp Sheridan, Montgomery, Ala., - - - - -	D-S-107
Camp Shelby, Hattiesburg, Miss., - - - - -	D-S-108
Camp Beauregard, Alexandria, La., - - - - -	D-S-109
Camp Kearny, Linda Vista, Cal., - - - - -	D-S-110
Camp Devens, Ayer, Mass., - - - - -	D-S-146
Camp Upton, Yaphank, L.I.N.Y. - - - - -	D-S-147
Camp Dix, Wrightstown, N. J., - - - - -	D-S-148
Camp Meade, Annapolis, Jct., Md., - - - - -	D-S-149
Camp Lee, Petersburg, Va., - - - - -	D-S-150
Camp Jackson, Columbia, S. C., - - - - -	D-S-151
Camp Gordon, Atlanta, Ga., - - - - -	D-S-152
Camp Sherman, Chillicothe, O., - - - - -	D-S-153
Camp Taylor, Louisville, Ky., - - - - -	D-S-154
Camp Custer, Battle Creek, Mich., - - - - -	D-S-155
Camp Grant, Rockford, Ill., - - - - -	D-S-156
Camp Pike, Little Rock, Ark., - - - - -	D-S-157
Camp Dodge, Des Moines, Iowa, - - - - -	D-S-158
Camp Funston, Ft. Riley, Kans., - - - - -	D-S-159
Camp Travis, Ft. Sam Houston, Texas, - - - - -	D-S-160
Camp Lewis, American Lake, Wash., - - - - -	D-S-161

TRAINING CAMPS AND SCHOOLS.

Camp Alfred Vail, Little Silver, N. J. - - -T-M-176 - - - T-S-177
Camp Stanley, Leon Springs, Texas, - - - -T-M-178 - - - T-S-179
Ft. Leavenworth, Leavenworth, Kansas, - - -T-M-180 - - - T-S-181
Presidio of Monterey, Monterey, Calif., - -T-M-182 - - - T-S-183

AVIATION SECTION FLYING FIELDS & SCHOOLS.

Wilbur Wright Field, Fairfield, O., - - - - -A-S-187
Rockwell Field, San Diego, Cal., - - - - -A-S-188
Chamute Field, Rantoul, Ill., - - - - -A-S-189
Scott Field, Belleville, Ill., - - - - -A-S-190
Selfridge Field, Mt. Clemens, Mich., - - - - -A-S-191
Kelley Field, S. San Antonio, Texas, - - - - -A-S-192
Post Field, Fort Sill, Okla., - - - - -A-S-193
Park Field, Millington, Tenn., - - - - -A-S-194
Call Field, Wichita Falls, Tex., - - - - -A-S-195
Love Field, Dallas, Texas, - - - - -A-S-196
Rich Field, Waco, Texas, - - - - -A-S-197
Ellington Field, Houston, Tex., - - - - -A-S-198
Taliaferro Field, Fort Worth, Tex., - - - - -A-S-199
Hazelhurst Field, Mineola, L. I., - - - - -A-S-200
Gerstner Field, Lake Charles, La., - - - - -A-S-201
Carlstrom Field, Arcadia, Fla., #1, - - - - -A-S-202
Dorr Field, Arcadia, Fla., #2, - - - - -A-S-203

A register will be kept at each loft, which will show the full particulars of each bird's ring number in a serial order. The color, the sex (in the case of older birds) and full particulars of any symbols stamped on the wings will also be entered.

In order to assist men who are not able to distinguish the sex of pigeons to separate the cock birds from the hens, it is usual to mark the birds on the back just above the tail. This is generally done at the lofts with ordinary red or blue marking ink, the cock birds being marked red, and the hens blue.

C. Divisions of Pigeons of a Loft Entering into Service.

The pigeons are divided into as many lots as there are stations. One lot of 12 per station. Three sets of 4 per lot.

When the pigeons of a loft begin work they are divided into sets which relieve each other in turn for the liaison of a same station or a same sector.

Experience shows that during periods of activity it is very difficult to prevent the troops to which pigeons have been allotted from prolonging the interment of the birds. This exceptional treatment, customary during active operations, is very pernicious. The increase in the time of interment in the baskets entails a corresponding decrease in the time spent at the loft, and eliminates almost completely the possibility of practice flights; the speed and reliability of the pigeon as a messenger, are thereby diminished. Under these conditions, it is absolutely necessary to divide the pigeons of a same loft or sector into such lots and sets. The sets are marked A.B.C.

Each lot of twelve birds should be banded with a specially colored spiral celluloid band, designating the station at the front to which each

lot is assigned. These various colors are definitely assigned to the several forward stations, and the birds should never be forwarded to any forward station other than the one station designated by the color of the spiral band.

Every pigeon put into service has on his wing the mark of the set to which he belongs, his band number and the year hatched.

The following rules must be observed when dividing the birds for the stations:

In the case of adult pigeons, the cock and hen bird of the same couple should be assigned to different lots, but to sets which are in service at the same time. In this way the two birds can be at the loft together during the days of rest, and as they will become aware of the fact after a few practice flights, this will increase their speed when making return flights from the stations.

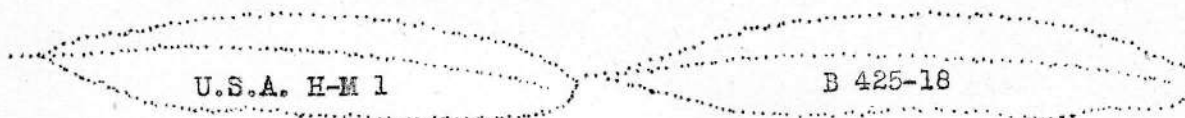
D. Marking the Pigeons of a Loft.

The nationality, nature and number of the loft are marked on one feather. The set, band number and year are marked on another feather.

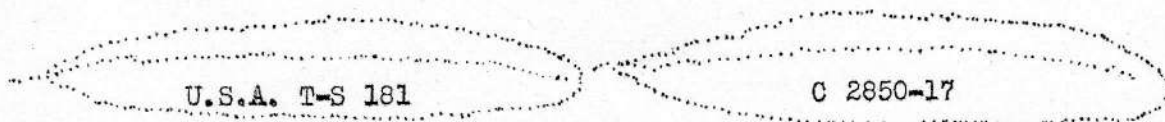
For example, the banded pigeon 285-18 (hatched in 1918) of the Division Stationary Loft at Camp Lee, in service in set A, will be marked;



The banded pigeon 425-18 (hatched in 1918) of the Headquarters Mobile Loft, at Washington, D. C., O.C.S.O., in service in set B, will be marked:



The banded pigeon 2850-17 (hatched in 1917) of the Stationary Loft at Fort Leavenworth Training Camp, in service in set C, will be marked:



XIV. DISTRIBUTION OF BIRDS FROM THE LOFTS TO PIGEON STATIONS.

The Signal Corps will be provided with motorcycles with trailer cages or other vehicles for the special purpose of sending up pigeons from the lofts, and these must be supplemented when necessary by the transport at

the disposal of the Corps. The usual procedure is for the Corps to arrange to send the pigeons to Divisional Headquarters, where they are handed over to the Brigade Signal Section.

In some localities, instead of sending baskets through Divisions, it may be better to send them out direct to specified places to which the Brigades concerned will send for the birds.

Formation or units demanding pigeons from the lofts should state whether the birds are to be sent out in stock baskets holding eight birds, in which they can be kept, if necessary, up to seven days. The pigeons suffer from the confinement, and if kept in baskets for any longer period will require many days' rest in the loft to recover.

From the lofts to the Brigade Headquarters, the birds should, if possible, be sent out in stock baskets.

Food, message carriers, message books, and a card of instructions are sent out with the birds from the lofts. Each basket should have a label attached, giving the date the birds left the loft.

Cock birds are marked RED, hen birds BLUE. Cock and hen birds are not to be placed together in an infantry basket, or in the same compartment of a stock basket.

Cock and hen birds are not to be released together.

Forward of Brigade Headquarters the birds should generally be carried up by hand in the infantry pattern basket. They should not be kept in these baskets for more than 40 hours, at the end of which time they should be released.

Transfer to infantry baskets at Brigade Headquarters must be done by a man trained to handle pigeons.

When taking a bird out of a basket it must be handled gently, the wings being pinioned with one hand. The birds must be taken out head first, and not tail first, as more wing flights are broken through this than any other cause.

When a unit which has a Pigeon Station is relieved by another, the Pigeon Station and its equipment should be handed over to the Commanding Officer of the incoming unit.

XV. CARE OF PIGEONS AFTER THEY HAVE LEFT THE LOFT.

(1) On the Defensive.

In the front line, at important Battalion or Company Headquarters, Pigeon Stations should be established and a daily supply of pigeons sent up to those stations.

This insures that in the event of other means of communication failing through bombardment or other causes, the pigeons are available during daylight as an alternative means of communication, that the pigeons themselves are trained to fly on the required route, and that if, as should be done, actual messages are sent with each pigeon, the officers and men who will have to use them in an emergency are accustomed to the method, and also the speed of transmission from the loft to the addressee is tested.

For training purposes the demands on the lofts should not be more than can be conveniently met, otherwise the pigeons will get stale and be of no use.

(2) In the Offensive.

Pigeons have proved a reliable and speedy method of getting back

messages through heavy barrages.

The distribution of pigeons depends on the number available. Four birds should be kept with the Brigade Forward Station and two of four kept in Reserve, if possible, at advanced Infantry Brigade Headquarters. A proportion of the available birds should be allotted to each attacking Battalion and of these, two pigeons will accompany the Headquarters of one of the assaulting companies of the Battalion. The pigeon men must be detailed to accompany certain definite officers.

A new type of pigeon basket to hold two pigeons will be issued to the Signal Corps for use in the assault. Birds should not be kept in these baskets more than 12 hours.

This new basket is small, light and inconspicuous, and can be strapped on to a man's back so as to leave his hands free.

(3) General Instructions.

The officer to whom a Pigeon Station is allotted is responsible for the messages sent and that the pigeons are kept in a suitable place and properly looked after. They must be kept as far as possible under shelter. Neglect of birds leads to bad flights and may endanger important messages.

Pigeons which have been roughly handled, have had their wing flights or tail feathers broken, have not been fed and watered, have been wet, and especially if they have become caked with mud, will make bad flights, and may even fail to reach their lofts. No food must be given other than the pigeon food sent out with the birds. Birds should not be fed until they have been 24 hours away from their lofts. They should be fed only once a day, half an hour before sunset. The water trough must be kept filled with clean water.

The message carrier is to be attached to the pigeon's leg, on which there is no identification ring, and care must be taken not to pinch the clips of the carrier so tight as to stop the circulation.

Gas-proof covers should be kept on the baskets, but should only be raised so as to cover the baskets completely when there is gas about; at other times they should be kept down so as to allow the free circulation of air to the pigeons.

XVI. PRACTICE WITH PIGEONS.

In normal times, from trenches within sight of the enemy, pigeons should not be released from near a Headquarters, the place and time of release being continually varied.

Each pigeon released should carry a message for transmission to an addressee.

1. Despatch and Receipt of Messages.

Before deciding to send off a message by carrier pigeon it is necessary to consider the importance of the message, the number of the birds available, the prospect of getting more up, and whether the message can be sent by other means. As pigeons are intended primarily to provide a means of communication for important messages when all other means have broken down, they should usually be reserved for an emergency.

Every message should be written in the Pigeon Service Message Book. The forms are specially made to fit into the Message Carriers which are supplied for each Pigeon Station and all the spaces on the form should

be correctly filled in. It is generally advisable to send two birds, each carrying a copy of the same message. If, however, the number of pigeons is few, and there is any uncertainty as to when further supplies will be available, instead of sending each message in duplicate by two pigeons, it may be advisable to send only one pigeon with each message and to send the duplicate of the last message sent, with the next pigeon flown.

Pigeons cannot be relied upon to home the same day if released less than one hour before sunset. They will not home at night unless specially trained. Ordinarily they are not released at night or during a thick fog unless the man who has the birds in charge knows they have had special training. It is always better to keep them until the weather is clear under ordinary circumstances. However, they are valuable under any conditions and there must be no hesitancy in releasing them at any hour of the day or night if any emergency exists.

The message carrier will hold two sheets of the Pigeon Service Message Book, but in an emergency, if it is necessary to send more than two sheets, a carrier may be attached to each leg of the pigeon. This practice, however, is undesirable and should be avoided if possible.

A sketch is a useful means of showing the situation concisely, and for this purpose a sheet torn from the Pigeon Service Message Book is convenient, and will fit into the message carrier.

Messages should normally be in code; there is always a risk of a pigeon straying and falling into the hands of the enemy.

All officers and, if possible, one man in each platoon, should know how to handle pigeons and fix message clips, while all officers should know how to fill in a Pigeon Service Message Form.

It is most important that the message should be clear and concise, and always contain time, date, place, unit, and signature.

2. Message Work.

A. Writing Messages.

Every message must be written on a form contained in the Pigeon Service Message Book, furnished for the purpose, but it should be written in a clear hand, care being taken to fill in all the particulars as required by the form. When completed this must be carefully folded, and rolled so that it will fit into the message carrier (if this be in use). No portion of the message form must be allowed to project over the top of the carrier; otherwise, the latter cannot be securely closed.

The message book provides for the making of three copies of every message. One copy is intended for retention in the book, and two copies are then available for despatch.

It is recommended that two copies of a message should be sent whenever sufficient birds are available for this procedure.

The address on the form will always be the final address to which it is desired that the message should be forwarded, by the Signal Service. The name or number of the loft to which the pigeon will carry the message is not entered on the form.

All names of individuals and of units are to be written in code. This is sometimes overlooked, especially in the case of sender's unit, which is often allowed to appear after his signature. If this is not done, the use of code words becomes not only negatory, but a positive source of danger, since there is always risk of the bird going astray and landing in the enemy's lines.

A sketch is often a useful means of showing the situation concisely, and for this purpose a sheet torn from the Pigeon Service Message Book

is convenient and will fit into the message carrier.

B. Fixing Messages to the Bird.

There are two methods of fixing messages on to the bird:-

- (1) By means of rubber rings;
- (2) By means of metal holders.

If rubber rings be employed, the message is bound round the leg of the bird on which the rubber rings have already been slipped. The rubber rings are first slipped apart up and down, so as to allow the message to be wound round the bird's leg. The operator will hold one end of the message in the left hand, which also holds the leg of the bird, and carefully wind the message round the leg with the right hand; the rubber rings are then carefully drawn inwards and over the message, in order to keep it in position. This method is admirably suited for securing the message, but it has the disadvantage of being more difficult of adjustment than the method of the metal holder. When fastening a message on the pigeon in this manner, it is best, - if not indispensable, - for the operator to obtain the services of an assistant.

The use of metal carriers is much simpler, and is the method in vogue. Message carriers must be made of aluminum and as light as possible. They should be placed on the lower part of the bird's leg, below the knee, but inside the leg, with the top of the carrier upwards. This must be done in such a manner that, when the bird settles, there is no pressure on its toes from the carrier; any pressure of this sort may frighten the pigeon and prevent it from entering the loft on returning with a message. The message carrier must be securely closed before it is placed on the bird's leg, otherwise the top of the carrier is liable to fall off, and the message lost. This mischance may also occur if the carrier is placed the wrong side up.

The metal bands of the carrier should be fixed firmly round the small part of the leg, but not pressed too tightly.

A pigeon without its message is useless.

Every Pigeon Station, whether in the firing line or not, will be placed under the orders of a definite officer, such as a Battalion or Company Commander, who will then be responsible for all messages sent by pigeon. When possible this officer should himself sign each message as required in Field Service Regulations. He will also be responsible for seeing that the pigeon baskets are kept in a suitable spot and properly attended. Any neglect of the birds will lead to bad flights, and worse still, may lead to important messages being lost.

Should a unit, entrusted with a Pigeon Station, be relieved by another unit, that Pigeon Station, together with its equipment, will be handed over to the incoming unit.

Before deciding to send off a message by pigeon, it is necessary to consider:-

- (1) The importance of the message;
- (2) The number of birds available;
- (3) The prospect of replacing birds so despatched; and,
- (4) Whether the message can be sent by any other means.

Pigeons should NOT be employed when other means of communication have not failed or are unlikely to fail.

The pigeon Service Personnel in charge of a loft is responsible for taking the message carrier off a pigeon on its arrival and for passing on the message for re-transmission without loss of time.

Arrangements for transmitting the message from the Pigeon Loft to the addressee will be made by the Commanding Officer of the Signal Corps in whose charge the loft is placed.

Most messages sent by pigeon, especially in Trench Warfare, lose much of their value if not transmitted at once so that, unless the pigeon loft is within a very short distance of the nearest signal office, it will usually be best to arrange for telephone or telegraph communication between the two.

The loft man must be trained to use a telephone so that he can transmit the messages. This will avoid the necessity of attaching special signal personnel.

In cases where secrecy is desired, it is possible to place the message in a small tube, which in turn can be inserted down the pigeon's neck into its crop.

On arrival at its destination, the bird can be made to regurgitate the tube; but the operations demand a little skill.

It is advisable for this reason that all carrier pigeons shot down or found dead in the field should be sent to the nearest headquarters of the Pigeon Service for examination.

XVII. THE USE OF PIGEONS FROM AIRCRAFT.

Success has attended the use of carrier pigeons when liberated from aircraft in flight.

For this kind of work the metal message carrier has given the best results; it must be attached in accordance with the instructions hereinbefore referred to. Over distances ranging from 20 to 30 miles in fine weather one pigeon can always be relied upon to reach home with a message. In bad weather, or over greater distances, the message should be sent in duplicate by two separate pigeons.

In the case of observation balloons and airships, should the pigeons have been on board more than one day, they should be given food and water twice a day until liberated. This food and water should be given just after daybreak. The birds will then only require water before liberation.

If the pigeons are to be used from aeroplanes, it is assumed that they will be liberated the day they are taken on board, and it will not be necessary to feed or water the birds. From this class of aircraft, pigeons should always be released in such a manner that they will first move with the wind. To insure this result the pigeon must be held firmly in the hand; it must be thrown forcibly downwards and sideways in the direction the wind is blowing, so that the wind may assist it to clear the machine. There is some risk of the flight, and tail feathers being pulled out when liberating the birds if this is badly done. Pigeons must not be subject to cold currents of air during the flight of the aircraft.

At night, in fog or in very bad weather, pigeons should only be liberated from aircraft in cases of real urgency, as the chance of their homing under these conditions is always doubtful. Nevertheless, if the bird can manage to find a safe landing-place for the night, it will resume its homeward flight during the early hours of the following day.

XVIII. FAILURES OF THE PIGEON SERVICE.

A. Failures of Management.

The following have been found to be various causes of failure in the use of carrier pigeons during recent operations:

- (a) The Headquarters of formations have omitted to allot Pigeon Stations definitely to Commanding Officers, and have not defined the responsibility of the latter for the despatch of messages;
- (b) Baskets of pigeons have been sent forward from the lofts to the places specified beforehand, but no arrangements have been made by the recipients to meet the birds;
- (c) Baskets have not been handed over to an officer or responsible Non-commissioned officer at Brigade Headquarters; but have been allowed to stand neglected for several days;
- (d) There has been neglect to water and feed birds when these have been away from their lofts;
- (e) The pigeons have been allowed to become caked with mud;
- (f) Messages have been badly written, not timed, and not signed by an officer.

B. Losses of Pigeons and Equipment.

Owing to the time required to train pigeons to home properly to a new loft, it may take weeks to replace lost pigeons. During actual fighting many losses are unavoidable, but losses, other than these are generally due to ignorance or to a lack of organization. It is only by eliminating such sources of failure that a continuous pigeon service can be maintained in a prolonged offensive.

Economy in the shape of stores is also essential; empty pigeon baskets and water troughs should be carefully returned to the lofts at an early opportunity; care should be taken to avoid any waste of message carriers, satchels containing message books, pigeon food or gas bags for pigeon baskets. These articles are not always easy to replace.

By direction of the Chief Signal Officer.

(Signed) F. R. CURTIS,

Colonel, Signal Corps.

-36- METRIC TABLES

: Centimeters :	Inches :	Meters :	Feet :	Kilometers :	Miles :
: to :	to :	to :	to :	to :	to :
: Inches :	Centimeters :	Feet :	Meters :	Miles :	Kilometers :
: Cm. :	Inches :	Inches :	Cm. :	M. :	Feet :
: 1 :	0.394 :	1 :	2.54 :	1 :	3.28 :
: 2 :	0.787 :	2 :	5.08 :	2 :	6.56 :
: 3 :	1.181 :	3 :	7.62 :	3 :	9.84 :
: 4 :	1.575 :	4 :	10.16 :	4 :	13.12 :
: 5 :	1.969 :	5 :	12.70 :	5 :	16.40 :
: 6 :	2.362 :	6 :	15.24 :	6 :	19.68 :
: 7 :	2.756 :	7 :	17.78 :	7 :	22.97 :
: 8 :	3.150 :	8 :	20.32 :	8 :	26.25 :
: 9 :	3.543 :	9 :	22.86 :	9 :	29.59 :
: 10 :	3.937 :	10 :	25.40 :	10 :	32.81 :

METRIC TABLE OF LENGTH	
10 Millimeters	1 Centimeter
10 Centimeters	1 Decimeter
10 Decimeters	1 Meter
10 Meters	1 Dekameter
10 Dekameters	1 Hectometer
10 Hectometers	1 Kilometer

METRIC TABLE OF VOLUME	
10 Milliliters	1 Centiliter
10 Centiliters	1 Deciliter
10 Deciliters	1 Liter
10 Liters	1 Dekaliter
10 Dekaliters	1 Hectoliter
10 Hectoliters	1 Kiloliter

METRIC TABLE OF WEIGHT	
10 Milligrams	1 Centigram
10 Centigrams	1 Decigram
10 Decigrams	1 Gram
10 Grams	1 Dekagram
10 Dekagrams	1 Hectogram
10 Hectograms	1 Kilogram

FRACTIONAL INCHES TO CENTIMETERS			
INCHES	CM.	INCHES	CM.
1/8	.049	5/8	.246
1/4	.098	3/4	.295
3/8	.148	7/8	.344
1/2	.197	1	.394

COMPARATIVE ANALYSIS OF VARIOUS GRAINS (PERCENTAGE OF DIFFERENT FOOD VALUES)

					NITROGEN	CRUDE:	
					FREE EXTRACT	FIBER	ASH
Arg. Corn	(Heating)	10.9	10.5	5.4	69.6	2.1	1.5
K. Corn	(Fattening)						
	(Heating)	12.5	10.9	2.9	70.6	1.8	1.3
	(Fattening)						
Peas	(Muscle and)						
	(Bone Builder)	13.9	23.2	1.9	52.6	5.7	2.7
	(Muscle and)						
Vetches	(Bone Builder)	13.3	25.9	1.8	49.8	6.0	4.2
Hemp	(Delicacy Only)	8.9	18.2	32.6	21.1	15.0	4.2