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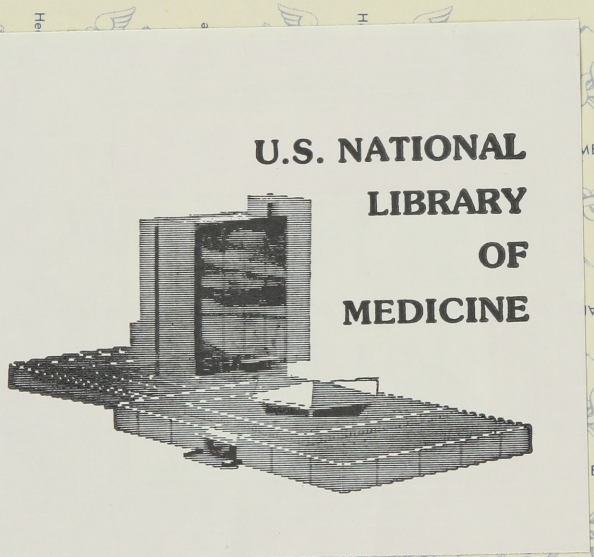

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U.S. Army. Signal Corps

History of the

AIRPLANE AMBULANCE

Compiled in the

OFFICE OF THE CHIEF OF AIR SERVICE

By

Colonel Albert E. Truby, M.C.

Chief Surgeon.

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AIRPLANE AMBULANCES.

Airplane ambulances have been used in the Air Service of the United States Army since early in 1918. The first one was actually constructed at Gerstner Field, La., in February, 1918. The early development of a necessity for transportation of this kind is well described by the officer in charge of training aviators at that station in a report submitted by him on this subject:

> "Gerstner Field is located in a low, swampy country, surrounded by many bayous. The roads are few in number and exceedingly poor. They become impassable after heavy rains.
>
> "The first flying accident that occurred at this field convinced me of the necessity of having some means of getting surgeons to the scene of crashes, as well as some means of transportation for the patient. As early as February, 1918, it was evident to me that airplane transportation was the only way of getting to the site of most crashes. Authority was therefore obtained to convert a JN 4 airplane into an ambulance. This plane demonstrated its great usefulness at once."

The success of this work at Gerstner Field was reported to the Chief of Air Service in Washington, and in July, 1918, he issued instructions that all flying fields convert a suitable plane into an ambulance for use in emergencies. These converted planes were extensively used at many stations, and it is known that the prompt first aid rendered and the speedy, comfortable trip through the air, instead of a tedious journey in a motor vehicle over miles of rough road, lessened much severe suffering, and in some cases actually saved lives. It is firmly believed that in both war and peace this means of transporting the sick and wounded will eventually become of great importance.

It is very evident, from the following news item abstracted from the Figaro, Paris, December 5, 1921, that the French Army is using airplane ambulances to an increasingly greater extent:

"It appears that the ambulance airplanes of the Levant and in Morocco are growing rapidly in their emulation of each other, which is both admirable and profitable.

"Every day a new record is made by one or the other.

"A few weeks ago in Morocco they made a remarkable record by transporting 18 wounded men 80 kilometers; now we hear that in the Levant they have just evacuated 44 wounded a distance of 400 kilometers over the desert of Syria between Deir-ez-Zor, on the Euphrates, at the southern border of our mandate, and Aleppo.

"This last operation is a record for transporting wounded by airplane. Moreover the conditions under which it was done and the advantages gained merit attention.

"After the victorious battles of the 24th and 26th of October, fought in the region of Deir-ez-Zor by Colonel Debieuvre against the warlike tribe of Ogueidats, who fought all the more fiercely against our troops because they had given a severe setback to the British in 1920, General Gouraud, High Commissioner in Syria, gave orders on October 26th to Medical Inspector Emily, Chief Surgeon of the Army of the Levant, and to Major Denain, commanding the Air Service, to prepare for the evacuation as rapidly as possible to Aleppo of the wounded we had during the course of these glorious combats.

"This work was rendered particularly difficult and dangerous, due to the fact that the 400 kilometers which separate these two places is an inhospitable desert, without landing places, occupied by hostile Bedouin tribes, the atmospheric conditions are characteristically severe in these regions and particularly because it was impossible to have a gas station at Deir-ez-Zor, which is 20 days from Aleppo by camel convoy.

"A detachment composed of all the ambulance airplanes in service with the Army of the Levant was immediately organized at Aleppo under the command of Lieutenant-Pilot Vindreau and of the Chief Surgeon of the Air Service in the Levant, Doctor Liegeois.

"On October 25th, a military surgeon, Doctor Chevallier, went to Deir by airplane to render the urgent surgical assistance needed.

"The same day five airplanes brought back 10 wounded covering in a few hours the 800 kilometers for the round trip from Aleppo to Deir-ez-Zor and return, a very remarkable performance when the difficulties enumerated above are considered.

"Evacuation continued the following days and soon all the transportable wounded—44 in all—were transported by air to the military hospital in Aleppo, making in three hours and a half and under very satisfactory conditions as far as comfort is concerned, a trip which requires at least a week by motor ambulance, and by camel or cacolet* more than three weeks over heavy roads which would have been very trying on the wounded men.

"Thanks to the airplane, Principle Surgeon Chartres, Division Surgeon of the 2nd Division, was able to go to Deir to superintend the evacuation and care of the wounded.

"Doctor Liegeois, who followed and directed the operations from the medical standpoint, estimates that, without counting the suffering that was avoided, five wounded men owe their lives to this method of evacuation.

"The results are a great honor to the Air Service of the Army of the Levant, and especially to the pilots who, not satisfied with being courageous war pilots, have on this occasion given proof of their skill, endurance and training by bringing safely into port all the wounded confided to them in spite of the difficulties of such a long flight.

"It should be noted that in all the time that this means has been used for evacuation in the Levant, not a single wounded or sick man has been the victim of an airplane accident.

(Signed) . . . . . .

* Form of saddle for horse or mule, carrying two men in a sitting position.

PRESENT DISTRIBUTION OF MEDICAL OFFICERS.

The ratio of medical officers to the strength of the Army was fixed by the Act of June 3, 1916, as the result of years of experience during a time when the requirements of the service increased rather as the result of the advance of medical science than of changed military conditions. This experience showed the necessity of 7 medical officers for every thousand enlisted men of the Army. The Act of June 4, 1920, continued substantially the same ratio, absorbing within this ratio, however, one Medical Administrative Corps Officer for every two thousand enlisted men.

With an Army of 280,000 as then authorized, it appeared likely that this ratio would enable the medical service to fulfill the usual requirements, to supply officers for the many additional features of military service which have developed since the beginning of the World War, and to supply details to the many educational projects that feature the new military policy of the country as defined by the National Defense Act of June 3, 1916, as amended by the Act of June 4, 1920.

Reductions of the Army and proposed reductions bring us face to face with a certainty that the ratio of 7 per thousand will reach a point in its downward slide with successive reductions in strength of the Army when only the positive necessities of the medical service can be maintained and beyond which this will be impossible.

The bill now in Congress, S. 3113, seeks to reduce the total number of officers of the Army, leaving the Medical Corps at 1,053 or 6½ per thousand of a force of 150,000 enlisted men plus 12,000 Philippine Scouts, and provide for the maintenance of 1,053 medical officers regardless of future reductions in the enlisted strength of the Army. Such a provision as this is vital. Without it the most essential feature of our military policy, the educational—such as the R. O. T. C., the training of the Organized Reserves and National Guard and those enrolled in the C. M. T. C.—will fail. With this guarantee of a sustained and constant strength the Corps may at least approximate the realization of its

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Sworn testimony of Colonel Albert E. Truby, M. C., taken by Colonel G. LeR. Irwin, I.G., June 3, 1921, Washington, D. C.

Q. Will you please state your name, rank and station.

A. Colonel Albert E. Truby, Medical Corps, on duty as Chief, Medical Division, Air Service, Washington, D. C.

Q. As Chief, Medical Division, Air Service, you have been interested in organizing an ambulance service in the Air, have you not ?

A. I have.

Q. Can you tell me briefly the steps that you have taken in organizing this ambulance service in the Air Service and also about the selection of the Curtiss Eagle type of plane forthis purpose and its suitability ?

A. Early in 1918, at some of our air service stations we had crashes where the necessity for an ambulance plane was very evident, in fact some crashes occurred at places such as at Gerstner Field where patients could not be reached by any other means of transportation. A plane was converted at that station which would hold a litter and it soon proved to be so valuable that the Chief of Air Service then called the Director of Aeronautics, issued instruction to all fields that they should provide themselves with such an ambulance plane. The result was that new planes were converted for this purpose and they have demonstrated their value at these Air Service stations. In fact, we know that a number of lives have been saved by getting patients to the hospitals promptly by airplane after crashes. At many stations these crashes occur away from all

roads and to haul by wheel transportation over rough fields and roads, men who have been seriously injured in crashes would often result in their death. By using the airplane ambulance, the patient is carried without any physical discomfort and is rapidly brought to the hospital. These planes are still in use at practically all of our fields for emergency work. No patient has ever been injured through this means of transportation.

Most of the planes mentioned above carry but one patient and the pilot. The Air Service felt the need of something larger and better so that the patient could have a medical officer present with him on these trips, consequently a few months ago, General Mitchell informed me that the Air Service had purchased several (two or three) Curtiss Eagle planes and told me that he thought they were admirably adapted for transporting patients as they were large enough to accommodate several at one trip, and also large enough to allow the doctor or nurse to accompany the patients. He asked me to draw plans for placing litters in one of these ships. I communicated with our medical officers at the Medical Research Laboratory at Mineola which is near the Curtiss Plant. They took up the plans with the Curtiss people and then referred them to the Air Service Engineering plant at McCook Field, and I believe that the contract was drawn up after the plans had been approved by the commanding officer of that field. I will give you a detailed plan of the interior of the ship.

This plan will show you that the litters were fastened to the side walls of the ship and to stanchions which were removable. It held four litters and four chairs in addition to the place for the pilot and

his assistant. In loading in this way there was no chance of the shifting of the personnel as the litters were fastened to the ship and the patients also fastened in the basket litters. This ship was Air Service property and did not belong to the Medical Department.

Before using this ship for the transportation of patients, I felt that it would be necessary to get War Department authority for a proposed trip which was not in the nature of an emergency. I asked that we be allowed to bring four patients with an attendant from Mitchel Field to Bolling Field so that these patients could be admitted to the Walter Reed Hospital. This was referred to the Surgeon General who recommended approval and also to General Mitchell for a statement as to the reliability of the ship. It was then referred to the Commanding General of the 2nd Corps Area, who also approved it. The War Department returned this disapproved, with a statement to this effect: Transportation by this means is not justified as long as there are safer means of transportation available. Consequently the ship was never used for transporting patients. It was brought from Mitchel Field to Bolling Field in order to demonstrate it to the class at the War College together with the demonstration of other types of planes. Telegram was sent to the Commanding Officer of Mitchel Field to send the plane down for that purpose. It was flown by the pilot in charge through a very severe storm. The War College demonstration was called off on account of the rain and was never held,however, I asked the Surgeon General and the officers in his office to inspect the ship and two trips were made carrying six to eight Medical Officers on each trip. The litters were removed in order to enable them to place chairs in

the plane for the passengers.

The ship was kept at Bolling Field and was, I think, used for flying around the field, in order that different pilots might try it out. Lieutenant Kirkpatrick, the regular pilot of the ship returned to Mitchel Field. The trip to Langley Field which resulted in the crash was probably authorized by proper authority. I do not know anything about it - The Medical Department had nothing to do with that trip and knew nothing about it. Lieutenant Ames, the pilot, was physically qualified as shown by our records. The examinations of all pilots in the Air Service pass through my office and no pilot is allowed to fly until the physical examination has been reviewed and I have certified that he is physically qualified for flying.

Q. Colonel Truby, do you consider that this Eagle Airplane was well adapted for ambulance purposes ?

A. From a medical point of view it was the best thing we have seen or heard of. The British have a plane which carries about the same number of patients. As to the technical points from an Air Service point of view I cannot say.

Q. Have you made flights in this plane ?

A. No, I never have. I contemplated making the trip with Lieutenant Kirkpatrick and the patients from New York to Bolling Field if it had been authorized.

This crash occurred two days before the bomb explosion at Aberdeen, otherwise this particular plane would have been available and would undoubtedly have been of great value in bringing the men injured in that explosion to Walter Reed Hospital. The value of this method

of transporting patients would then have been demonstrated. All of the injured could have been transported to Walter Reed Hospital the afternoon of the same day and much suffering and shock for the patients avoided. Furthermore, they would have been in a large modern hospital where skilled surgeons could immediately operate if necessary. Lieut. Eliason's life would undoubtedly have been saved. The weather was perfect and the trip by airplane takes but a half hour. I believe that the War Department would have approved of its use in an emergency of that kind.

Q. Colonel Truby, would you approve of the conversion of one of the other airplanes into an ambulance plane to replace this one that was crashed ?

A. I believe that before we use any planes carrying so many patients that it would be well to try them out under all weather conditions for six months or a year before we attempt anything of the kind again. I am of the opinion that this plane was very reliable but the question as to whether or notalarge plane is more apt to crash than a small plane in a big storm is, I think, still unsettled.

Q. Have you at any time heard of any criticism of this plane?

A. No, the reports which I have received have all been most excellent ones. General Mitchell first recommended it and Lieut. Kirkpatrick was most enthusiastic in his statements about the management of this ship.

Q. What opinion did the Surgeon General and the officers in his office express ?

A. They were most enthusiastic about it, especially those who took the trips, - no vibrations and no tilt and disturbance of any kind. Of

course, the trips they took were very short, - 10 to 15 minutes. The ventilation of the cabin was poor, but this was to have been corrected.

Q. Have you anything further to state in connection with this investigation ?

A. I might refer to the report of crashes which occurred in the Air Service during 1920, with particular reference to crashes which occurred in stormy weather. These statistics have just been compiled from reports of Flight Surgeons and have not been published, I do not know whether they should be published in this report. We had a total of 312 crashes in the Air Service during 1920, with total of 34 deaths among the pilots and 12 deaths among the passengers. 74 of these 312 crashes occurred in bad weather. Twenty-seven of them were reported as being due to stormy weather.

Q. Have you any suggestions looking towards eliminating accidents or lessening the number of accidents by improving the handling of airplanes ?

A. Of course, this matter is one with which I have nothing to do except as to the physical condition of pilots. The War Department has adopted all the recommendations which we have made along these lines and I amsatisfied that we have the best physical standards for pilots of any country in the world. They are strictly adhered to and there are no exceptions made.

Q. So there are three conditions. The condition of the pilot, the condition of the plane, and the weather. Your branch looks to the condition of the pilot, the Air Service looks to the condition of the machine, and the third one seems to be more or less loose, that is the sending of information regarding the weather ?

A. I may state that on this trip which we proposed to make from New York to Washington, the authorities at Mitchel Field were to telephone here and find out the local weather conditions and we had no idea of attempting anything in stormy weather. Furthermore, Lieut. Kirkpatrick who was to pilot the ship informed me that he could make the trip from New York to Washington and would always be within gliding distance of some landinf field, providing that he flew at about 8,000 to 9,000 feet elevation. He planned to do that. Under those conditions, I think there is very little risk in transporting patients by a ship of this kind.

Q. Is there anything further you wish to add ?

A. Nothing else.

AET/nbm

June 2, 1921.

MEMORANDUM for Major Frank.

1. Inasmuch as the War Department has recently disapproved of a request to transport patients from New York to Washington by airplane ambulance, it seems to me that a DH 4 would be of no use at McCook Field.

2. I do not know whether or not the War Department has any objection to continuing the custom of using airplane ambulances at our fields for emergency purposes. At some of the fields this method of transportation is the only way in which men who have crashed in inaccessible places can be brought back to the hospital. For this purpose we need a plane which could land in a very small space, and which is capable of carrying one patient and a medical officer in addition to the pilot.

3. I have collected photographs of all airplanes which have been used for this purpose in our service and all of the reports concerning details of construction, as well as other data which would be valuable in designing a plane which would meet our present needs. As this is a technical Air Service problem, it seems to me that a board should be appointed to determine the best type of plane to use for this purpose. I could easily give the board the information I have and also indicate what requirements from a medical point of view such a plane should possess.

4. It might be well to send these papers to the Commanding Officer, McCook Field, for a statement as to his views in the matter.

Albert E. Truby
Chief Surgeon.

ABT\nbm

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Chief Surgeon.

THE AIRPLANE AMBULANCE

By

Colonel Albert E. Truby, M. C.

For the Medical History of the World War
Feb. 9, 1922.
Sent to Editor
M. H. of War.

The first known report of any plans to transport patients by airplane was made by Captain George H. R. Gosman, Medical Corps, U. S. A., and Lieutenant A. L. Rhoades, Coast Artillery Corps, to the Surgeon General of the Army early in 1910. Gosman and Rhoades had constructed a plane at Fort Barrancas, Fla. It made its first flight in January, 1910. Shortly after this Captain Gosman brought his report to Washington and endeavored to obtain funds from the War Department for the work of improving upon this plane and using it for carrying surgical dressings and transporting patients. His mission failed, but he was undoubtedly the first to point out the great possibilities of the airplane for this purpose.

In February, 1912, in France, Dr. Duchaussoy (Blanchard, (R.) Le Transport des blesses en aeroplane. Paris Med., 1916-17, XXI, 53-55) suggested the use of an airplane ambulance. In April of that year the proposition was submitted to the representatives of military aviation, who reported it to the Secretary of War on May 23, 1912. So far as known, however, nothing came of this recommendation.

During the retreat of the Serbian army in November and December, 1915, thirteen wounded or sick were transported eighty to two hundred kilometers. This was an emergency measure and no special provision was made for doing this by modifying or changing the plane. The manoeuvre was successful and not only were they safely transported but escaped inevitable capture as well.

THE AIRPLANE AMBULANCE

By

Colonel Albert E. Truby, M. C.

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In France, during the World War, Dr. Chassaing, a member of the chamber of deputies, succeeded in inducing the Aviation Department to construct an airplane especially designed for transportation of two wounded men in a recumbent position. The airplane was first tried out at Villacoublay in September, 1917, and later on the Aisne front. The January 19, 1918, issue of "La Nature" contains an article descriptive of an airplane ambulance devised by Dr. Chassaing, mentioned above. This article was first brought to the attention of the Chief Surgeon of the Air Service, U. S. Army, on June 10th of that year.

In the United States service the necessity for this mode of transportation for fliers who were injured in crashes became prominent soon after flying fields were established. It was evident that an airplane ambulance would not involve the delay and discomfort of the ordinary ambulance at many of our stations where the roads were poor and the distances were great. This was especially true of victims of airplane crashes, who, while in a critical condition, frequently had to be carried long distances and by roundabout routes to reach a hospital. In addition, it was seen that a flying ambulance would offer a means of getting a medical officer to the patient quickly, which in some instances would mean the saving of life. So far as records show, the first flying field to use the airplane in transporting medical officers to the site of crashes, and also for transporting patients, was Gerstner Field, Lake Charles, La. This station is located in low, swampy country, surrounded by many bayous. Crashes occurred at places which could be reached by no transportation except the airplane. Consequently, in

February, 1918, the commanding officer authorized the conversion of a JN4 airplane into an ambulance, and it was completed and commissioned during that month.

Major Wilson B. Driver, Medical Corps, and Captain William C. Ocker, Air Service, made the plans and supervised the construction of this ambulance at Gerstner Field. They are also entitled to the credit for first transporting patients in an airplane ambulance in this country. Captain Ocker in his report states: "Up to this time, while we were constructing the airplane ambulance, we used ordinary flying machines to carry doctors to the scene of accidents, and in this way Major Driver was able to save the life of two cadets. In one case a rib punctured the lung, and in the other he arrived in time to stop what would have been a fatal hemorrhage. The surgeon had an emergency kit in the hospital ready to go in the airplane at all times, and the medical officers were ready to fly with any flier, in any machine, at any time, to the scene of accidents. They received no flying pay and their only object was to save life and to improve the service by rendering such help as possible to the pilots."

The practical utility of the airplane ambulance was at once established, and based on the reports of actual results at Gerstner Field, the Director of Air Service, on July 23, 1918, directed the construction of airplane ambulances at all flying fields.

The necessity for providing prompt medical aid at the site of crashes was also recognized at a very early date at Rockwell Field, San Diego, California, as is shown by the following communication from

the surgeon at that station on February 12, 1918:

"From: The Surgeon, Rockwell Field, San Diego, Cal.

To: The Chief Surgeon, Aviation Section, Signal Corps, Washington, D. C.

Subject: Attending accidents by aeroplane.

"1. Owing to the size of the flying field at this post, there is sometime considerable delay before the arrival of the ambulance, also when accidents occur at distant landing fields which may be remote from medical aid, I have this day improvised a first aid pouch that can be put in an aeroplane.

"2. When an accident occurs, I take the hospital corps pouch, enter an aeroplane that is always standing ready and piloted by a junior military aviator detailed by the Chief of Training Department, reach the scene of accident in a few minutes, render such aid necessary until the arrival of the ambulance and assistant surgeon.

"3. 1st Lts. Pope, Kramer and Brooks, Medical Reserve Corps, have volunteered to answer these calls in my absence and are being trained for such duties.

"4. This, I think, will often be the means of saving lives.

"5. Owing to the urgency of the situation I have taken this liberty without first consulting the Chief Surgeon, and am writing to ascertain if this meets your approbation.

W. R. Ream,
Major, Medical Reserve Corps."

Major Ream was one of the first medical officers of the U. S. Army to be designated as a Flight Surgeon. He was the first Flight Surgeon to be placed on a flying status. He was killed in

an airplane crash at Eppingham, Ill., on August 24, 1918, while on duty with the "Middle West Flying Tour". Ream Field, Houston, Texas, was named in his honor by the Director of Military Aeronautics in September, 1918.

At Ellington Field, Houston, Texas, the first airplane ambulance was commissioned about April 1, 1918, built after the plans of the first ship at Gerstner Field. An improved type was soon designed, and was commissioned on July 6, 1918. This was the first plane to use the standard U. S. Army litter. Major W. H. Frank, Air Service, who was in command of this field at that time, made the following report upon the work of airplane ambulances at that station:

"The first airplane ambulance was put in commission at Ellington Field about April 1, 1918. This ambulance was made out of a JN-4-D with a Curtiss OX-5 engine. Later, when the gunnery school at San Leon started operation, this airplane ambulance was sent to San Leon and a new airplane ambulance was made out of a JN-4-H. The new one was completed and put in commission about July 6, 1918. This ambulance was used a great deal at Ellington Field. San Leon, the gunnery school, was about seventeen miles from the main field and all instruction in aerial gunnery was carried on at San Leon. A great number of crashes occurred at San Leon and in each instance the injured flyers were transported to the hospital at the main field by means of the airplane ambulance. By bringing the men up in the airplane ambulance, actual time consumed in transportation was about fifteen minutes. Had it been necessary to transport these men in a motor ambulance, it would have taken one hour and a half. Thus it is apparent that a great deal

of time and possibly lives were saved by using the airplane ambulance.

"Several instances occurred where men crashed when out on a cross-country trip at distances varying from fifty to one hundred and fifty miles from the field. Upon telephonic notification, the airplane ambulance was sent to the scene of the crash and the injured flyers were brought in with ease and comfort, whereas, to have brought some of these injured men in by motor ambulance would have meant their death from shock and discomfort, because of the seriousness of their injuries. One particular instance is recalled where five planes crashed in a hurricane at Brenham, Texas. In this case it would have taken a motor ambulance at least a day to make the round trip over very bad country roads, whereas, the two injured flyers were safely in bed in the Ellington Field hospital two hours after the crash, by use of the airplane ambulance. So much use was made of the airplane ambulance at Ellington Field that we considered it as necessary to have the airplane ambulance in condition as we did to have motor ambulances in condition."

The surgeon of Ellington Field, Major A. R. Goodman, Medical Corps, submitted the following report on September 30, 1918:

"Lieut. C. E._____ suffered a fracture of the left leg (tibia and fibula) and contusion of the face and head, following an aeroplane crash at Brenham, Texas, September 27, 1918. He was immediately taken to the local hospital where splints were applied to the leg and the contusions dressed.

"On the following day the ambulance ship (Curtiss H) left Ellington Field at 1:30 PM with pilot and medical officer, arrived

at Brenham at 3:15 PM, making the 90 miles in 1 hour 45 minutes, due to adverse winds. On return trip, left Brenham at 5:50 PM, arrived at Ellington Field at 6:45 PM, making the trip in 55 minutes with the aid of favoring winds.

"The patient stated that he felt the take off and landing very slightly. The trip across was very smooth, so much so that he almost went to sleep. The loading and unloading didn't bother him at all. The difference between the ease and lack of jarring in the ship and the ambulance carrying him to the ship was very marked."

In April, 1918, Major L. F. Luckie, Medical Corps, was transferred to Gerstner Field. He also became interested in transporting patients by airplane ambulance, and while at this station substituted an adjustable reclining chair for the litter, in order that the patient could be placed either in a sitting or a reclining position. This device, however, did not prove to be satisfactory.

In August, 1918, Major S. M. Strong, Medical Corps, at Eberts Field, Ark., devised a very useful form of litter to be used in airplane ambulance at his station. This litter consisted of a frame made of iron pipe, about six feet in length, constructed in such way that each leg of the patient had a separate frame for splinting purposes. Canvas was laced to this frame and broad canvas straps were provided to firmly fix all parts of the patient's body to the litter

Captain Norvelle W. Sharpe, Medical Corps, published an article on the "Ambulance Airship" in the Annals of Surgery for November, 1918. The drawings and plans for the ambulance plane which he describes bear

the date of August 8, 1918. These plans of the Mather Field ambulance are practically identical with a plane constructed at Ellington Field and commissioned July 6, 1918. The Ellington Field ambulance was an improvement over the one made at Gerstner Field, and these plans were sent to practically all Air Service stations. Ambulances built after these plans were constructed in the summer and fall of 1918 at Taylor, Post, Mather, Rich and Carruther Fields.

After receiving the instructions noted above from the Director of Air Service, most fields rapidly provided airplanes for transporting sick and wounded. Many of them attempted to improve upon the Gerstner Field and Ellington Field types, developing models of their own, until all flying fields, with two or three exceptions, were equipped. Ingenious ideas were brought out in the manner of modifying planes and adapting litters. In some a modified Army stretcher was used. In others a Stokes litter in various modifications was used. In most cases the turtle back of the plane is removable and the patient placed inside or on the fuselage from above; in others from below, while in one model the patient is placed in a coffin-shaped litter and is slid into the side of the ship like a drawer into a chest. An interesting type is one which uses the Stokes Navy litter. The advantages of this form of litter were recognized and emphasized by the late Major W. R. Ream, Medical Corps, when he was flight surgeon and post surgeon at Rockwell Field in the summer of 1918. In the Airplane devised by him the bottom of the fuselage is lowered at one end, making an inclined plane along which the Stokes litter slides, manipulated by cables and a small windlass. After the litter is loaded and winched up the incline into place, the latter is raised by another winch to its position flush with the bottom of the fuselage and locked

into place. The patient can be so securely fastened in when carried by this form of litter that both can be handled as one object. The Stokes Navy litter appears to be the best type yet devised for the easy handling of a wounded man, particularly the grave cases usually resulting from an airplane crash. Once the patient is securely fastened in a Stokes litter he need not be disturbed until he is placed on the operating table or in his bed at the hospital. This litter has, therefore, been adopted as a standard type at all flying fields for use in airplane ambulances. The method, however, of drawing this litter up an inclined plane into the bottom of the fuselage of the airplane was too complicated for practical use and has since been abandoned.

From what has been stated above it can readily be seen that the airplane ambulance was extensively used at flying fields in the United States during the World War. It is believed that no other country used them to any extent since there is little recorded in the literature outside of what has been mentioned in this article.

Airplane ambulances will undoubtedly be used in the future for the following purposes:

1. At training fields and other Air Service stations for taking medical officers to the site of crashes and bringing men who have been injured in crashes back to the hospital at the stations.

2. For transporting patients from isolated stations to large hospitals where they can receive better treatment.

3. For use at the front in time of war in transporting seriously wounded to hospitals on the line of communication or at the base.

4. For transporting medical supplies in emergencies.

Types of Ambulances: Different types of airplane ambulances will be required in the future depending upon the kind of service they are expected to perform. The ideal ambulance for training fields should be one which possesses the following features:

1. Provision for carrying three or four persons, namely, the pilot, medical officer, and one of two patients.

2. It should be designed and built for the purpose intended.

3. If an ordinary airplane is converted for this purpose it must not be structurally weakened.

4. It must be capable of landing in and taking off from a small place.

5. Provision must be made for handling the patient easily, quickly, and with a minimum of discomfort. The Stokes litter is considered the best type for accomplishing this purpose.

6. Means must be provided for protecting the patient from wind and sun.

7. The patient must be securely fastened to the litter, and the latter to its place in the ambulance.

8. A competent and careful flier should be assigned as pilot of the airplane ambulance, and the latter should always be kept ready for instant service.

9. It should be provided with adequate first aid equipment, including fire apparatus and implements necessary for rescuing patients from wrecked machines.

The ambulance which would be most useful at the front in time of war for evacuating wounded would necessarily be a large one which would be capable of carrying ten or more patients in Stokes litters. Large bombing planes and large planes developed through civilian aviation for the carrying of passengers and freight could readily be converted into airplane ambulances.

Advantages and Disadvantages: It is evident that there are limitations to the usefulness of an airplane ambulance, and equally plain that on occasions it may prove to be of supreme value. At flying fields where there is cross country flying the airplane ambulance will undoubtedly demonstrate its greatest usefulness, although at any field it may happen that a plane may fall some distance away, and in that case a medical officer can most quickly reach the injured flier and the latter be brought most expeditiously to the hospital by the use of one of these planes. No less favorable factor than time is the comfort with which the wounded man can be transported. There is no comparison between the smoothly gliding airplane and the jolting, rocking land ambulance. Numerous experiences on the various fields have conclusively demonstrated these contentions.

In addition to their value at Air Service stations, their importance in time of war in transporting serious cases from the front is likewise apparent. In past wars about eight per cent of the wounded have been classes as non-transportable because of the serious character of their wounds. To move such cases over rough and congested roads in army ambulances has always been considered an impossibility. This new means of transportation, however, is so

rapid and so comfortable, especially with the use of the Stokes litter, that this class of patients will in future wars be transported to well equipped hospitals in time for proper definitive treatment. Untold suffering and many lives can undoubtedly be saved in this way.

One medical officer in 1918 made the following remarks on this subject:

"Assuming that motor ambulances are immediately available, the use of an ambulance ship on the field is merely spectacular. I have seen one used to bring an injured man a mile across a level field when it would have been better for all concerned to have used an ordinary ambulance. In such cases the medical officer can, and frequently does go to the scene of the accident in a motor cycle a fraction of a minute in advance of the ambulance. Sometimes, however, the ambulance ship can be used to good advantage where the crash is quite near the flying field, because of intervening rough ground and an unfavorable arrangement of the roads. It is nevertheless true generally that the hospital ship would not justify its existence at fields where there is no cross country flying. It may stand idle on the line for several weeks, but sooner or later there will be a crash at a distance not only from the field but from any hospital or medical assistance. A single such instance is enough to pay for the maintenance of the ship.

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to the Base Hospital at Fort Sam Houston, about eight miles distant. Arrangements were made for landing on the Polo Grounds, and experimental trips were successfully made. ***** There was one such case, but the pilot had difficulty in controlling the ship and so brought the injured man back to the Post Hospital.

"Since I have been on this field (Rockwell) the hospital ship has twice been of great service. One officer was injured seventy miles from the field and forty miles from a railroad. He was brought in very quickly and in comparative comfort. ***** We now have an officer who crashed nearly twenty miles northeast of Santee and was brought to the hospital with the maximum of safety and comfort and a minimum of time; the medical officer reached him very quickly.

"My observation had led me to the conclusion that there ought to be a hospital ship on every flying field, always in commission, ready to take injured aviators to the hospital and to carry them medical assistance in the shortest possible time; and this conclusion is based, not on frequent little services, but on very great services infrequently rendered."

The limitations are:

1. In many instances difficulty or impossibility of landing at or near the scene of accidents, owing to unfavorable terrain. This is counterbalanced in many cases by the fact that a motor or horse-drawn ambulance is at the same disadvantage owing to the lack of roads or their impassable condition.

2. Limited carrying capacity of the planes. In the type used during the war only two persons could be carried, and on the

return journey the medical officer could not accompany the patient. This is only a partial disadvantage, as one of the first considerations is to get the surgeon to the injured man as quickly as possible. Then, too, a number of medical officers became pilots and were able to pilot the ship as well as to give the necessary first aid treatment and return with the patient.

3. In time of war there will, of course, be times when an airplane ambulance cannot reach the front. On the other hand there will also be many times, particularly after the engagement is over or troops have moved forward, when a large plane can be utilized to bring back seriously wounded men who cannot be moved over rough roads, but who could endure this mode of transportation.

In conclusion, there is no doubt that the airplane ambulance is a most valuable, even indispensable, addition to our armamentarium for rendering efficient service at flying fields, and also at the front in time of war. While it is true that the effect is to a certain extent spectacular and appeals strongly to the imagination, while its need may not be an everyday occurrence, and while it still has certain limitations, it is even more true that it has immense prospects for the future through its life-saving advantages in those instances where its use is justified.

THE AIRPLANE AMBULANCE

By

Colonel Albert E. Truby, M. C.

Copy of preceding paper.

The first known report of any plans to transport patients by airplane was made by Captain George H. R. Gosman, Medical Corps, U. S. A., and Lieutenant A. L. Rhoades, Coast Artillery Corps, to the Surgeon General of the Army early in 1910. Gosman and Rhoades had constructed a plane at Fort Barrancas, Fla. It made its first flight in January, 1910. Shortly after this Captain Gosman brought his report to Washington and endeavored to obtain funds from the War Department for the work of improving upon this plane and using it for carrying surgical dressings and transporting patients. His mission failed, but he was undoubtedly the first to point out the grest possibilities of the airplane for this purpose.

In February, 1912, in France, Dr. Duchaussoy (Blanchard, (R.) Le Transport des blesses en aeroplane. Paris Med.,1916-17, XXI, 53-55) suggested the use of an airplane ambulance. In April of that year the proposition was submitted to the representatives of military aviation, who reported it to the Secretary of War on May 23, 1912. So far as known, however, nothing came of this recommendation.

During the retreat of the Serbian army in November and December, 1915, thirteen wounded or sick were transported eighty to two hundred kilometers. This was an emergency measure and no special provision was made for doing this by modifying or changing the plane. The manoeuvre was successful and not only were they safely transported but escaped inevitable capture as well.

In France, during the World War, Dr. Chassaing, a member of the chamber of deputies, succeeded in inducing the Aviation Department to construct an airplane especially designed for transportation of two wounded men in a recumbent position. The airplane was first tried out at Villacoublay in September, 1917, and later on the Aisne front. The January 19, 1918, issue of "La Nature" contains an article descriptive of an airplane ambulance devised by Dr. Chassaing, mentioned above. This article was first brought to the attention of the Chief Surgeon of the Air Service, U. S. Army, on June 10th of that year.

In the United States service the necessity for this mode of transportation for fliers who were injured in crashes became prominent soon after flying fields were established. It was evident that an airplane ambulance would not involve the delay and discomfort of the ordinary ambulance at many of our stations where the roads were poor and the distances were great. This was especially true of victims of airplane crashes, who, while in a critical condition, frequently had

to be carried long distances and by roundabout routes to reach a hospital. In addition, it was seen that a flying ambulance would offer a means of getting a medical officer to the patient quickly, which in some instances would mean the saving of life. So far as records show, the first flying field to use the airplane in transporting medical officers to the site of crashes, and also for transporting patients, was Gerstner Field, Lake Charles, La. This station is located in low, swampy country, surrounded by many bayous. Crashes occurred at places which could be reached by no transportation except the airplane. Consequently, in February, 1918, the commanding officer authorized the conversion of a JN4 airplane into an ambulance, and it was completed and commissioned during that month.

Major Wilson E. Driver, Medical Corps, and Captain William C. Ocker, Air Service, made the plans and supervised the construction of this ambulance at Gerstner Field. They are also entitled to the credit for first transporting patients in an airplane ambulance in this country. Captain Ocker in his report states: "Up to this time, while we were constructing the airplane ambulance, we used ordinary flying machines to carry doctors to the scene of accidents, and in this way Major Driver was able to save the life of two cadets. In one case a rib punctured the lung, and in the other he arrived in time to stop what would have been a fatal hemorrhage. The surgeon had an emergency kit in the hospital ready to go in the airplane at all times, and the medical officers were ready to fly with any flier, in any machine, at any time, to the scene of accidents. They received no flying pay and their only object was to save life and to improve the service by rendering such help as possible to the pilots."

The practical utility of the airplane ambulance was at once established, and based on the reports of actual results at Gerstner Field, the Director of Air Service, on July 23, 1918, directed the construction of airplane ambulances at all flying fields.

The necessity for providing prompt medical aid at the site of crashes was also recognized at a very early date at Rockwell Field, San Diego, California, as is shown by the following communication from the surgeon at that station on February 12, 1918:

"From: The Surgeon, Rockwell Field, San Diego, Cal.

To: The Chief Surgeon, Aviation Section, Signal Corps, Washington, D.C.

Subject: Attending accidents by aeroplane.

"1. Owing to the size of the flying field at this post, there is sometime considerable delay before the arrival of the ambulance, also when accidents occur at distant landing fields which may be remote from medical aid, I have this day improvised a first aid pouch that can be put in an aeroplane.

"2. When an accident occurs, I take the hospital corps pouch, enter an aeroplane that is always standing ready and piloted by a junior military aviator detailed by the Chief of Training Department, reach the scene of accident in a few minutes, render such aid necessary until the arrival of the ambulance and assistant surgeon.

"3. 1st Lts. Pope, Kramer and Brooks, Medical Reserve Corps have volunteered to answer these calls in my absence and are being trained for such duties.

"4. This, I think, will often be the means of saving lives.

"5. Owing to the urgency of the situation I have taken this liberty without first consulting the Chief Surgeon, and am writing to ascertain if this meets your approbation.

W. R. Ream,
Major, Medical Reserve Corps."

Major Ream was one of the first medical officers of the U. S. Army to be designated as a Flight Surgeon. He was the first Flight Surgeon to be placed on a flying status. He was killed in an airplane crash at Eppingham, Ill., on August 24, 1918, while on duty with the "Middle West Flying Tour". Ream Field, Houston, Texas, was named in his honor by the Director of Military Aeronautics in September, 1918.

At Ellington Field, Houston, Texas, the first airplane ambulance was commissioned about April 1, 1918, built after the plans of the first ship at Gerstner Field. An improved type was soon designed, and was commissioned on July 6, 1918. This was the first plane to use the standard U. S. Army litter. Major W. H. Frank, Air Service, who was in command of this field at that time, made the following report upon the work of airplane ambulances at that station:

"The first airplane ambulance was put in commission at Ellington Field about April 1, 1918. This ambulance was made out of a JN-4-D with a Curtiss OX-5 engine. Later, when the gunnery school at San Leon started operation, this airplane ambulance was sent to San Leon and a new airplane ambulance was made out of a JN-4-H. The new one was completed and put in commission about July 6, 1918. This ambulance was used a great deal at Ellington Field. San Leon, the gunnery school, was about seventeen miles from the main field and all instruction in aerial gunnery was carried on at San Leon. A great number of crashes occurred at San Leon and in each instance the injured flyers were transported to the hospital at the main field by means of the airplane ambulance. By bringing the men up in the airplane ambulance,

actual time consumed in transportation was about fifteen minutes. Had it been necessary to transport these men in a motor ambulance, it would have taken one hour and a half. Thus it is apparent that a great deal of time and possibly lives were saved by using the airplane ambulance.

"Several instances occurred where men crashed when out on a cross-country trip at distances varying from fifty to one hundred and fifty miles from the field. Upon telephonic notification, the airplane ambulance was sent to the scene of the crash and the injured flyers were brought in with ease and comfort, whereas, to have brought some of these injured men in by motor ambulance would have meant their death from shock and discomfort, because of the seriousness of their injuries. One particular instance is recalled where five planes crashed in a hurricane at Brenham, Texas. In this case it would have taken a motor ambulance at least a day to make the round trip over very bad country roads, whereas, the two injured flyers were safely in bed in the Ellington Field hospital two hours after the crash, by use of the airplane ambulance. So much use was made of the airplane ambulance at Ellington Field that we considered it as necessary to have the airplane ambulance in condition as we did to have motor ambulances in condition."

The surgeon of Ellington Field, Major A. R. Goodman, Medical Corps, submitted the following report on September 30, 1918:

"Lieut. C. E. ____ suffered a fracture of the left leg (tibia and fibula) and contusion of the face and head, following an aeroplane crash at Brenham, Texas, September 27, 1918. He was immediately taken to the local hospital where splints were applied to the leg and the contusions dressed.

"On the following day the ambulance ship (Curtiss H) left Ellington Field at 1:30 PM with pilot and medical officer, arrived at Brenham at 3:15 PM, making the 90 miles in 1 hour 45 minutes, due to adverse winds. On return trip, left Brenham at 5:50 PM, arrived at Ellington Field at 6:45 PM, making the trip in 55 minutes with the aid of favoring winds.

"The patient stated that he felt the take off and landing very slightly. The trip across was very smooth, so much so that he almost went to sleep. The loading and unloading didn't bother him at all. The difference between the ease and lack of jarring in the ship and the ambulance carrying him to the ship was very marked."

In April, 1918, Major L. F. Luckie, Medical Corps, was transferred to Gerstner Field. He also became interested in transporting patients by airplane ambulance, and while at this station substituted an adjustable

reclining chair for the litter, in order that the patient could be placed either in a sitting or a reclining position. This device, however, did not prove to be satisfactory.

In August, 1918, Major S. M. Strong, Medical Corps, at Eberts Field, Ark., devised a very useful form of litter to be used in airplane ambulance at his station. This litter consisted of a frame made of iron pipe, about six feet in length, constructed in such way that each leg of the patient had a separate frame for splinting purposes. Canvas was laced to this frame and broad canvas straps were provided to firmly fix all parts of the patient's body to the litter.

Captain Norvelle W. Sharpe, Medical Corps, published an article on the "Ambulance Airship" in the Annals of Surgery for November, 1918. The drawings and plans for the ambulance plane which he describes bear the date of August 8, 1918. These plans of the Mather Field ambulance are practically identical with a plane constructed at Ellington Field and commissioned July 6, 1918. The Ellington Field ambulance was an improvement over the one made at Gerstner Field, and these plans were sent to practically all Air Service stations. Ambulances built after these plans were constructed in the summer and fall of 1918 at Taylor, Post, Mather, Rich and Carruthers Fields.

After receiving the instructions noted above from the Director of Air Service, most fields rapidly provided airplanes for transporting sick and wounded. Many of them attempted to improve upon the Gerstner Field and Ellington Field types, developing models of their own, until all flying fields, with two or three exceptions, were equipped. Ingenious ideas were brought out in the manner of modifying planes and adapting litters. In some a modified Army stretcher was used. In others a Stokes litter in various modifications was used. In most cases the turtle back of the plane is removable and the patient placed inside or on the fuselage from above; in others from below, while in one model the patient is placed in a coffin-shaped litter and is slid into the side of the ship like a drawer into a chest. An interesting type is one which uses the Stokes Navy litter. The advantages of this form of litter were recognized and emphasized by the late Major W. R. Ream, Medical Corps, when he was flight surgeon and post surgeon at Rockwell Field in the summer of 1918. In the airplane devised by him the bottom of the fuselage is lowered at one end, making an inclined plane along which the Stokes litter slides, manipulated by cables and a small windlass. After the litter is loaded and winched up the incline into place, the latter is raised by another winch to its position flush with the bottom of the fuselage and locked into place. The patient can be so securely fastened in when carried by this form of litter that both can be handled as one object. The Stokes Navy litter appears to be the best type yet devised for the easy handling of a wounded man, particularly the grave cases usually resulting from an airplane crash. Once the patient is

securely fastened in a Stokes litter he need not be disturbed until he is placed on the operating table or in his bed at the hospital. This litter has, therefore, been adopted as a standard type at all flying fields for use in airplane ambulances. The method, however, of drawing this litter up an inclined plane into the bottom of the fuselage of the airplane was too complicated for practical use and has since been abandoned.

From what has been stated above it can readily be seen that the airplane ambulance was extensively used at flying fields in the United States during the World War. It is believed that no other country used them to any extent since there is little recorded in the literature outside of what has been mentioned in this article.

Airplane ambulances will undoubtedly be used in the future for the following purposes:

1. At training fields and other Air Service stations for taking medical officers to the site of crashes and bringing men who have been injured in crashes back to the hospital at the stations.

2. For transporting patients from isolated stations to large hospitals where they can receive better treatment.

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Types of Ambulances: Different types of airplane ambulances will be required in the future depending upon the kind of service they are expected to perform. The ideal ambulance for training fields should be one which possessed the following features:

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Advantages and Disadvantages: It is evident that there are limitations to the usefulness of an airplane ambulance, and equally plain that on occasions it may prove to be of supreme value. At flying fields where there is cross country flying the airplane ambulance will undoubtedly demonstrate its greatest usfeulness, although at any field it may happen that a plane may fall some distance away, and in that case a medical officer can most quickly reach the injured flier and the latter be brought most expeditiously to the hospital by the use of one of these planes. No less favorable factor than time is the comfort with which the wounded man can be transported. There is no comparison between the smoothly gliding airplane and the jolting, rocking land ambulance. Numerous experiences on the various fields have conclusively demonstrated these contentions.

In addition to their value at Air Service stations, their importance in time of war in transporting serious cases from the front is likewise apparent. In past wars about eight per cent of the wounded have been classed as non-transportable because of the serious character of their wounds. To move such cases over rough and congested roads in army ambulances has always been considered an impossibility. This new means of transportation, however, is so rapid and so comfortable, especially with the use of the Stokes litter, that this class of patients will in future wars be transported to well equipped hospitals in time for proper definitive treatment. Untold suffering and many lives can undoubtedly be saved in this way.

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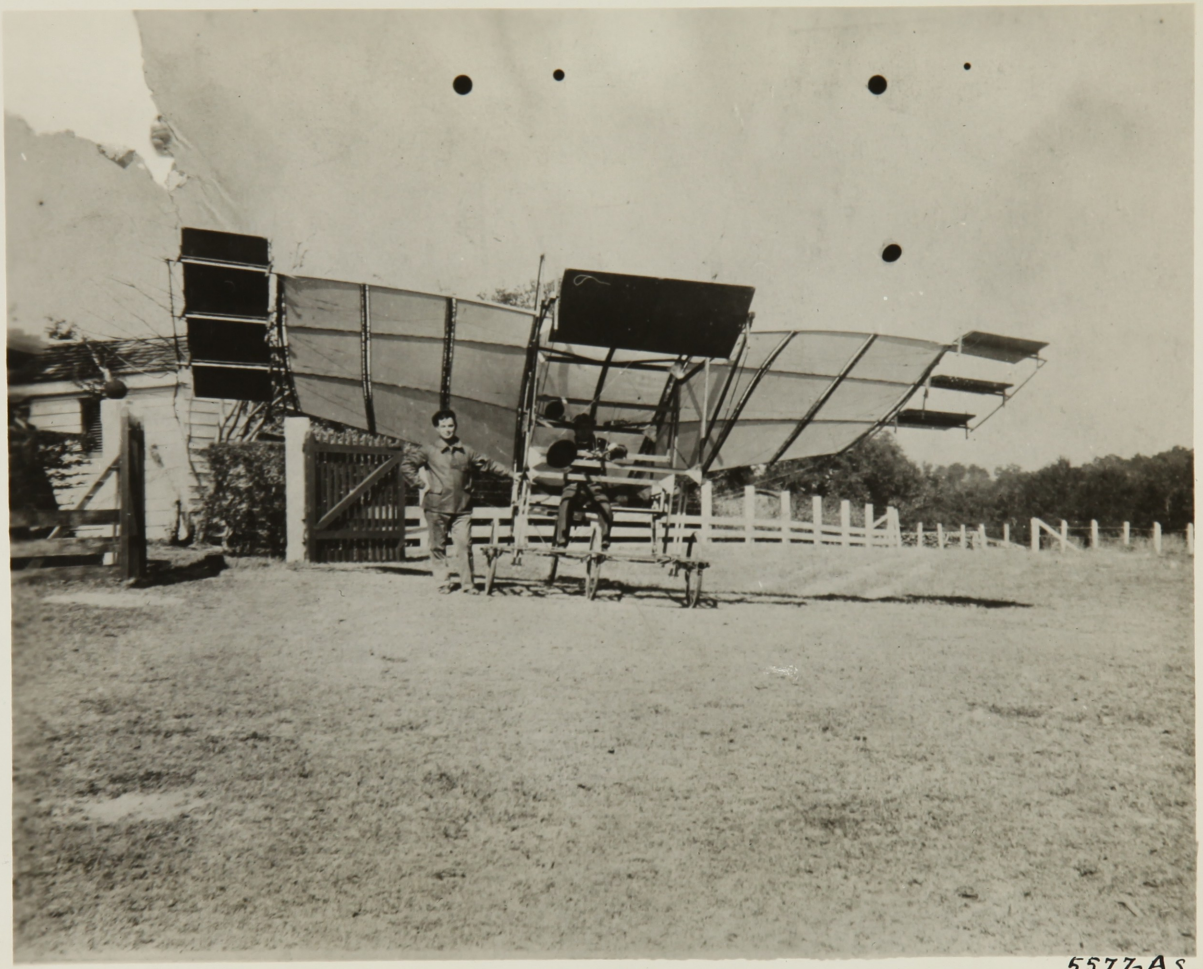
Gosman Rhoades

A-5577-A.S.

Monoplane designed and built by Gosman and Rhoades in 1909.
It was flown twice by these officers in 1909 and 1910.



Gosman - Rhoades Aeroplane, 1909-1910. Ft. Barrancas, Fla.

5577-A.S.

Rhodes - Curtiss Aeroplane
Trial Jan 26 1910

B-5577-AS.

Fort Barrancas, Florida.

Office of the Surgeon
Signal Corps Aviation School
San Diego, California
February 12, 1918.

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To: The Chief Surgeon, Aviation Section Signal Corps, Washington, D. C.

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W. R. Ream,
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NOTE;-Major Ream was one of the first medical officers of the U. S. Army to be designated as a Flight Surgeon. He was the first Flight Surgeon to be placed on a flying status. He was killed in an airplane crash at Eppingham, Ill., on August 24, 1918, while on duty with the "Middle West Flying Tour". Ream Field, Houston, Texas, was named in his honor by the Director of Military Aeronautics in September, 1918.

A.E.F.

SIGNAL CORPS AVIATION SCHOOL
GERSTNER FIELD, LAKE CHARLES, LOUISIANA.

July 15, 1918.

From: Commanding Officer.

To: Director of Military Aeronautics, Washington, D.C.

Subject: Hospital Ship.

1. In reply to wire of July 3, 1918, which has been answered, by wire of July 5th, in part, enclosed find two photographs and tracing, showing plan of rear cockpit of Hospital Ship in use at this School. This ship has been used continuously since about May 1st, has been found satisfactory, and has been used to great advantage since completion.

Maxwell Kirby
Major, N. A., J. M. A.

March 21, 1921.

From: Captain William C. Ocker, Air Service.

To: The Chief Surgeon, Air Service.

Subject: First Airplane Ambulance in the United States.

1. I was on duty at Gerstner Field, Lake Charles, La., in January, February and March, 1918, in charge of the training of aviators. Gerstner Field is located in a very low, swampy country, surrounded by many bayous. The roads at that time were very few in number and exceedingly poor. They became impassable after heavy rains.

2. The first accident that occurred some distance from the field convinced me of the necessity of having some means of getting surgeons to the scene of crashes. As early as February, 1918, it was evident to me that airplane transportation was the only way of getting to the site of most crashes after a heavy rain. Consequently I made a recommendation to the commanding officer to convert an ordinary JN4 airplane into a flying ambulance. The commanding officer at the field, Lieut. Colonel L. E. Goodier, Jr., did not give me much encouragement. On February 14, 1918, Major Wilson E. Driver, M. C., arrived at the field for duty, and he became convinced at once that a flying ambulance was necessary at the station. Consequently he and I reopened the matter with the commanding officer and received his approval for converting one of our airplanes into an ambulance plane.

3. Up to this time, and while we were constructing the airplane ambulance, we used ordinary flying machines to carry doctors to the scene of accidents, and in this way Major Driver was able to save the lives of two cadets. In one case a rib had punctured a lung, and in another he arrived in time to stop what would have been a fatal hemorrhage. The surgeon had an emergency kit in the hospital ready to go in the airplane at all times, and the medical officers were ready to fly with any pilot, in any machine, at any time to the scene of the accident. They received no flying pay, and their only object was to save life and to improve the service by rendering as much help as possible to the pilots.

4. The accompanying photographs of airplane #3131 show the result of our efforts, and this is believed to be the first airplane in the United States to be converted and used for the transportation of patients. As will be noted, we provided a special chair for the patient. My idea was to have the patient

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3. Up to this time, and while we were constructing the airplane ambulance, we used ordinary flying machines to carry doctors to the scene of accidents, and in this way Major Driver was able to save the lives of two cadets. In one case a rib had punctured a lung, and in another he arrived in time to stop what would have been a fatal hemorrhage. The surgeon had an emergency kit in the hospital ready to go in the airplane at all times, and the medical officers were ready to fly with any pilot, in any machine, at any time to the scene of the accident. They received no flying pay, and their only object was to save life and to improve the service by rendering as much help as possible to the pilots.

4. The accompanying photographs of airplane #8151 show the result of our efforts, and this is believed to be the first airplane in the United States to be converted and used for the transportation of patients. As will be noted, we provided a special chair for the patient. My idea was to have the patient

in a prone position, but Major Driver thought that in a glide the patient's head would be in a position to cause rush of blood to his head. This ambulance plane was commissioned in February, 1918.

5. This machine proved very useful, but was not entirely satisfactory in the case of very serious accidents where the patient could not sit up in the chair which we had provided. Consequently Major Driver improved the seating arrangement for the patient. This plane, as will be seen from the photograph, allowed the patient to recline with head and shoulders slightly elevated. It was placed back on the line after remodeling on March 28, 1918,* and was reported by the commanding officer as extremely satisfactory and of great value to the service at Gerstner Field. In fact it was so useful that the Director of Military Aeronautics issued instructions to have similar planes installed at all flying fields.

6.# Subsequent to the construction of this plane, Major F. L. Luckie, M. C., arrived at the station and placed a porch chair in airplane ambulance #3131 for the patient. This chair was so constructed that it could be raised or lowered to suit the comfort of the patient. I understand, however, that this arrangement did not prove satisfactory.

7. My experience as a pilot at Gerstner Field demonstrated that an airplane ambulance is absolutely essential at a station of that kind, since many of the accidents occurred in places where it was not possible to reach them with medical aid, or to return them to the hospital except by airplane transportation.

8. To Major Wilson E. Driver belongs the credit for having developed the first airplane ambulance in the United States, if not in the world, for without his aid and enthusiasm we would not have been able to obtain the attention of the commanding officer to carry on this work.

(Signed) William C. Ocker,
Captain, Air Service.

NOTE:-*Planes after this type were constructed at Ellington, Payne, Call and Souther Fields.

#One plane after the type designed by Major Luckie was built at Love Field, September 1, 1918. It was not satisfactory.

QEJ

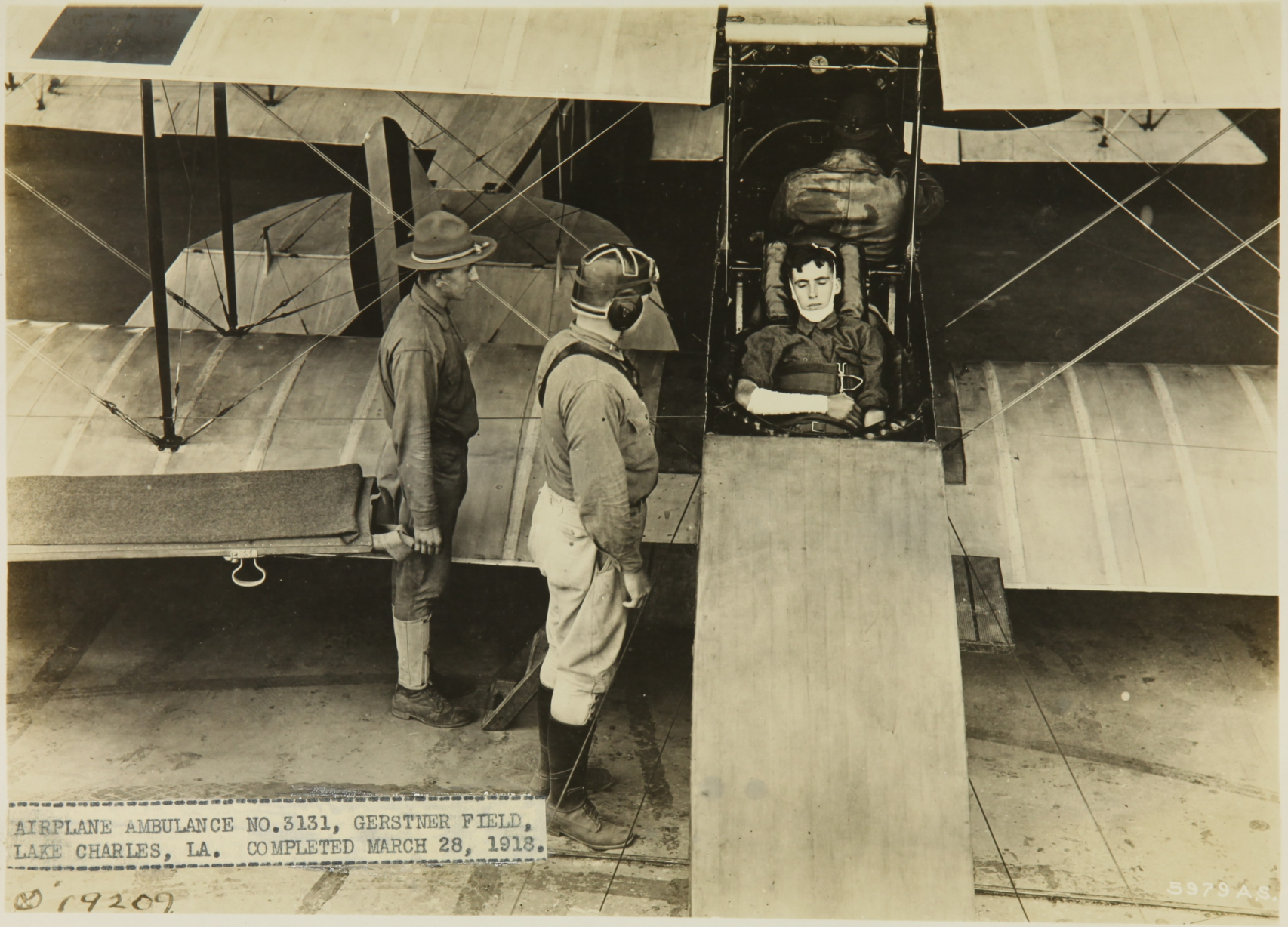
Major Ocker, A.S.

Major Driver, M.C.

Maj.Ocker,AS.Maj.Kirby,AS.Maj.Driver,MC.

Airplane Ambulance No.3131, Gerstner Field, Lake Charles, Louisiana. Commissioned in February 1918. This was the first plane converted for this purpose and the first airplane ambulance in the United States to actually carry patients. The seat for the patient was changed on March 28, 1918, see next photograph.

9764-AS.

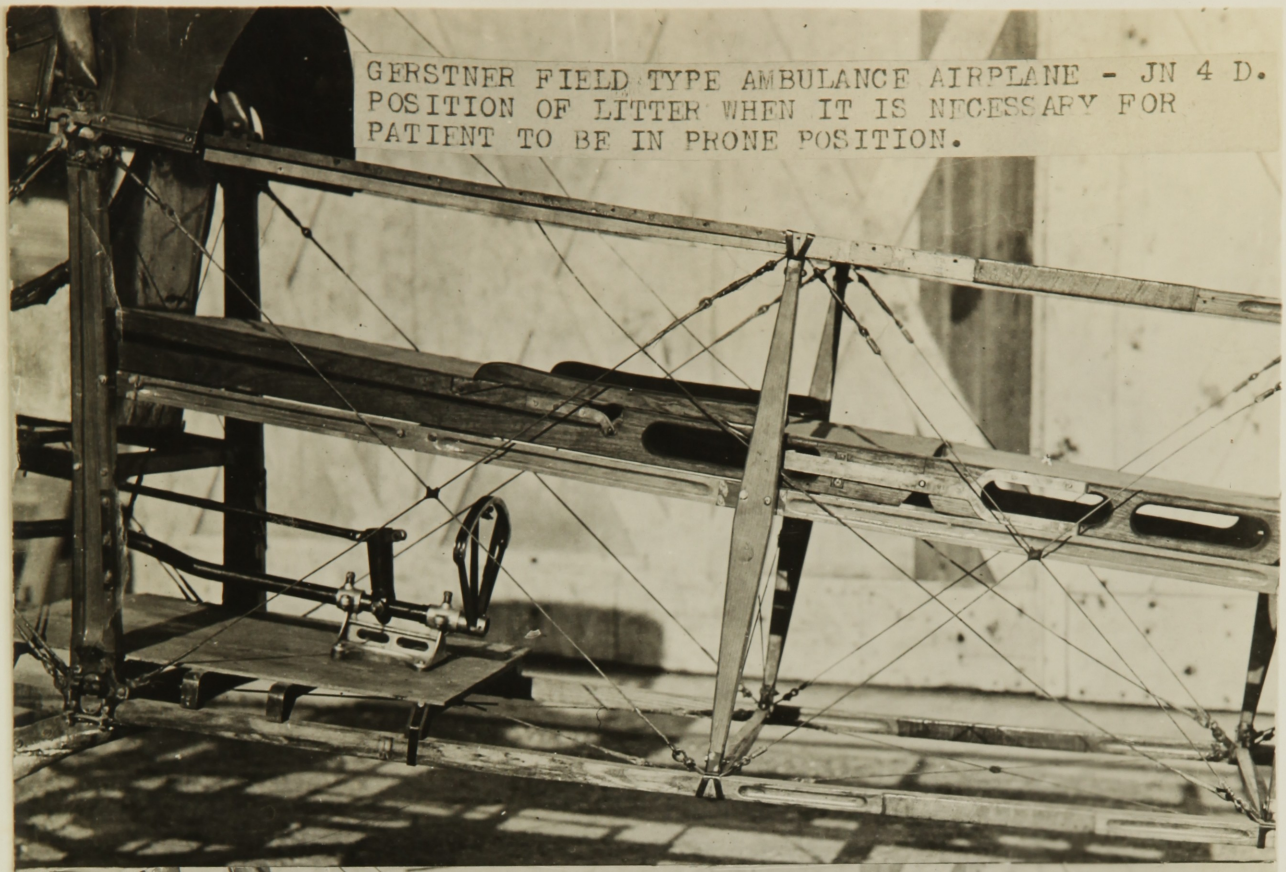


AIRPLANE AMBULANCE NO.3131, GERSTNER FIELD, LAKE CHARLES, LA. COMPLETED MARCH 28, 1918.

Ø 19209

5979 A.S.

G 27
3131
THIS AMBULANCE DOES NOT REQUIRE THE USE OF THE ARMY LITTER. DOTTED LINE ON TOP OF FUSELAGE SHOWS REMOVABLE PORTION OF FUSELAGE WHICH PERMITS PATIENT TO BE LOWERED INTO PLANE WHILE IN PRONE POSITION. Mch. 28, 1918
5954 A.S.

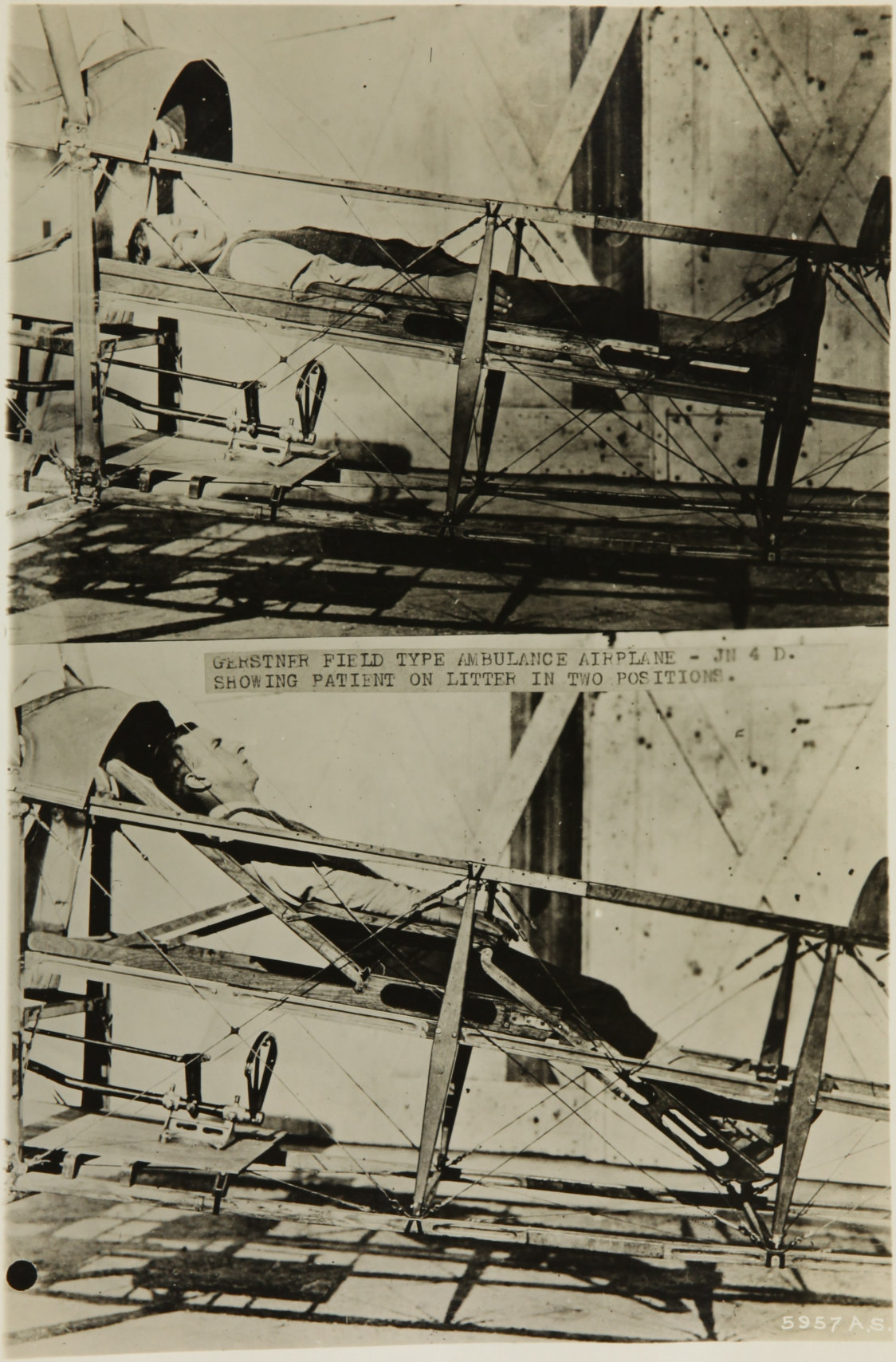


GERSTNER FIELD TYPE AMBULANCE AIRPLANE - JN 4 D.
POSITION OF LITTER WHEN IT IS NECESSARY FOR PATIENT TO BE IN PRONE POSITION.

#2

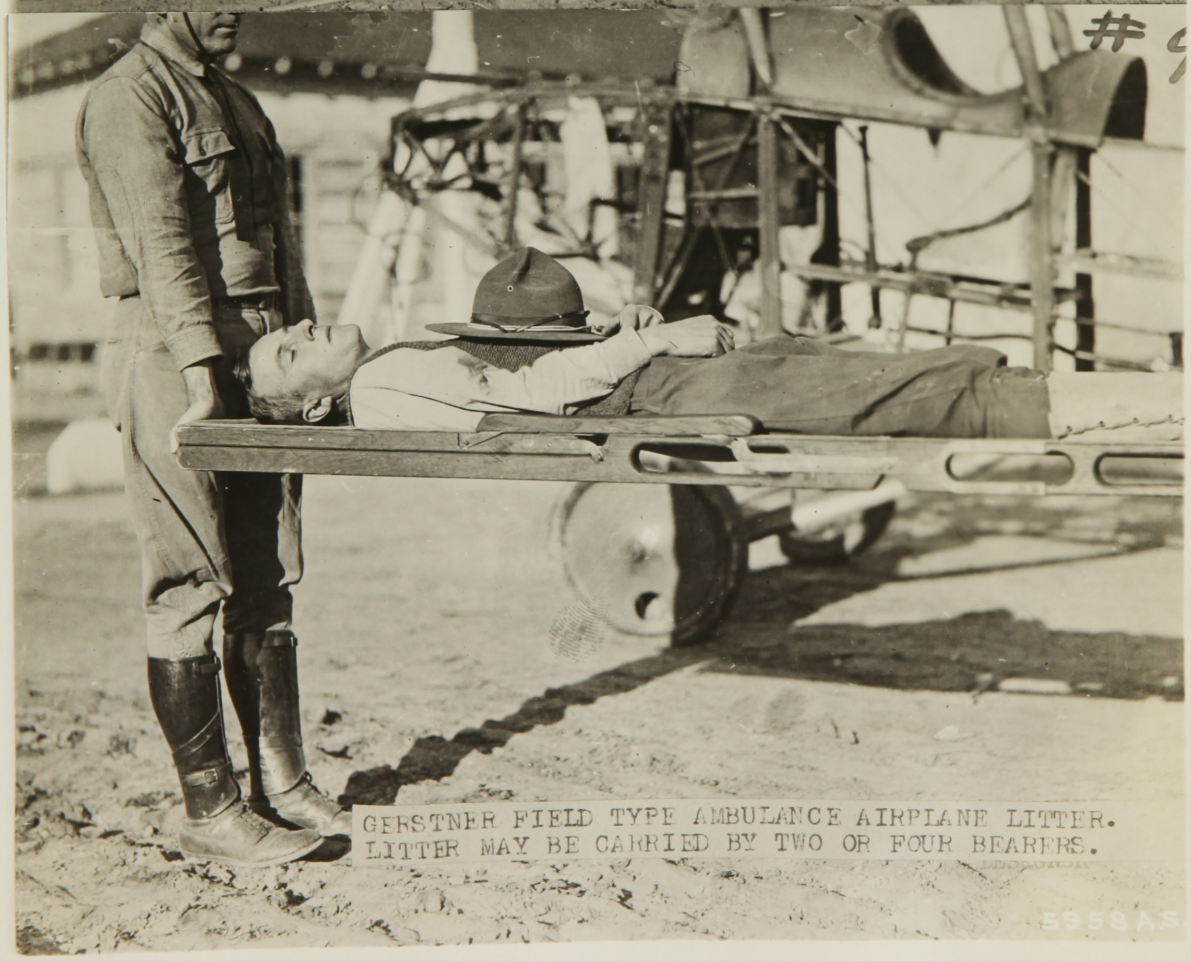
POSITION OF LITTER IN FUSELAGE WHEN IT IS NECESSARY FOR PATIENT TO SIT UP. ALSO POSITION WHEN USED FOR ORDINARY PASSENGER.

5955 A.S.



GERSTNER FIELD TYPE AMBULANCE AIRPLANE - JN 4 D.
SHOWING PATIENT ON LITTER IN TWO POSITIONS.

5957 A.S.



GERSTNER FIELD TYPE AMBULANCE AIRPLANE LITTER.
LITTER MAY BE CARRIED BY TWO OR FOUR BEARERS.

GERSTNER FIELD TYPE AMBULANCE AIRPLANE LITTER -
MAY BE USED ON FORD CAR IN TWO POSITIONS.

F. LUCKIE
JOR M.C. ENGINEER

#11.

J.F. LUCKIE
MAJOR M.C.
ENGINEER

5956 AS

August 26, 1918.

From: Commanding Officer, Ellington Field, Texas.

To: Director of Military Aeronautics, Training Section; Attention Major M. F. Harmon, Washington, D. C.

Subject: Ambulance Airplane - Ellington Field.

1. Communication under date of July 27, 1918, was received at this Post from the Director of Military Aeronautics signed by Lieut. Colonel F. R. Kenney, calling attention to the fact that Gerstner Field, at Lake Charles, La., had in operation an ambulance plane and that it had been used to great advantage at that Field; copy of that letter from the Director of Military Aeronautics is herewith enclosed.

2. Ellington Field has had an airplane ambulance in operation for several months,* and it is thought at this Field that it has many advantages over that which has been in use at Lake Charles.

3. In the arrangement designed for the ambulance plane at Lake Charles the patient is in a sitting position. In many accidents it has been found by experience at this Field that the patient is absolutely unable to sit up or to be transported in any position except that of lying down.

4. Photographs of the ambulance plane in use at this Field are enclosed herewith, and it will be seen that the patient is to be put on a stretcher the same as if he were going to be put on an automobile ambulance. He can be placed in the ambulance plane and transported on the stretcher lying down just the same as in a wheel ambulance.

5. This communication is being sent to you for your information, because it is thought that the ambulance plane in use at this Field has many advantages over that which was in use at Gerstner Field, and which carried the patient in a sitting position.

W. H. Frank,
Major, Air Service, M. C.,
Commanding.

NOTE:-*First plane at Ellington Field commissioned about April 1, 1918, built after plans of the Gerstner Field ambulance, commissioned March 28, 1918. Second plane commissioned July 6, 1918. See photos of Ellington Field plane No. 38175.

REF

WAR DEPARTMENT
AIR SERVICE
WASHINGTON, D. C.

March 16, 1921.

Office of the Chief Air Service.

MEMORANDUM for Colonel Truby.

1. In reply to your memorandum of March 12th, I have looked up data as to the date on which the first airplane ambulance was put in commission at Ellington Field and find that it was about April 1, 1918.* This ambulance was made out of a JN-4-D with a Curtiss OX-5 engine. Later, when the gunnery school at San Leon started operation, this airplane ambulance was sent to San Leon and a new airplane ambulance was made out of a JN-4-H. The new one was completed and put in commission about July 6th, as stated in your memorandum. This ambulance was used a great deal at Ellington Field. San Leon, the gunnery school, was about 17 miles from the main field and all instruction in aerial gunnery was carried on at San Leon. A great number of crashes occurred at San Leon and in each instance the injured flyers were transported to the hospital at the main field by means of the airplane ambulance. By bringing the men up in the airplane ambulance, actual time consumed in transportation was about fifteen minutes. Had it been necessary to transport these men in a motor ambulance, it would have taken one hour and a half. Thus, it is apparent that a great deal of time and possibly lives were saved by using the airplane ambulance.

2. Several instances occurred where men crashed when out on a cross-country trip at distances varying from fifty to one hundred and fifty miles from the field. Upon telephonic notification, the airplane ambulance was sent to the scene of the crash and the injured flyers were brought in with ease and comfort, whereas, to have brought some of these injured men in by motor ambulance would have meant their death from shock and discomfort, because of the seriousness of their injuries. One particular instance is recalled where five planes were crashed in a hurricane at Branham, Texas. In this case it would have taken a motor ambulance at least a day to make the round trip over very bad country roads, whereas, the two injured flyers were safely in bed in the Ellington Field hospital two hours after the crash, by use of the airplane ambulance. So much use was made of the airplane ambulance at Ellington Field that we considered it as necessary to have the airplane ambulance in condition as we did to have motor ambulances in condition.

W. H. Frank,
Major, Air Service,
Acting Executive.

NOTE:-*The first plane mentioned in this memo. was evidently made after the plans designed by Capt. Ocker, A.S., and Major Driver, M.C., at Gerstner Field in March, 1918. See Capt. Ocker's letter and photos of Gerstner Field, also note and photos of Payne Field. The second ambulance plane at Ellington Field, commissioned about April 1, 1918, was the first plane using the Standard U.S. litter. Other planes built on this plan at Taylor, Post, Mather, Rich and Carruthers Fields.

GEI

POST HOSPITAL
AIR SERVICE
ELLINGTON FIELD HOUSTON TEXAS

September 30, 1918.

From: The Post Surgeon.

To: Air Service, Division, S. G. O.

Subject: Report on Ambulance Ship.

1. It is thought the following report of transporting patient by Ambulance Ship a distance of 90 miles would be of interest:

Lieut. C. E. Carlson suffered a fracture of the left leg (tibia and fibula) and contusion of the face and head, following an aeroplane crash at Brenham, Texas, September 27, 1918. He was immediately taken to the local hospital where splints were applied to the leg and the contusions dressed.

On the following day the Ambulance Ship (Curtis H) left Ellington Field at 1:30 P. M., with pilot and medical officer, arrived at Brenham at 3:15 P. M., making the 90 miles in 1 hour 45 minutes, due to adverse winds. On return trip, left Brenham at 5:50 P. M., arrived at Ellington Field at 6:45 P. M., making the trip in 55 minutes with the aid of favoring winds.

The patient stated that he felt the take off and landing very slightly. The trip across was very smooth, so much so that he almost went to sleep. The loading and unloading didn't bother him at all. The difference between the ease and lack of jarring in the ship and the ambulance carrying him to the ship was very marked.

A. R. Goodman
Major, Medical Corps.

POST HOSPITAL
AIR SERVICE
ELLINGTON FIELD HOUSTON TEXAS

September 30, 1918.

From: The Post Surgeon.

To: Air Service, Division, S. C. O.

Subject: Report on Ambulance Trip.

1. It is thought the following report of transporting patient by Ambulance Ship a distance of 30 miles would be of interest:

Lieut. O. E. Carlson suffered a fracture of the left leg (tibia and fibula) and contusion of the face and head, following an aeroplane crash at Brenham, Texas, September 27, 1918. He was immediately taken to the local hospital where splints were applied to the leg and the contusions dressed.

On the following day the Ambulance Ship (Curtis H) left Ellington Field at 1:30 P. M., with pilot and medical officer, arrived at Brenham at 3:15 P. M., making the 90 miles in 1 hour 45 minutes, due to adverse winds. On return trip, left Brenham at 5:30 P. M., arrived at Ellington Field at 6:45 P. M., making the trip in 55 minutes with the aid of favoring winds.

The patient stated that he felt the take off and landing very slightly. The trip across was very smooth, so much so that he almost went to sleep. The loading and unloading didn't bother him at all. The difference between the ease and lack of jarring in the ship and the ambulance carrying him to the ship was very marked.

A. R. Goodman
Major, Medical Corps.

Report from Ellington Field, Houston, Texas.

(a) The Hospital Ship (38175) was completed and flown for the first time on July 6, 1918.

(b) One of the modifications which were afterwards found necessary was an improvement of the rear seat, to enable the patient to lie flat if necessary. A ship for this purpose should be designed instead of being remodeled. It was also suggested that a permanent pilot be assigned to the ship and that he be required to test same the required number of hours per week, in order that it would be in flying condition at all times.

(c) This plane has been found to be of great value in taking care of victims of accidents occurring at a distance from the field.

Norman W. Peek,
Major, J. M. A., A. S. (A),
Chief Engineer Officer.

Construction Details

Types of Ships

1. Two ships are in use as Hospital Ships : JN 4-H and JN 4-A: The former has more speed but requires a narrowing of the regulation army stretcher two inches at the rear, the latter is somewhat slower but is to be preferred because a regulation army stretcher can be used without alteration.

The Cowl

2. The cowl is split across at rear center section strut, so that part of the pilot's cowl remains fixed. The rear of the pilot's cowl and the observer's cowl is removable with about two feet of the turtle back. Slits are made in this in front on either side so it fits over the wires. The removable section is held in place either by two straps or a set of automatic lugs or clamps on either side.

The Observer's Seat

3. The regular observer's seat is removed and in place is installed the stretcher which lies flat in the fuselage. The stretcher when used as a seat lies about one foot further back than when used to carry patient. Its front forms part of the Surgeon's seat. A back rest for the Surgeon is removable; it is made of aanvas, which loops over the stretcher handles below on each side and is fixed above at a convenient distance, by looping over a removable spacer strut. In carrying the patient, this back rest is removed.

Spacer Strut Tightening Device

4. Spacer strut to the rear of the observer's seat supports the back of canvas fold of Surgeon's back-rest. It is removable, fitting into two steel sockets on each side of top longeron. A tension wire is placed immediately in front of this to prevent spreading of fuselage. This wire has a clamp by which it can be readily parted and dropped for removal of stretcher. This clamp also serves to tighten the wire and keep it taut.

The Step

5. A detachable step is necessary to assist in placing the loaded stretcher inside the fuselage. The step is three feet by eight inches, of half inch oak. It fits to the side of the lower longeron by means of two pegs fitting into eye bolts, which are fastened into the longeron by clamps. From the outside edge of the step, two one-eighth inch cables extend to the upper longeron, hooking over the upper longeron by means of grapples. When not in use, the cables fold up on step and the step fits inside the fuselage between the stretcher and the side.

The Stretcher

6. A regulation army stretcher is used. This is supported by a wooden trough placed inside the fuselage on either side. At the rear end, the handles fit under a cross strut which holds them down. A block is also placed in the rear to prevent the stretcher slipping down when empty. In front, the handles fit into steel loops on either side, with a pin placed through handle and loop to prevent slipping. Three canvas bands about eight inches wide with buckles and straps hold patient on stretcher. These fit across the chest, the pelvis and the ankles of the patient. A fourth band of the same size is used to hold arms in place (in case of wounds to arms or chest).

Emergency Box

7. An emergency box,8 x 10 x 12 inches,of galvanized iron is divided into compartments to hold suitable surgical supplies. Splints may be carried in the bottom of the fuselage and a small box is fitted into the fore end of the turtle back where tools may be carried.

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Mode of Operation

1. Removal of the Cowl: Unbuckle straps or loosen the automatic clamps. Remove by raising rear end and pulling back.

(Report from Ellington Field, Texas, continued)

2. Place step: Take step from side of stretcher and fix pegs into eye bolts on longeron below; then hook grapples over upper longeron so as to support ship.

3. Remove canvas back of Surgeon's seat by lifting off spacer strut above and slipping canvas loops below over ends of stretcher.

4. Unclamp the tightening device (tension wire).

5. Removal of stretcher: The pilot grasps the front handles of stretcher and lifts, pulling forward; this disengages the rear handles of stretcher. These are grasped by the Surgeon, who stands on the step, and who then steps to the ground, followed by the pilot.

6. Patient is placed on stretcher and canvas bands are buckled into place.

7. Loading of patient: Loaded stretcher is lifted by pilot at the head (which is toward the front part of the ship) and the Surgeon at the foot. Pilot mounts to running board of the plane and raises patient up through center section strut over the pilot's seat. Meanwhile Surgeon mounts step with foot of stretcher, then lowers his end first into fuselage. Stretcher is shoved back, so that handles fit into place under cross-strut at rear. Pilot lowers head into place and stretcher is shoved forward so that upper handles fit under steel loops on either side and are fastened by pins through loop and handle.

8. Step replaced: Spacer-strut, tightening device and cowl replaced.

9. Surgeon remains to be brought back by second trip of plane or other convenient means.

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Remarks on use of Planes

These ships have been in operation about two months. The pilot Lieutenant H. G. Peterson is specially detailed for the Hospital Ships and takes them out daily for testing.

He states that the loaded stretcher makes absolutely no difference in the handling of the ships in any way. The patients have all been interviewed and state they are transported with a minimum of discomfort.

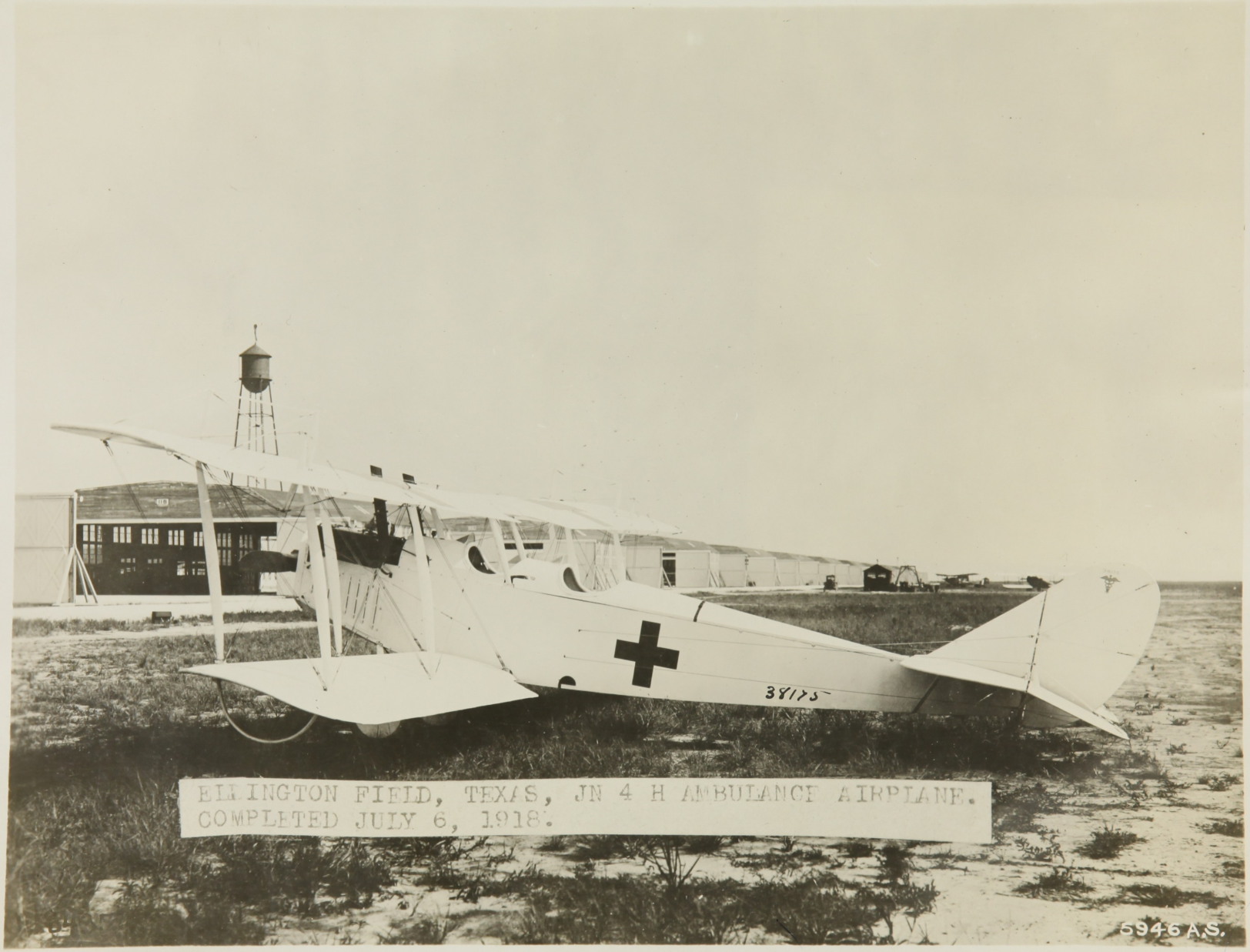
It is obviously much smoother than any other means of transportation. Even in landing and taking off in the roughest fields there

(Report from Ellington Field, Texas, continued)

is less disturbance than in use of ambulance on same grounds.

It is obvious that a skilled pilot is necessary in order to exercise good judgment in regard to landings, etc.

The amount of time saved in answering distant calls is also an important factor.



ELLINGTON FIELD, TEXAS, JN 4 H AMBULANCE AIRPLANE.
COMPLETED JULY 6, 1918.

ELLINGTON FIELD, TEXAS, JN 4 H AMBULANCE AIRPLANE. WITH PILOT AND SURGEON READY TO START.

5971A.S.

ELLINGTON FIELD, TEXAS, JN 4 H AMBULANCE AIRPLANE.
APPROACHING SCENE OF ACCIDENT.

ELLINGTON FIELD, TEXAS, JN 4 H AMBULANCE AIRPLANE.
TOP REMOVED FROM FUSELAGE - LITTER BEING REMOVED.

5961 A.S.

ELLINGTON FIELD, TEXAS, JN 4 H AMBULANCE AIRPLANE. RENDERING FIRST AID TO PATIENT AND PREPARING TO LOAD.

5948 A.S.

ELLINGTON FIELD, TEXAS, JN 4 H AMBULANCE AIRPLANE. COMPLETED JULY 6, 1918. PLACING TOP ON FUSELAGE AFTER WOUNDED MAN HAS BEEN PLACED WITHIN.

PLACING MAN IN FUSELAGE.

ELLINGTON FIELD, TEXAS, JN 4 H AMBULANCE AIRPLANE.
IN PROCESS OF LOADING.

BILLINGTON FIELD, TEXAS, JN 4 H AMBULANCE AIRPLANE.
SHOWING LITTER IN PLACE, WITH AND WITHOUT PATIENT.

5952 A.S.

N-122

ELLINGTON FIELD, TEXAS, JN 4 H AMBULANCE AIRPLANE. WOUNDED MAN IN PLACE READY TO BE CARRIED TO HOSPITAL.

5950 A.S.

May 18, 1918.

From: Lt. Colonel F. W. Weed, Medical Corps.

To: The Surgeon General. (Attention Colonel Howard).

Subject: First Aid, Aviation Fields.

1. Tentative arrangements for the prompt administration of first aid treatment at aviation flying fields vary considerably.

2. A logical scheme providing for the early treatment of injured in the event of a poor landing or crash of an airplane would seem to be the immediate despatch of a medical officer, in an airplane, to the point where the accident occurred; followed by the emergency ambulance by road or overland. The engine of the ambulance should be capable of making the highest practicable speed. At present ambulance engines are geared down to twenty miles per hour.

3. One must be ultra-phlegmatic to make a first airplane trip and on alighting retain that calm frame of mind requisite to the best possible handling of a perhaps gravely injured aviator.

4. It is, therefore, recommended that medical officers on duty at aviation fields be required to make a sufficient number of flights, with qualified aviators, to accustom themselves to the experience. The relative infrequency of airplane accidents is all the more reason for this, what might properly be called training; and that emergency ambulances used on flying fields be made speedier, if practicable.

F. W. Weed.

1st Ind.

W.D., S.G.O., May 31, 1918. To the Chief Surgeon, Aviation Section, Signal Corps, War Department.

1. Returned. The Medical Department has only two types of ambulances, the standard G.M.C., and the standard Ford. The G.M.C. ambulance has been materially developed and improved in regard to its riding qualities since those issued to aviation flying fields were manufactured. As soon as a sufficient quantity of the new product is available for issue, an additional ambulance of the new pattern will be forwarded to the various aviation camps, and arrangements will be made to replace the springs and provide the other improvements on those already supplied.

2. In view of the plan to send a medical officer to the flying field in an airplane, it would appear to be equally practicable to develop an airplane ambulance in which to bring the injured aviator back to the hospital. Inasmuch as this method will do away with all inequalities of road service and offer the least shock to the injured, it is suggested that such an ambulance be developed for the air service. In the meantime the Medical Department has no objection to the Signal Corps developing an ambulance to meet its requirements so long as the cost is chargeable to the appropriation of that service.

By order of the Surgeon General:

Edwin P. Wolfe,
Colonel, Medical Corps.

Report from Payne Field, West Point, Mississippi.

(a) The first airship ambulance was completed July, 1918.

(b) This ship was reconstructed to conform to drawings received from Ellington Field, in which several alterations were made to improve design submitted.

(c) No modifications were later made.

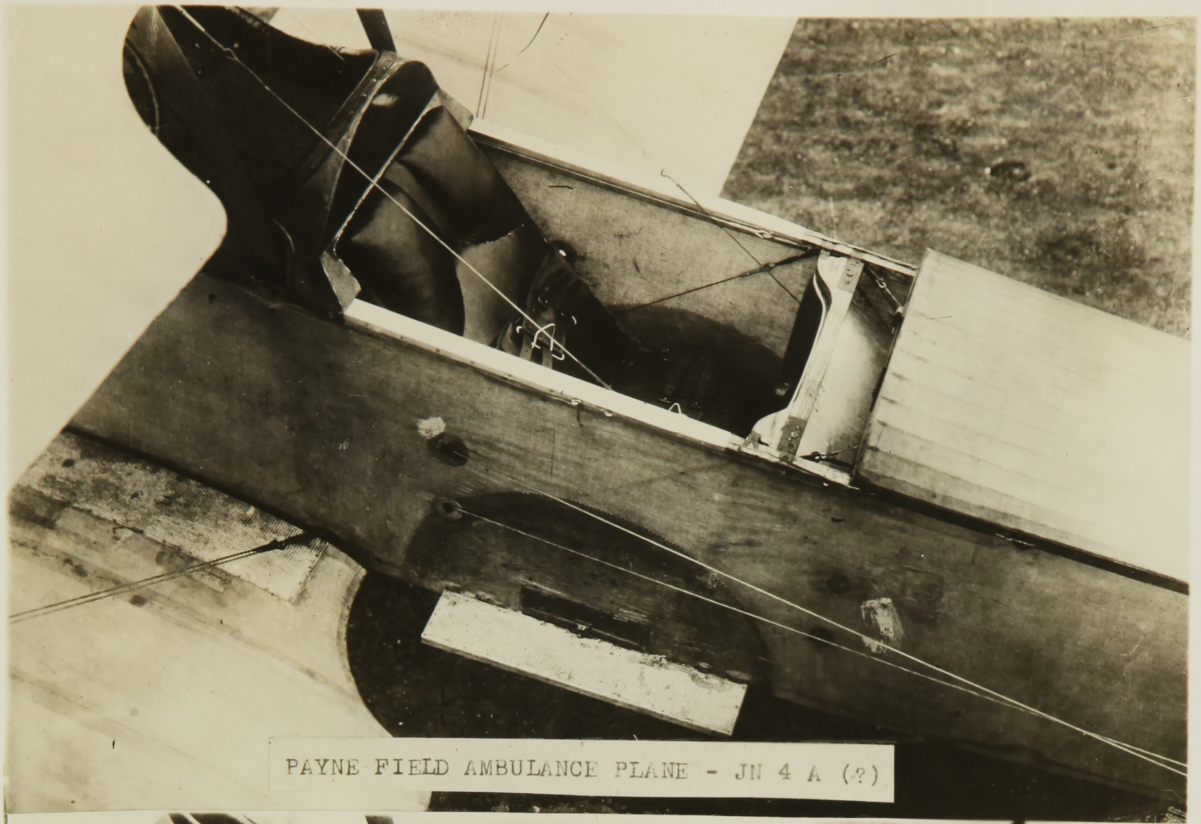
(d) The disadvantages of this ship seem to be the position in which the patient is carried, as shown by the following opinion of Engineer Officer, this field:

> "The patient lies on an angle of about 30 degrees with a safety belt across the chest. From the hips to the knees the position is horizontal and with a safety belt across the thighs. From the knees down to the feet the angle is about 30 degrees, with a safety belt across the legs. I have been the pilot of the hospital ship on five occasions and was a patient in one of the same construction at another field, and can state from experience that the position of the patient is very poor. It is hard for a man with wrenched back or broken legs or arms to be fastened in in that position. There is no cover preventing the wind from coming in on the face, and the face is one part that is generally smashed up pretty badly. The hospital ship at this field cannot be reconstructed so that it will be of any service other than can be performed by an ordinary ship used in training."

Henry MacV. Smith,
1st Lieut., Medical Corps, U. S. A.

NOTE:-This plane was modeled after the first Ellington Field plane (commissioned April 1, 1918). It is evident from the photographs that both were modeled after the plane designed by Captain Ocker, A.S., and Major Driver, M. C., at Gerstner Field. The latter was commissioned March 28, 1918.

Q.E.F.



PAYNE FIELD AMBULANCE PLANE - JN 4 A (?)

AIRPLANE AMBULANCE CONTRUCTED AT DORR FIELD 1918. Jul 18/18

9763-A.S.

Report from Love Field, Dallas, Texas.

(a) The first airship ambulance, JN 4H, was completed September 1, 1918.

(b) Ship was constructed according to the blue print from drawing of Barrows of Gerstner Field, dated July 10, 1918.

(c) This ship was unsatisfactory in that the patient was transported in a semi sitting posture, as shown by photograph. On February 7, 1919, ship was reconstructed so as to allow patient to lie in a recumbent position, which also proved unsatisfactory in that it interfered with the proper balance.

Vernon K. Earthman,
Major, Medical Corps, U.S.A.,
Surgeon.

Report from Love Field, Dallas, Texas.

(a) The first airship ambulance, JN 4H, was completed September 1, 1918.

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Vernon K. Bartlemen,
Major, Medical Corps, U.S.A.,
Surgeon.

Dallas Newspaper Report

FIRST AID BY AIRPLANE

"Hospital Ship" Latest Addition
At Texas Flying Fields.

Dallas, Tex., June 22, 1918 -- A hospital airplane is the latest innovation at the Love Field aviation school. It is an emergency airship manned during all hours of flying practice to enable medical help to reach a fallen aviator.

The hospital "ship" is always ready for instant use. That there may be no delay, the emergency machine is "cranked up" every twenty minutes, so that the engine may be kept warm and ready to produce its best speed as soon as needed. The pilot and the physician stay close at hand.

Observers with field glasses keep a watchful eye upon the men in the air, and the instant a flier starts falling, information is telegraphed simultaneously to the ambulance, the fire wagon, and the hospital "ship".

Oftentimes when a forced landing occurs it is in a field distant from any road, and the ambulance can reach it only by traveling a long and round about way. The hospital "ship" can save time, not only by its speed, but also by going direct to the scene of the accident.

Students Not Disturbed

The ubiquitous evidence of preparations for accidents is thoroughly approved by the young fliers, and has no depressing effect on their spirits. Always during flying times the ambulances manned and with motors running stand on the "dead line" ready to start. Forced landings sometimes occur, with occasional accidents, but most frequently the injuries are not serious, so the ambulances have no terrors for the cadets. They call them "meat wagons".

LOVE FIELD, DALLAS, TEXAS, AIRPLANE AMBULANCES.
ABOVE: JN 4 H TYPE.
BELOW: JN 4 D TYPE.

Report from Brooks Field, San Antonio, Texas.

The accompanying photographs show the Brooks Field hospital airplane landing at Fort Sam Houston. Permission has been given to land this ship on the parade ground near the base hospital in case of emergency. The photographs give an idea of the appearance of the plane, which is unique in several respects. After the patient is once placed on the stretcher at the scene of the wreck he is not again handled until he is put into bed in the hospital. In other words, the stretcher lifts out and is used in exactly the same manner in which they use the stretcher of an ordinary ambulance. The rebuilt fuselage is of a new shape, not characteristic of the regular Curtiss JN4D planes. This ship is painted white. It handles well and has good climbing qualities.

Harford W. H. Power, Jr.,
Captain, A. S. A.,
Adjutant.

BROOKS FIELD, SAN ANTONIO, TEXAS.
AIRPLANE AMBULANCE CONSTRUCTED
FROM PLANS PREPARED AUGUST 16/18.

5978 A.S.

BROOKS FIELD, SAN ANTONIO, TEXAS.
AIRPLANE AMBULANCE CONSTRUCTED
FROM PLANS PREPARED AUGUST 16/18.

5977 A.S.

BROOKS FIELD, SAN ANTONIO, TEXAS.

59-127B

5457A.S.

BROOKS FIELD AMBULANCE AIRPLANE - JN 4 D - LANDING ON PARADE GROUND, FORT SAM HOUSTON, TEXAS, SEPTEMBER 12, 1918.

ILLUSTRATING MANNER IN WHICH PATIENT IS STRAPPED TO COLLAPSIBLE LITTER FOR TRANSPORTATION IN AIRPLANE.

PATIENT IN POSITION IN SHIP. THE HINGED SECTION OF THE FUSELAGE, BUILT ESPECIALLY FOR THIS SHIP, IS READY TO BE LOWERED OVER THE PATIENT.

5963 A.S.

Report from Scott Field, Belleville, Illinois.

Ship No. 1.

(a) First ship was completed September 14, 1918.

(b) Ship was designed by the Engineer at Gerstner Field, Lake Charles, Louisiana.

(c) Front end of litter was lowered, thus changing the position of patient from a reclining position to a horizontal position. Change recommended by the Surgeon, Captain Charles O. Bayless, M. C., "because there was more danger to patient being carried in reclining position than in the horizontal or prone position".

(d) After changes mentioned in paragraph (c) the advantages of this ship would be in the rapidity that the Medical Officer could reach the patient after an accident, and the rapidity that the patient could be transferred to the hospital.

Ship No. 2.

(a) The second ship was completed November 25, 1918.

(b) Ship was designed by Captain Asa J. Etheridge, A.S.A., Chief Engineer at Scott Field.

(c) No modifications were later found to be necessary.

(d) The advantages of this ship over Ship No. 1, is that Ship No. 2 has the door in the side of the ship, and it is easier to load the patient into the ship and easier to unload patient from the ship.

W. R. Russell,
Captain, Medical Corps.

SCOTT FIELD, BELLEVILLE, ILLINOIS - AIRPLANE AMBULANCE - JN 4 D PLACED IN SERVICE SEPTEMBER 14, 1918. SHOWING AMBULANCE LITTER.

PATIENT IN POSITION ON LITTER. TOP OF FUSELAGE OPEN.

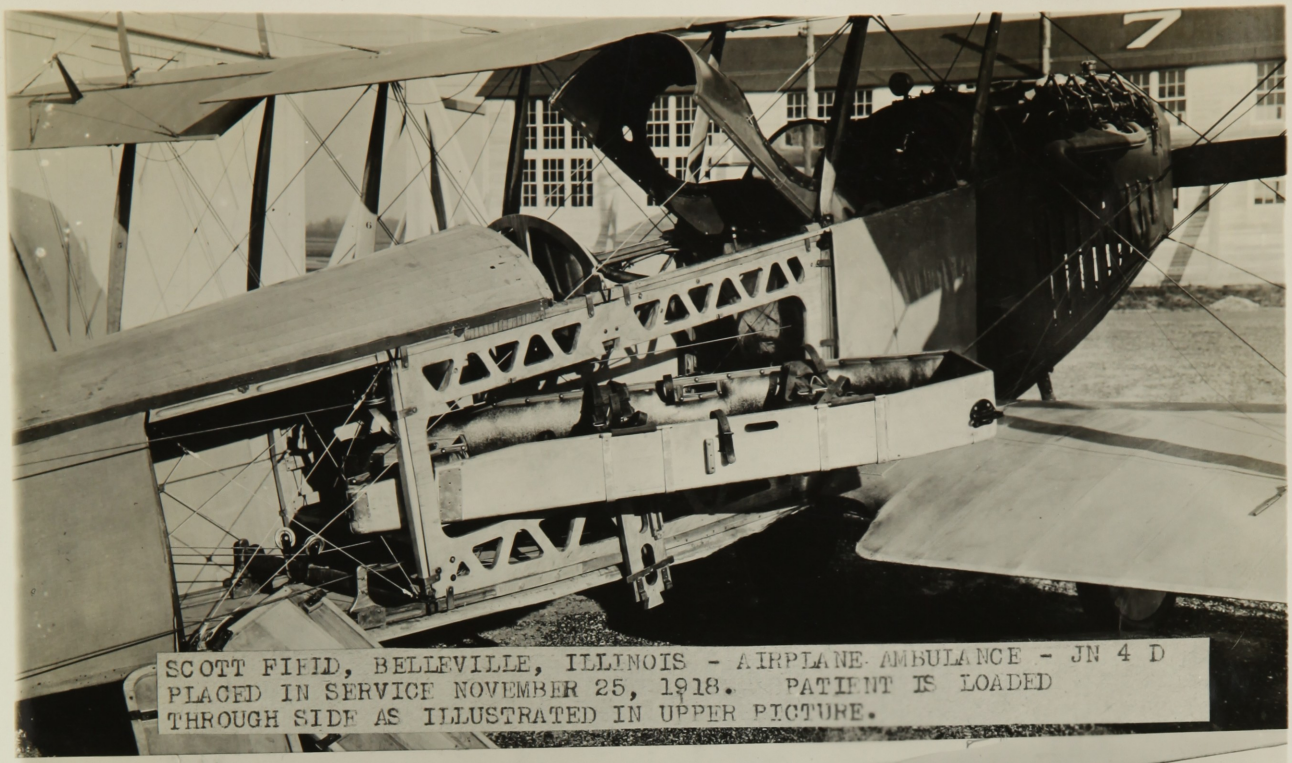
5959 A.S.

SCOTT FIELD, BELLEVILLE, ILLINOIS.
AIRPLANE AMBULANCE-JN 4 D.
PLACED IN SERVICE NOVEMBER 25, 1918.
PATIENT LOADED, DOORS CLOSED AND
SHIP READY TO RETURN.
PHOTO-SEC-3

5546, A.S.

SCOTT FIELD, BELLEVILLE, ILLINOIS.
AIRPLANE AMBULANCE-JN 4 D.
PLACED IN SERVICE NOVEMBER 25, 1918.
SHOWING PATIENT STRAPPED TO LITTER.
POTO-SEC-80

5544AS.



SCOTT FIELD, BELLEVILLE, ILLINOIS - AIRPLANE AMBULANCE - JN 4 D PLACED IN SERVICE NOVEMBER 25, 1918. PATIENT IS LOADED THROUGH SIDE AS ILLUSTRATED IN UPPER PICTURE.

SHOWING DOOR CLOSED.

53.60 A.S.

Report from Eberts Field, Lonoke, Arkansas.

(a) Ship completed September 14, 1918.

(b) Designed by Major S. M. Strong, M. C.

(c) No modifications were later found to be necessary.

(d) Patient can be carried comfortably in this ship, and it has a great advantage over the motor ambulance, especially if landing place available within reasonable distance of wreck.

Submitted herewith set of photographs, showing every step in loading the Aero-Ambulance, designed by the writer by remodeling Curtiss Biplane, Type JN 4D. This ambulance can be loaded in not to exceed the same length of time ordinarily consumed in loading a single patient in our present type of automobile ambulance. The following changes and additions were made in the ship:

REAR COCKPIT: Removed seat, instrument board, gas throttle, switch, stick, and rudder bar, and made the following additions:

1. Metal cross piece fuselage bottom to support the foot of the litter.

2. Two rests, one on either side of the ship, to support the center litter bars.

3. Two straps at the top of the cockpit in the rear, one on either side, to make the head of the litter fast.

4. Platform on top of fuselage at rear of cockpit.

5. Straps across the back of the ship to hold down the metal section of the turtle back.

Remodeled as follows:

1. Floor boards in rear of cockpit.

2. Two metal pipe fuselage braces substituted for the original wood braces.

3. Cut off turtle back 24 inches.

4. Lengthened cockpit metal covering 24 inches.

LITTER: Is made of pipe about six feet in length. Constructed in shape so as to give two separate leg pieces which will act as splints if necessary. Litter is covered with canvas, laced on, and easy to remove. Broad canvas straps, so placed as to cross the chest of the

Report from Ebert's Field, Lonoke, Arkansas.

(a) Ship completed September 14, 1918.

(b) Designed by Major S. M. Strong, M. C.

(c) No modifications were later found to be necessary.

(d) Patient can be carried comfortably in this ship, and it has a great advantage over the motor ambulance, especially if landing place available within reasonable distance of wreck.

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REAR COCKPIT: Removed seat, instrument board, gas throttle, switch, stick, and rudder bar, and made the following additions:

1. Metal cross piece fuselage bottom to support the foot of the lifter.

2. Two rests, one on either side of the ship, to support the center lifter bars.

3. Two straps at the top of the cockpit in the rear, one on either side, to make the head of the lifter fast.

4. Platform on top of fuselage at rear of cockpit.

5. Straps across the back of the ship to hold down the metal section of the turtle back.

Remodeled as follows:

1. Floor boards in rear of cockpit.

2. Two metal pipe fuselage braces substituted for the original wood braces.

3. Cut off turtle back 24 inches.

4. Lengthened cockpit metal covering 24 inches.

LIFTER: Is made of pipe about six feet in length. Constructed in shape so as to give two separate leg pieces which will act as splints if necessary. Lifter is covered with canvas, laced on, and easy to remove. Broad canvas straps, so placed as to cross the chest of the

patient or support an injured arm if necessary. One strap for each leg.

TO LOAD AMBULANCE: Metal section of turtle back is removed. Litter removed and loaded. Litter with patient is now lifted and placed upon the platform on top of fuselage. No. 2 man now goes to the other side of the ship and both men, now standing upon the step at the side of the ship, gently lift and slide the litter into its proper position in the cockpit. The foot of the litter sliding under a safety hook on either side. The usual life belt is tightened across the abdominal section of the patient. The head of the litter is tied by two straps to the metal pipe of the fuselage brace. Metal turtle back is replaced and strapped. Loading is then complete. Patient's head rests back across a shaped cushion, fastened on the litter and protects his head from rolling. The jar of the landing is absorbed by the spring of the metal frame of the litter and canvas and is practically without sensation of a jar. Test rides have proven that loading and transportation is very comfortable.

EQUIPMENT: Emergency equipment will be carried in a square canvas pack, similar to the present Hospital Corps pouch, equipped with a strap so it can be slung over the shoulder and is carried in the ship suspended at the back of the front seat in the rear cockpit. The usual fire extinguisher and wrecking tools are also on board.

When traveling to the scene of the wreck, the Medical Officer sits in the rear cockpit, and being supported by a leather cushion permits him to be in a very comfortable position and enables him to act as an observer to assist in locating the wreck.

Samuel M. Strong,
Major, M. C.

G487 FLIGHT SURGEONS AMBULANCE CORPS - EBERTS FIELD. LONOKE. ARKANSAS.

5545 A.S.

AERO AMBULANCE DESIGNED BY MAJOR
O.M. STRONG. M.C. U.S. ARMY 1918.
SHOWING MEDICAL OFFICER IN REAR COCK
PIT ACTING AS AN OBSERVER ON WAY TO W

AERO AMBULANCE DESIGNED BY MAJOR S.M. STRONG M.C. U.S. ARMY—1918
1ST STEP IN LOADING. PREPARING TO REMOVE COCKPIT.

5966 A.S.

AERO AMBULANCE DESIGNED BY S.M. STRONG MAJOR M.C. U.S. ARMY 1918
2nd STEP REMOVING COCKPIT CORNER. NOTE WOODEN PLATFORM.

AMBULANCE DESIGNED BY MAJOR S.M. STRONG M.C. U.S. ARMY 1918
REMOVING LITTER

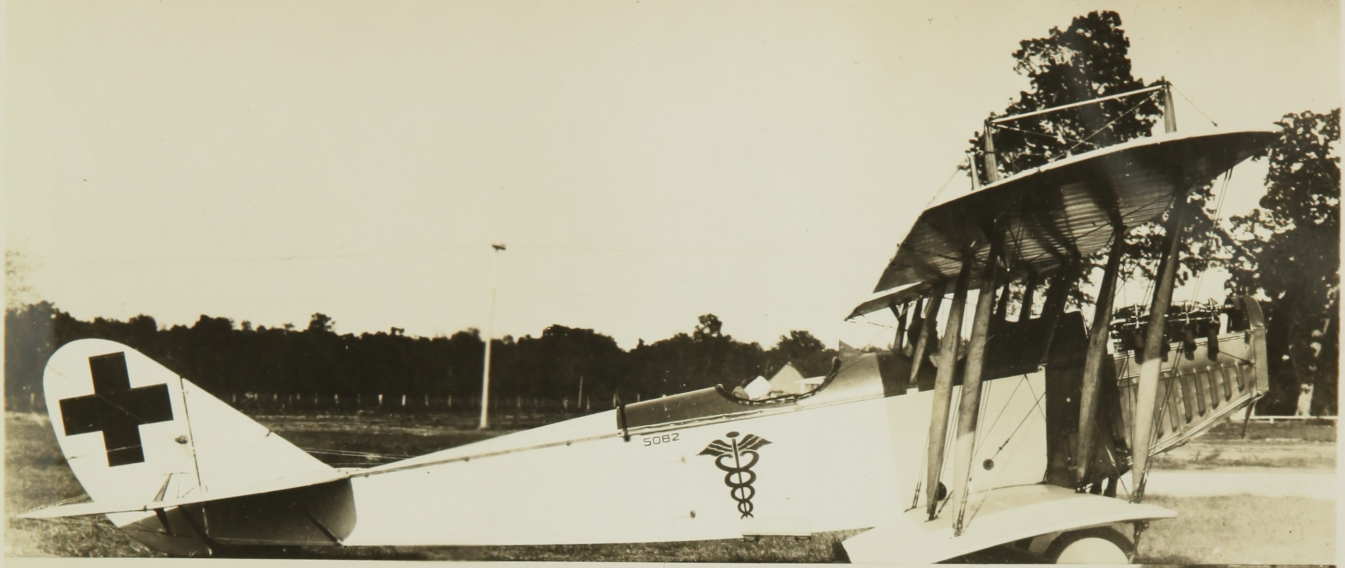
#5
AERO AMBULANCE DESIGNED BY MAJOR S.M. STRONG
MC US ARMY 1918.
STRAPPING PATIENT TO LITTER.

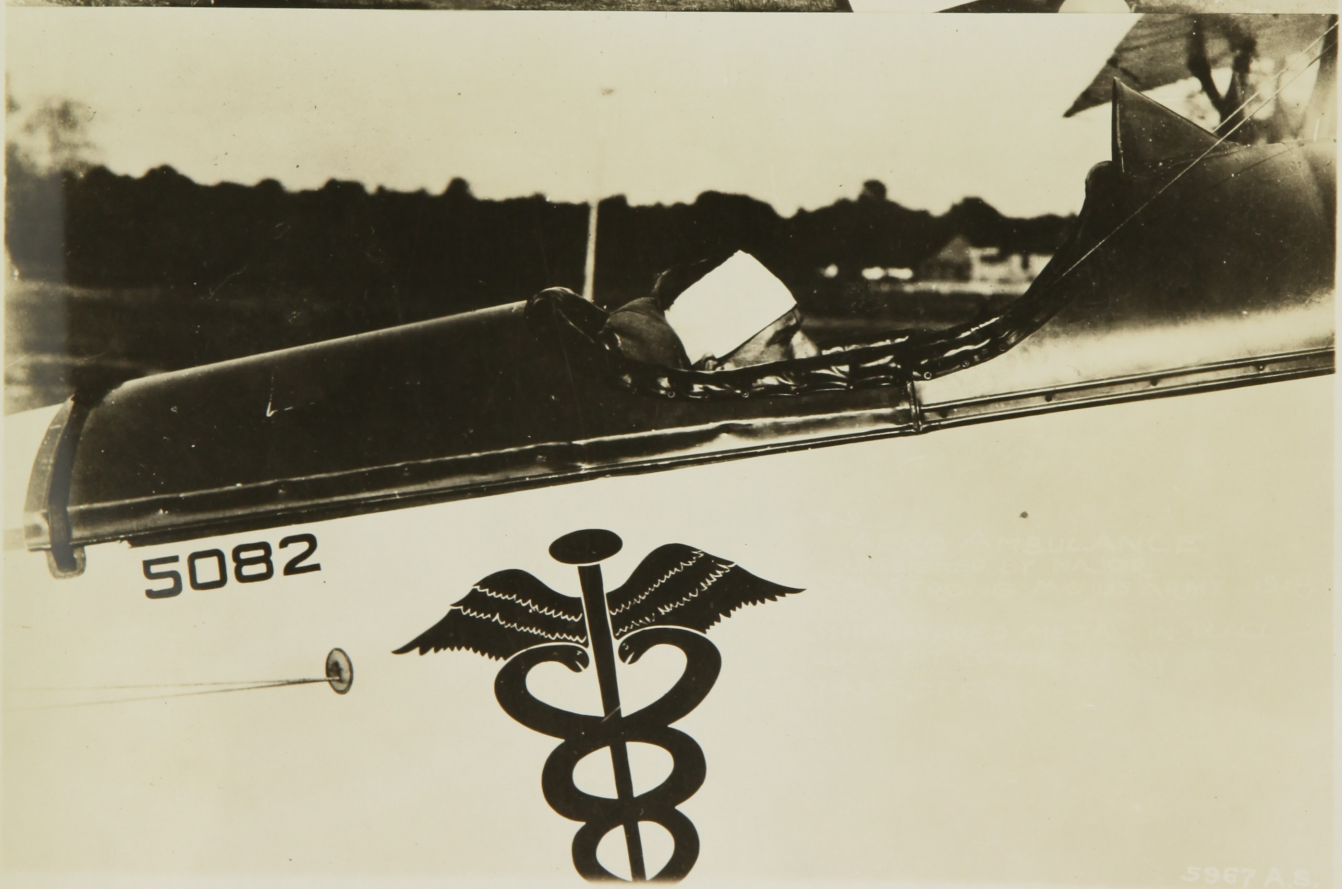
AMBULANCE DESIGNED BY
S.M. STRONG MC US ARMY
1918
LITTER USED — SPACE BETWEEN
CES TO STRADDLE CONTROL
EAD REST, BODY AND
ARS.

5964 A.S.

5082
MBULANCE DESIGNED BY MAJOR
ONG MC US ARMY 1918
PREPARED TO SLIDE PATIENT INTO
GE.
5965 A.S.

AERO AMBULANCE DESIGNED BY MAJOR S.M. STRONG
M.C. U.S. ARMY - 1918
LOADED PATIENT IN PLACE READY TO "TAKE OFF"





5967 A.S.

WESTERN UNION TELEGRAM

SAN DIEGO CALIF 1918 JULY 3 PM 7 40

AIR SERVICE DIVISION

SURGEON GENERAL OFFICE

U S A WASHINGTON

ROCKWELL FIELD TWO PERIOD REQUEST IMMEDIATE SHIPMENT FOR USE THIS POST ONE STOKES SPLIT STRETCHER NAVY STANDARD FOR INSTALLATION IN AEROPLANE FOR TRANSPORTING CROSS COUNTRY ACCIDENT CASES

REAM SURGEON

July 6, 1918.

MEMORANDUM for: Surgeon General's Office. (Attention Col. Wolfe,M.C.)

1. For the purpose of transporting patients by airplane the use of this type stretcher seems peculiarly fitted. The idea has suggested itself to the undersigned as well as to the Surgeon, Rockwell Field, and seems worthy of trial. Approval is, therefore, recommended for this field, alone, until its utility, or lack of it, can be demonstrated.

Nelson Gapen
Lt. Col., U.S.A., Retired.
Air Service Division.

NOTE:-This is the first suggestion, of record, for using the Stokes litters in airplane ambulances. See remarks and photographs of Stokes litter in connection with DH4 ambulance and Curtiss Eagle.

QEJ

WESTERN UNION TELEGRAM

SAN DIEGO CALIF 1918 JULY 3 PM 7 40

AIR SERVICE DIVISION

SURGEON GENERAL OFFICE

U S A WASHINGTON

ROCKWELL FIELD TWO PEDRO REQUEST IMMEDIATE SHIPMENT FOR USE THIS
POST ONE STOKES SPLIT STRETCHER NAVY STANDARD FOR INSTALLATION IN
AEROPLANE FOR TRANSPORTING GROSS CONDITY ACCIDENT CASES

HENRY SURGEON

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Air Service Division.

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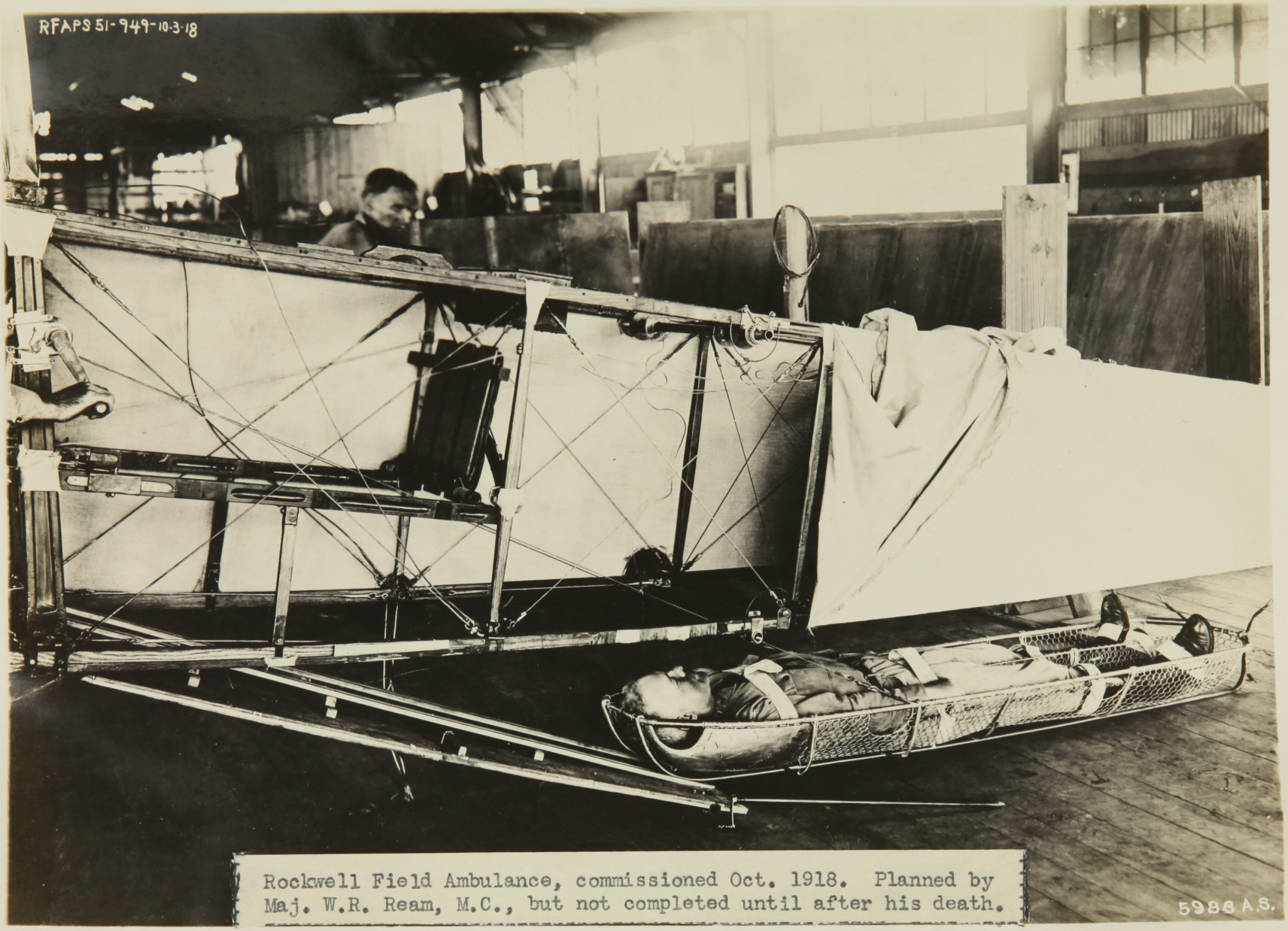
Rockwell Field Ambulance, commissioned Oct. 1918. Planned by Maj. W.R. Ream, M.C., but not completed until after his death.



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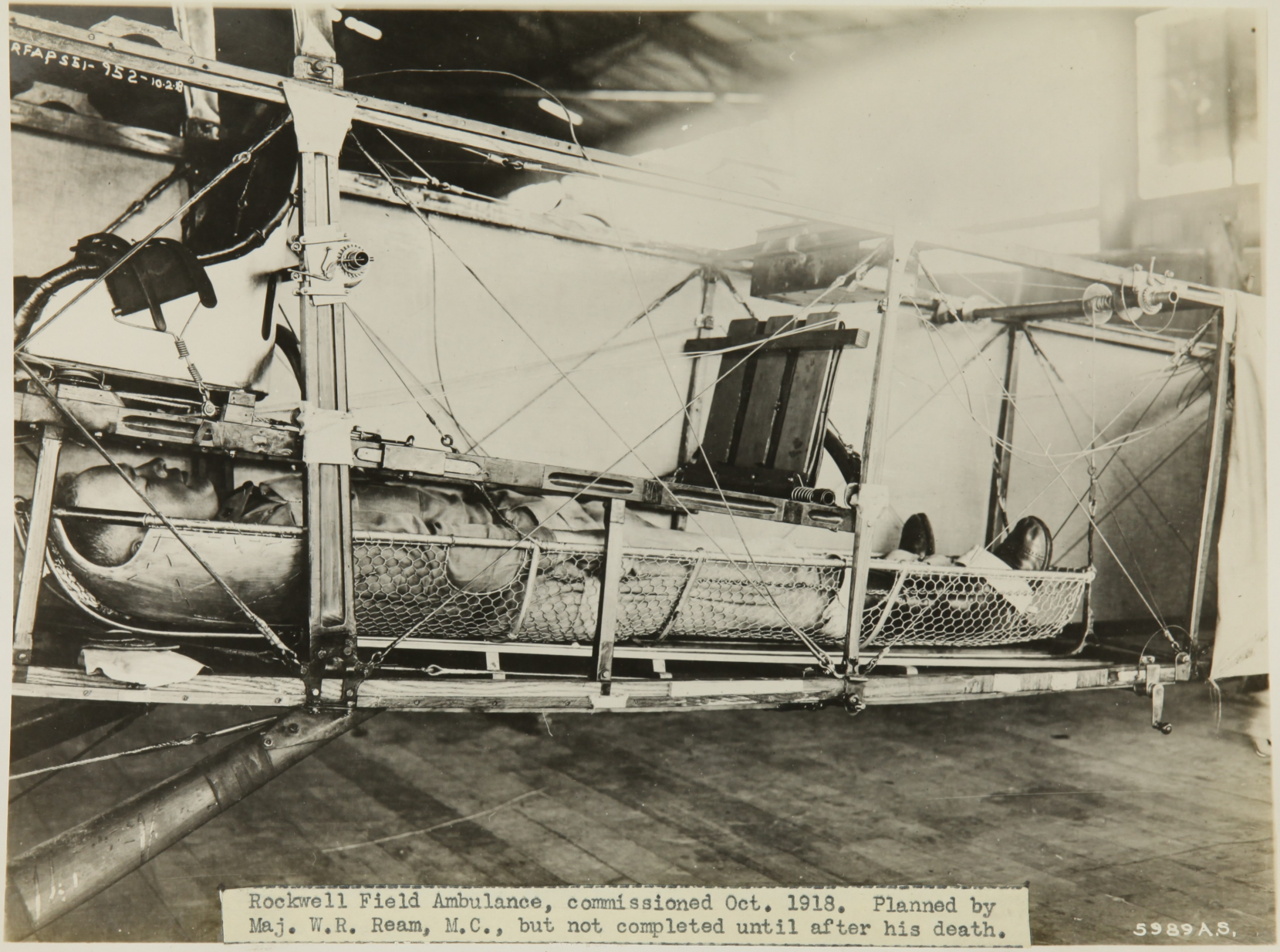


Rockwell Field Ambulance, commissioned Oct. 1918. Planned by Maj. W.R. Ream, M.C., but not completed until after his death.

5989 A.S.

Report from Call Field, Wichita Falls, Texas.

(a) First airship ambulance was completed October 18, 1918.

(b) Ship was modeled after blue prints received from Gerstner Field, Lake Charles, Louisiana, by the Engineering Department of this field, and modified in two respects, as shown by accompanying photographs, one of the aluminum siding and the other of the litter carrier.

(c) This model has given complete satisfaction.

Thomas F. McCormick,
1st Lieutenant, Medical Corps.

Report from Taylor Field, Alabama.

(a) One airplane ambulance has been in service on this field since October 28, 1918. Its Signal Corps number is 2436.

(b) Major E. L. Hoffman, J.M.A., S.C., commanding officer, Taylor Field, assisted by several engineering officers designed this ship.

(c) On its first flight, October 21, 1918, it was decidedly tail heavy. This was corrected by materially lessening the stagger of the wings.

(d) With any considerable amount of flying this ship is believed to be an advantage. Especially on cross-country training it is valuable in locating any ship forced down and in rendering medical attention. In serious injuries it is possible to strap the injured person in and bring him back at once to his home field. The principal disadvantage of this ship is that it frequently is impossible to land safely near a wrecked ship because of poor fields.

John A. Snowden,
Captain, Medical Corps.

195
10-22-18

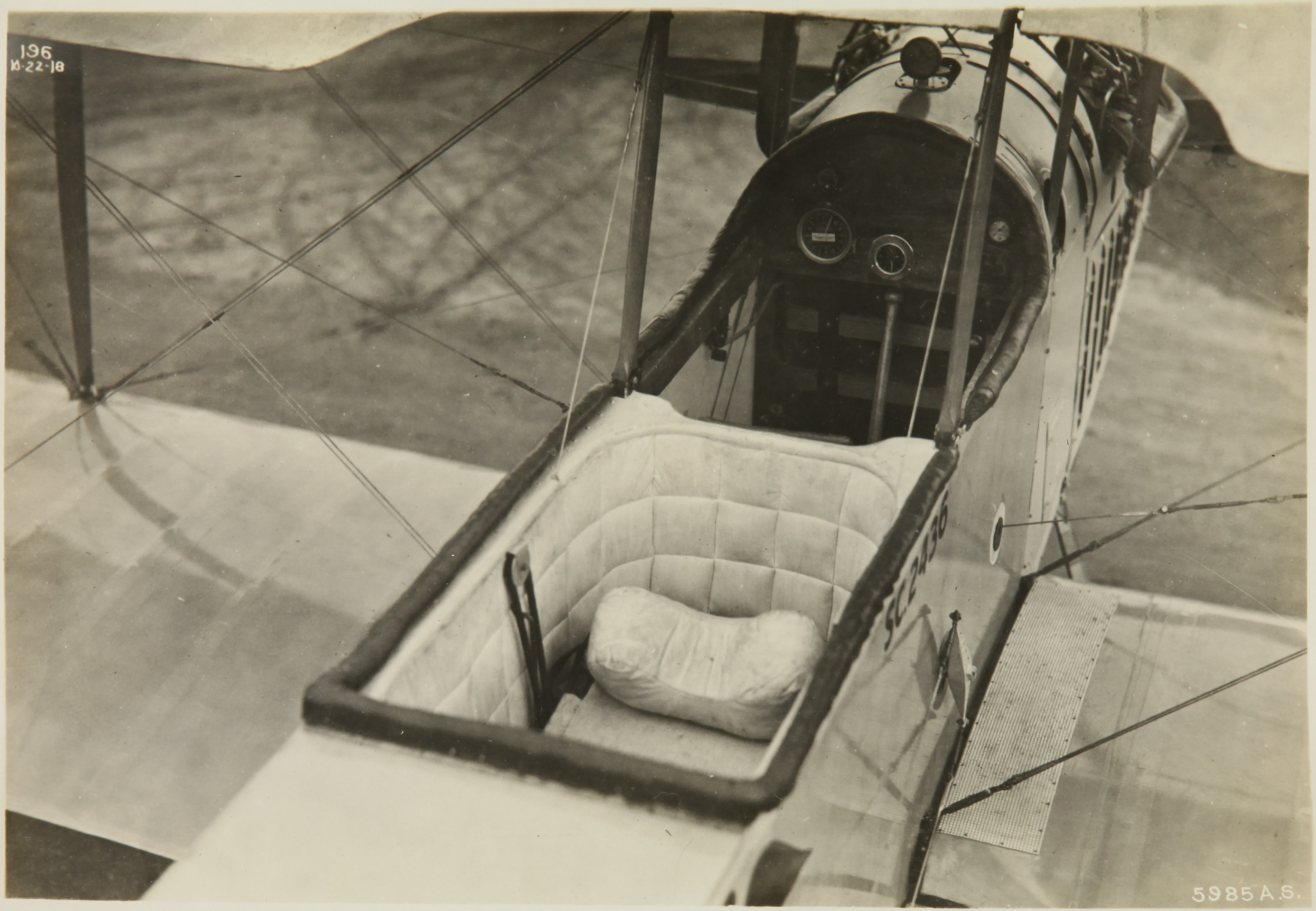
Taylor Field, Alabama, Side view of Airplane Ambulance completed October 28, 1918.

Taylor Field, Alabama, front view of Airplane Ambulance completed October 28, 1918.

Showing litter in place in padded wall compartment, Airplane Ambulance completed Taylor Field, Alabama, October 28, 1918.

198
10-22-18

Taylor Field, Alabama, showing Airplane Ambulance completed October 28, 1918.



Showing interior of Airplane Ambulance
Taylor Field, Alabama, completed
October 28, 1918.

Report from Post Field, Fort Sill, Oklahoma.

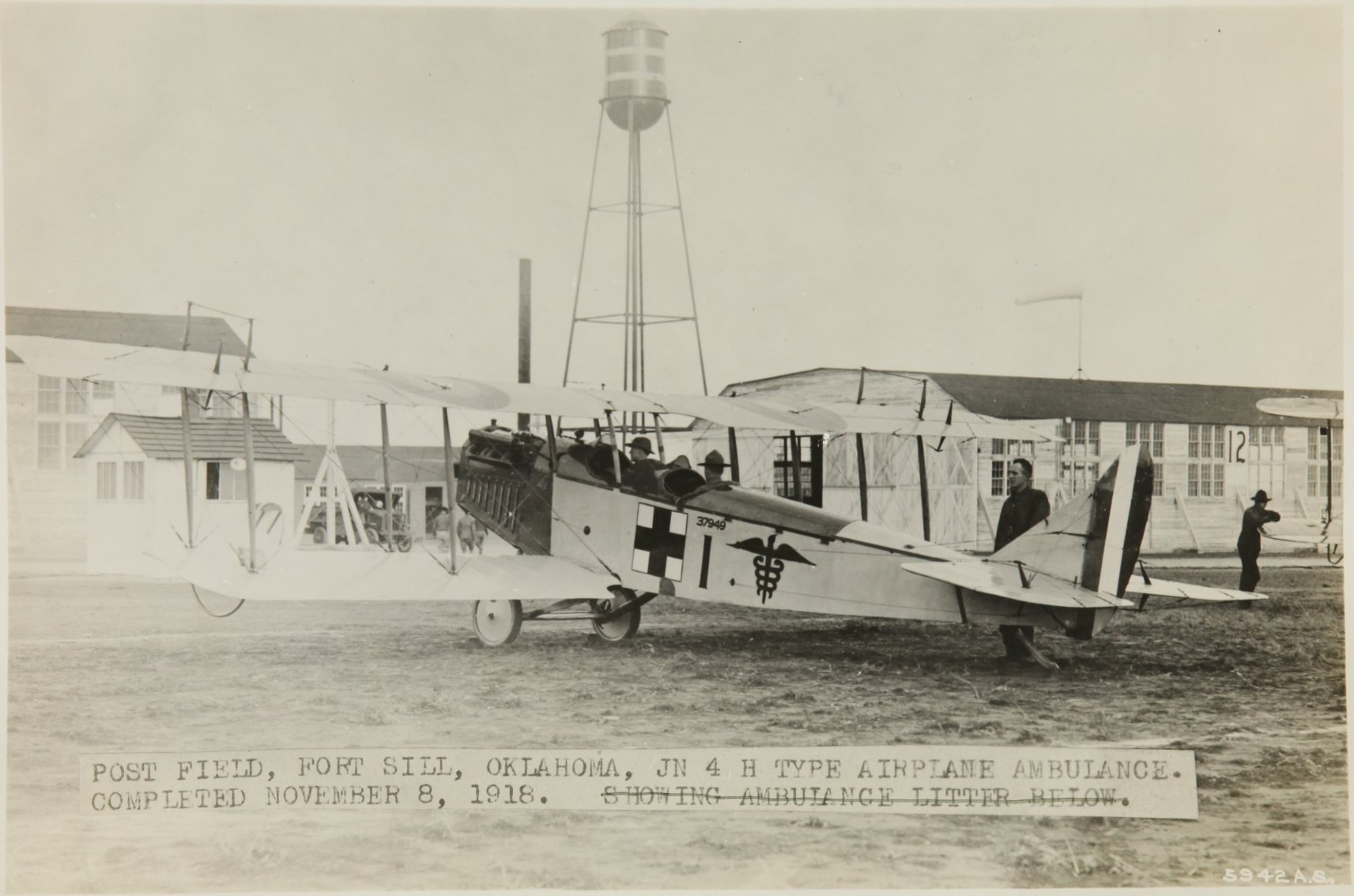
(a) The first airship ambulance was completed November 8, 1918.

(b) The ship was designed by Major M. L. King, A. S. A., and M. S. E. Cote.

(c) No modifications were later found to be necessary.

(d) This ambulance ship was of great service during active flying to get quick relief to scene of crash. Patients could be brought to hospital comfortably by the time a motor ambulance could reach the crash. The ambulance ship at this field is always flown by experienced pilots, usually officer in charge of flying field, and is always on the line during active flying.

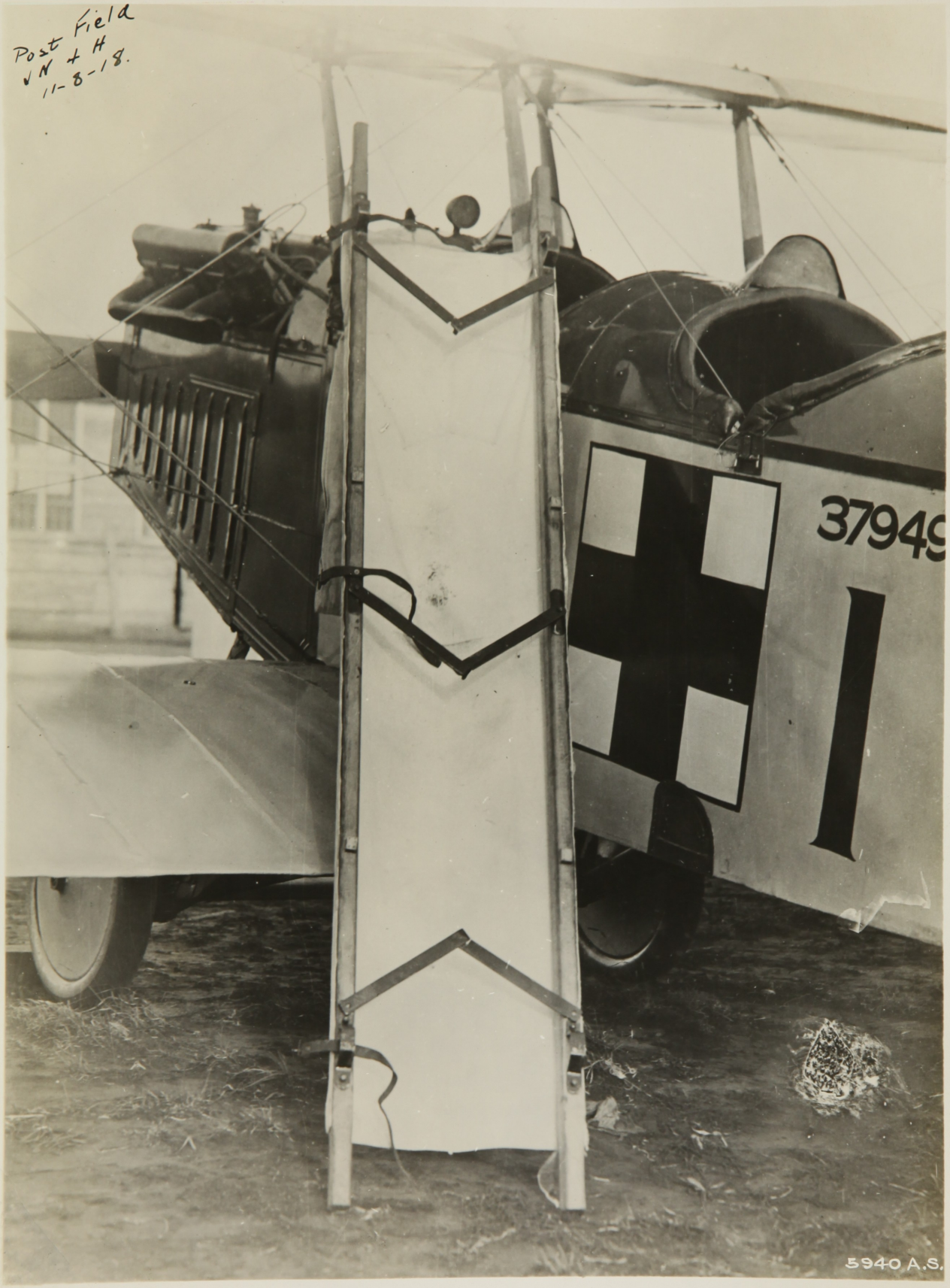
John F. Duckworth,
Major, M. C.,
Surgeon.



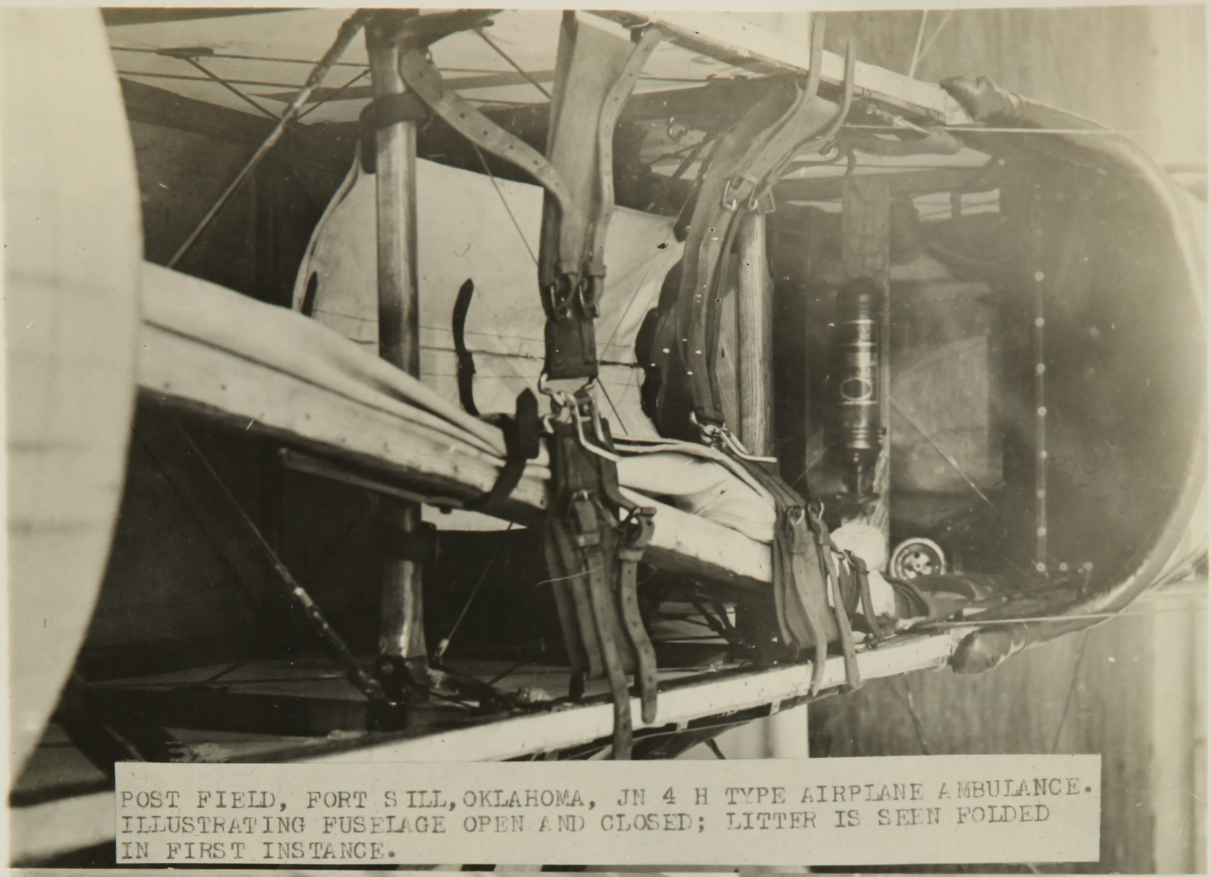
POST FIELD, FORT SILL, OKLAHOMA, JN 4 H TYPE AIRPLANE AMBULANCE.
COMPLETED NOVEMBER 8, 1918. ~~SHOWING AMBULANCE LITTER BELOW.~~

5942 A.S.

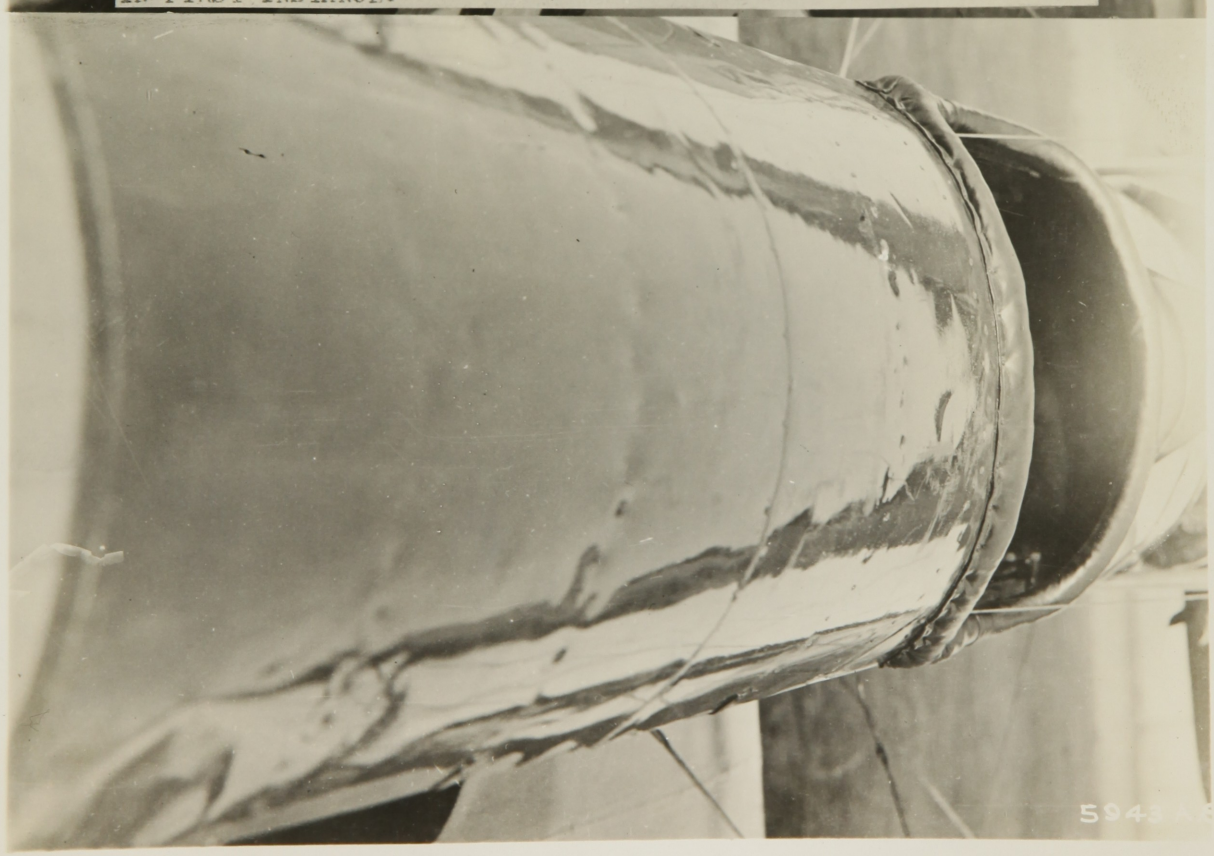
Post Field
JN 4 H
11-8-18.



POST FIELD, FORT SILL, OKLAHOMA, JN 4 H TYPE AIRPLANE AMBULANCE.
COMPLETED NOVEMBER 8, 1918. SHOWING AMBULANCE LITTER.

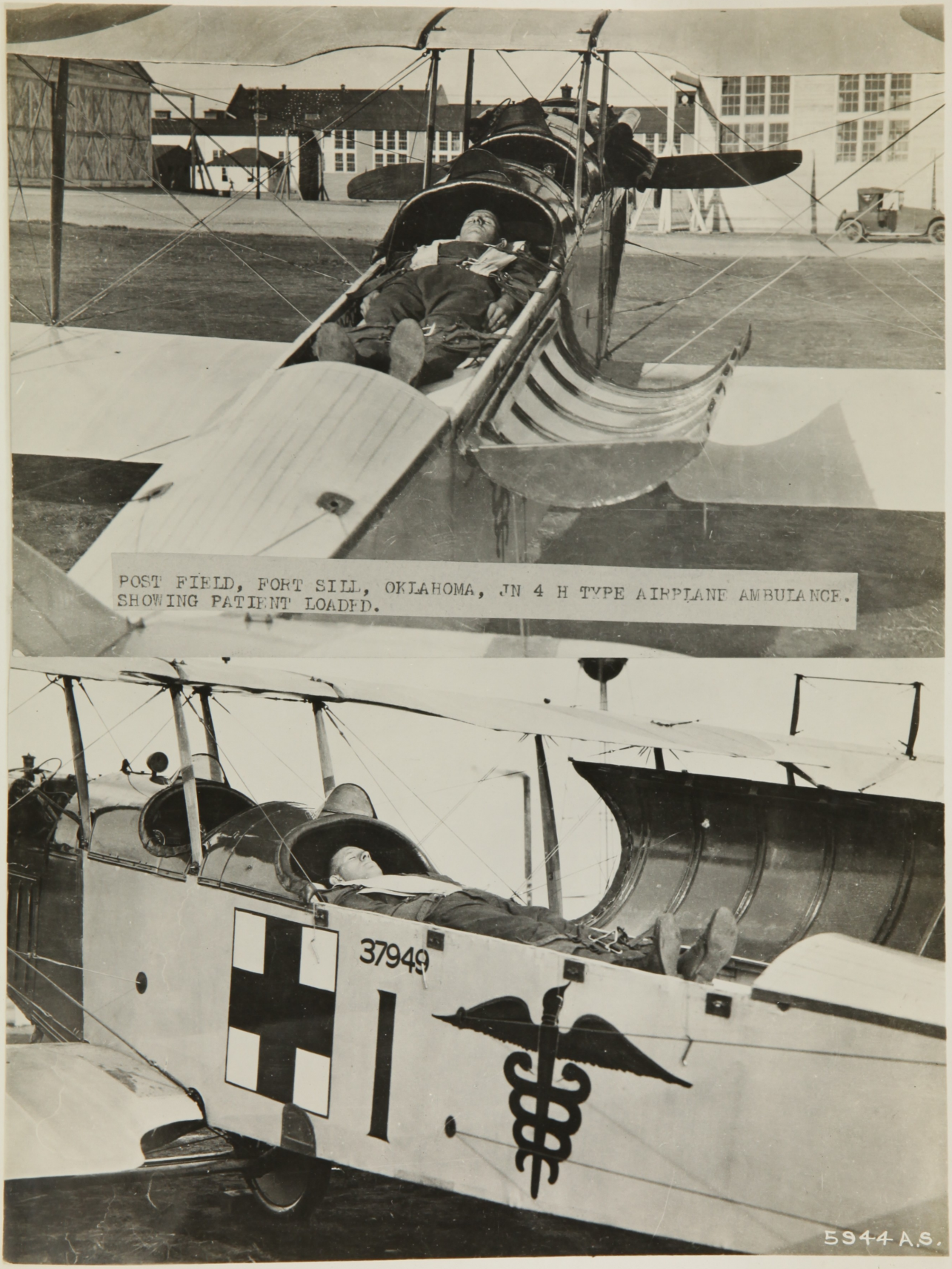


POST FIELD, FORT SILL, OKLAHOMA, JN 4 H TYPE AIRPLANE AMBULANCE. ILLUSTRATING FUSELAGE OPEN AND CLOSED; LITTER IS SEEN FOLDED IN FIRST INSTANCE.



POST FIELD, FORT SILL, OKLAHOMA, JN 4 H TYPE AIRPLANE AMBULANCE.
SHOWING INTERIOR.

5941AS.



POST FIELD, FORT SILL, OKLAHOMA, JN 4 H TYPE AIRPLANE AMBULANCE. SHOWING PATIENT LOADED.

POST FIELD, FORT SILL, OKLAHOMA. JN 4 H TYPE AIRPLANE AMBULANCE.
SHOWING PATIENT IN PROCESS OF UNLOADING.

5945 A.S.

Report from Souther Field, Americus, Georgia.

(a) Curtiss JN4D, No.3596, was equipped as a hospital ship and completed November 13, 1918.

(b) This ship was designed by Civilian W. J. Roepke and 2nd Lieutenant H. G. Blakeslee, A.S.A.

(c) There were no modifications later found to be necessary.

(d) The advantage of this ship as designed and built at this field was the quick method of handling the injured person in the rear cockpit, designed as a reclining chair. The turtle back was cut and hinged so that in no way would you need to place the person's feet in first, and this advantage was considered of first importance in handling an injured person, rather than using a stretcher, as designed in other blue prints that were sent here for that purpose.

Above information obtained from H. G. Blakeslee, 2nd Lieutenant, Engineering Officer. I have personally examined ship and find it is a reclining chair arrangement with one strap around abdomen and one around chest. Consider it a very poor type for an injured man, and not to be compared with stretcher type.

Thomas F. Bridgman,
Captain, Medical Corps,
Post Surgeon.

OFF. NEG. # 148

SOUTHER FIELD, AMERICUS, GEORGIA.

5458 A.S.

Souther Field, Americus, Georgia. Curtis JN 4 D Plane equipped, and completed November 13, 1918 for service as Airplane Ambulance. Top of Fuselage shown open.

OFF. NEG. # 146

5976 A.S.

JN 4 D type Airplane Ambulance. Completed Souther Field, Americus, Georgia, November 13, 1918.

OFF. NEG. #143

5980 A.S.

View of patient in fuselage JN 4 D type Airplane Ambulance completed Souther Field, Americus, Georgia, November 13, 1918.

Showing patient in a reclining position JN 4 D type Airplane Ambulance completed Souther Field, Americus, Georgia, November 13, 1918.

Report from Mather Field, Sacramento, California.

(a) First airship ambulance was completed and tested about November 15, 1918.

(b) Ship was designed by the Engineering Department at this field, and built in the shop of the Aero Repair under the supervision of the officer in charge and the noncommissioned officer in charge of the Mill Department.

(c) No modifications have been made in the ship as it was turned over to the flying department, with the exception of the litter, of which a minor change was found necessary in strapping the patient into it in order to make it more comfortable.

(d) It was used but once in going to an accident, and on this occasion it demonstrated that it could save time in getting a surgeon to the scene and transporting the injured back to the field. In this particular case it was impossible for the auto ambulance to get closer than within a mile of the wreck, whereas the ambulance ship landed right at the spot. On the other hand it will not always be possible for the ship to land at the scene of the wreck on account of it being impossible for it to take off in a limited space.

Peter de Obarrio,
Captain, Medical Corps.

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Peter de Dardio,
Captain, Medical Corps.

Report from Rich Field, Waco, Texas.

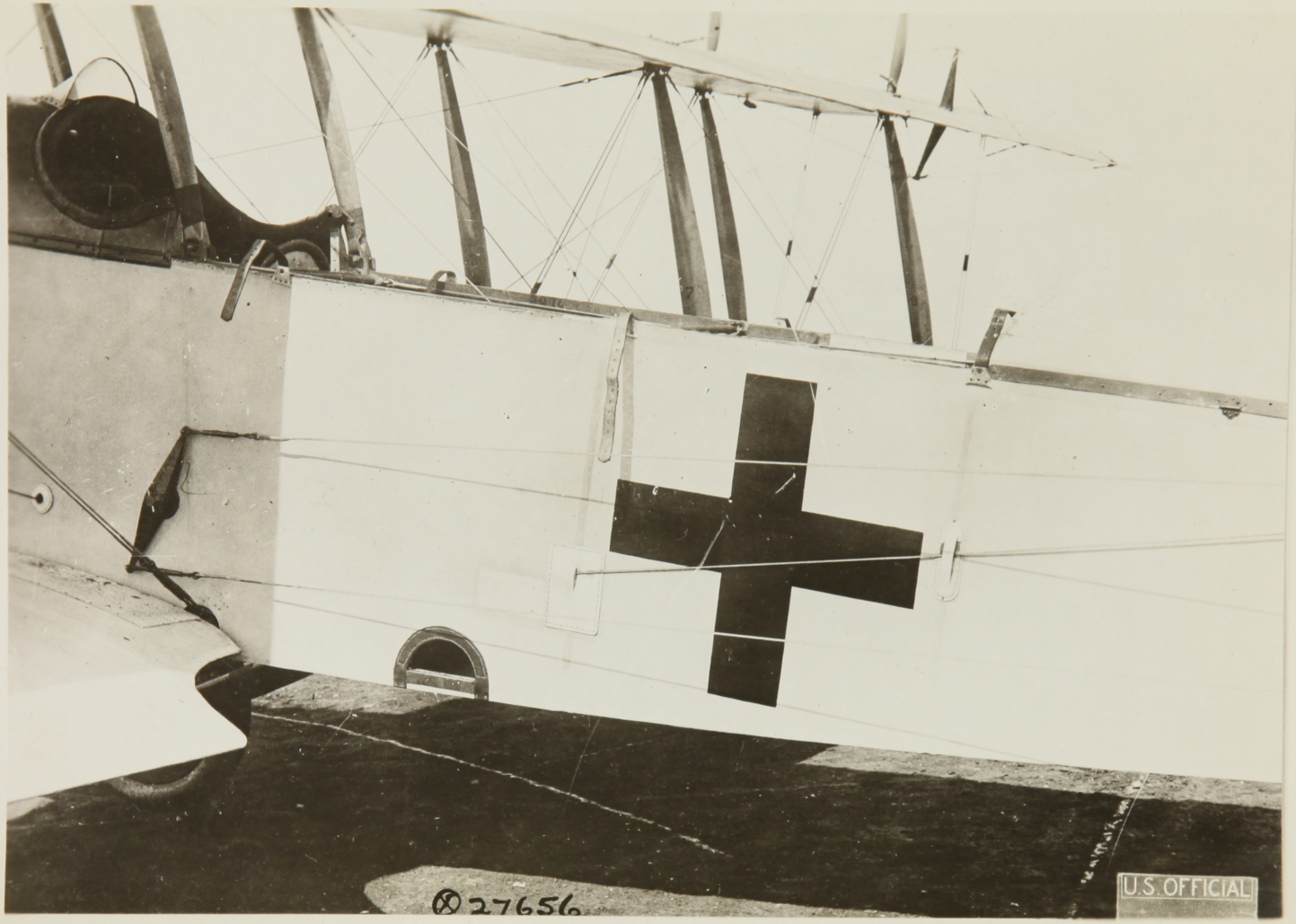
(a) The first airship ambulance was completed November 20, 1918.

(b) Design of ship: Curtiss JN4D.

(c) Modifications: Rear seat removed; single control installed in forward cockpit; rear cowling severed and made to lift off so that stretcher can be laid in fuselage.

James T. McBride,
1st Lieut.,M.C.

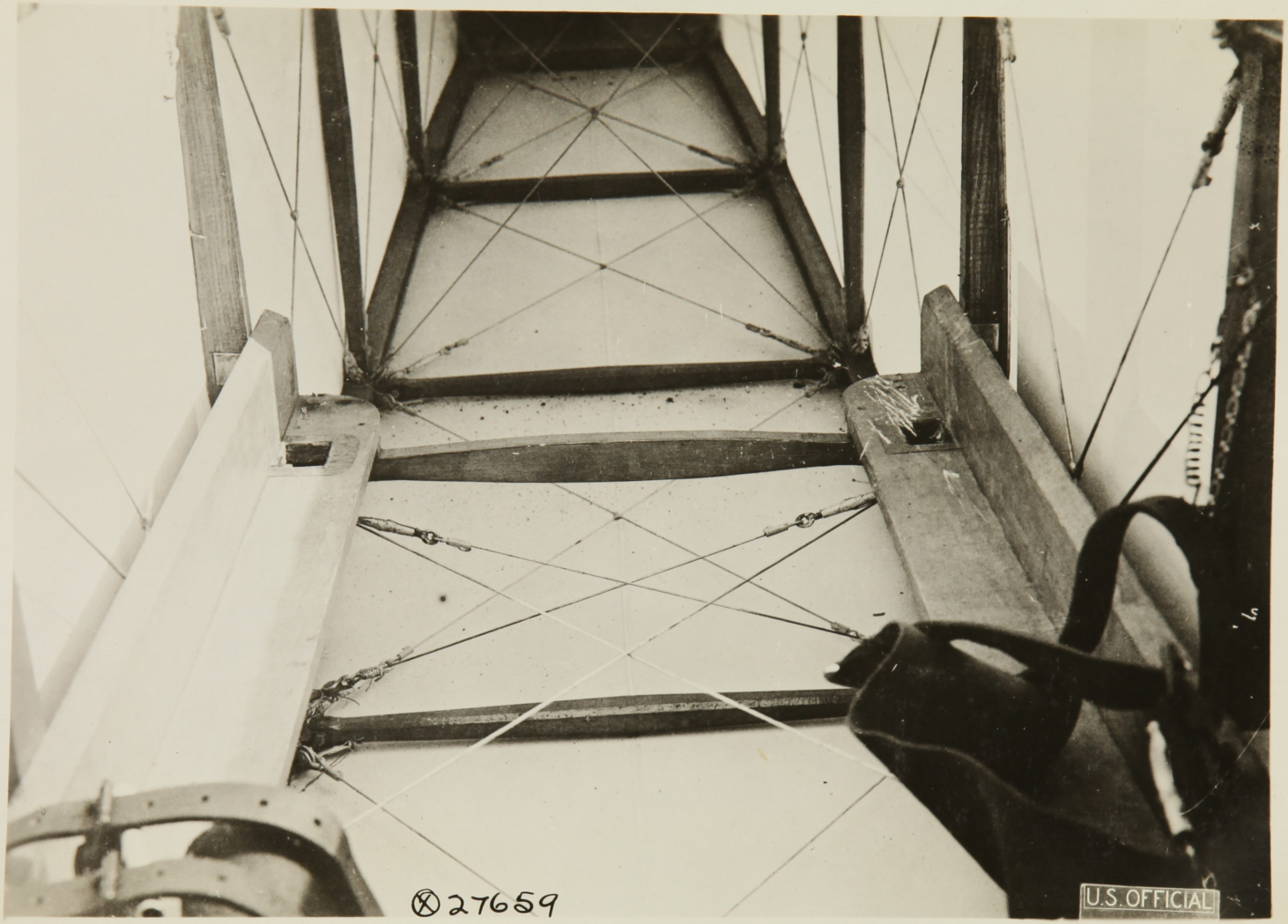
Rich Field, Waco, Texas. JN 4 D Type Airplane Ambulance. Completed November 20, 1918.



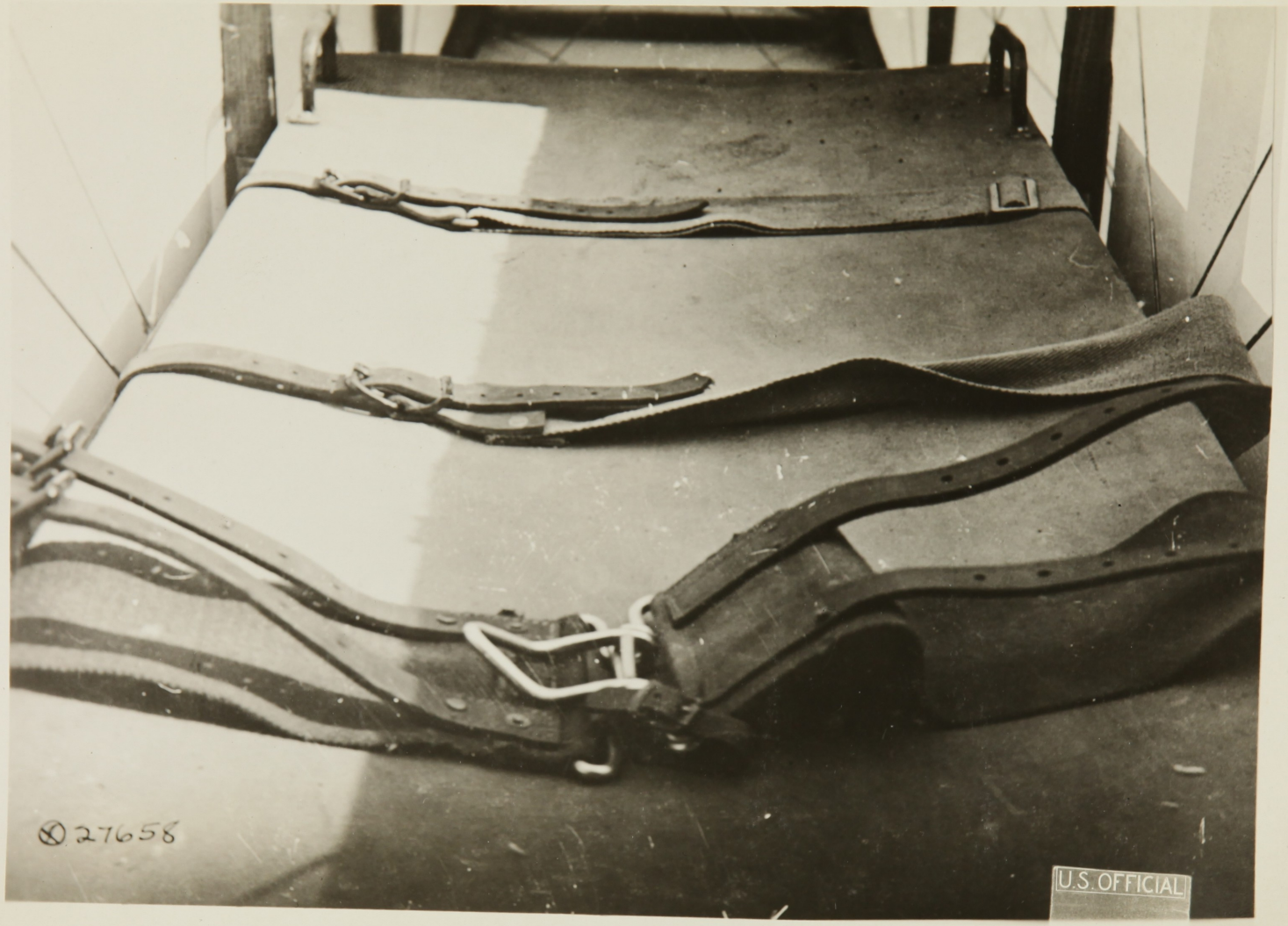
Ø 27656

View of side of JN 4 D Airplane
Ambulance completed at Rich Field, Texas,
November 20, 1918.

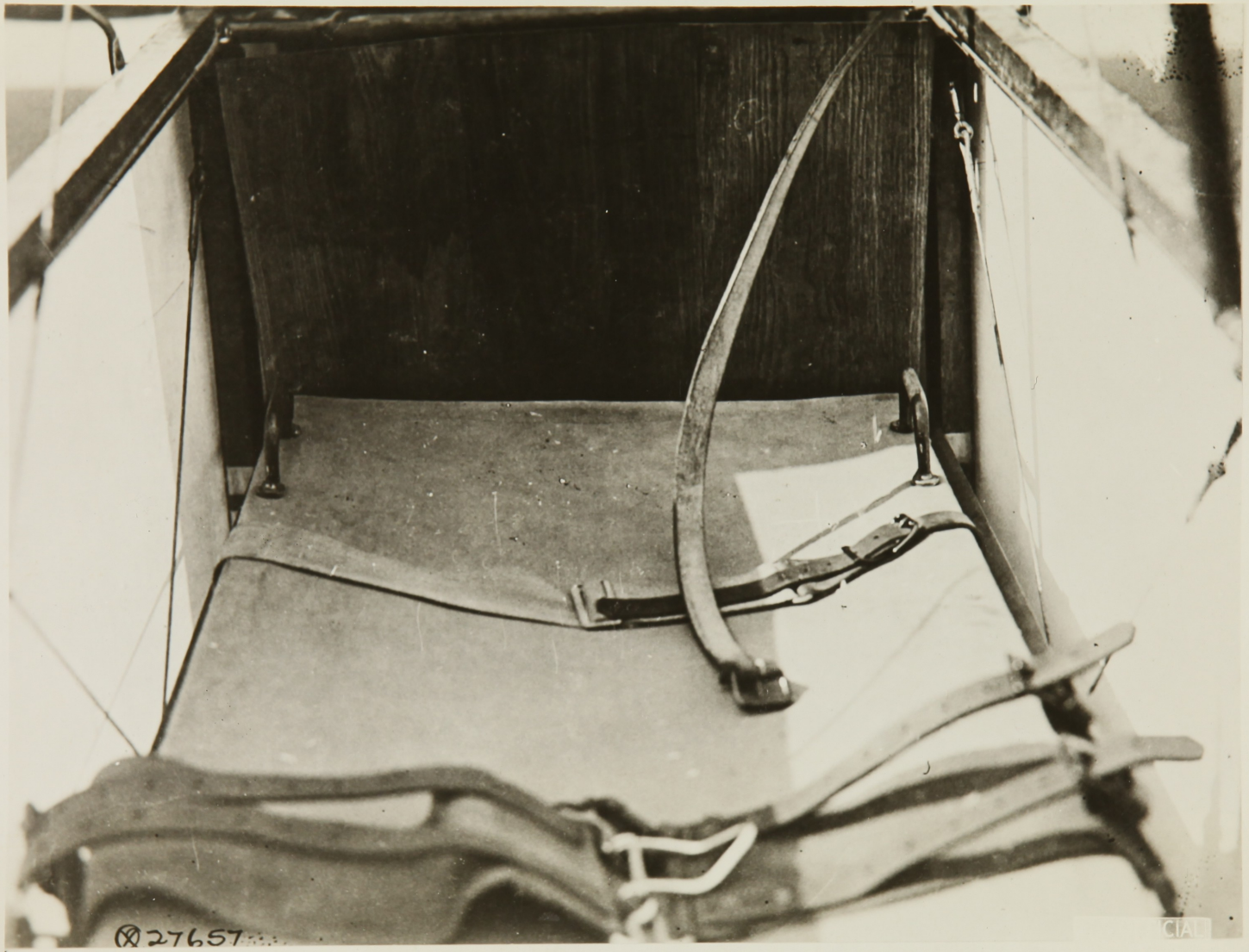
JN 4 D type Airplane Ambulance completed at Rich Field, Texas, November 20, 1918. Top of fuselage and litter removed.



Where litter is placed in JN 4 D type Airplane Ambulance - completed at Rich Field, Texas, November 20, 1918.



Illustrating litter in place with means of security, JN 4 D type Airplane Ambulance, completed at Rich Field, Texas, November 20, 1918.



JN 4 D type Airplane Ambulance - completed Rich Field, Texas, November 20, 1918. Showing Litter.

Report from Carruthers Field, Fort Worth, Texas.

(a) First airplane ambulance was completed November 21,1918.

(b) Ship was designed by Captain N. W. Sharp, M. C.

(c) No modifications made.

Lewis H. Long,
1st Lieutenant, Medical Corps.

Report from Chanute Field, Rantoul, Illinois.

(a) First airship ambulance was completed December 1, 1918.

(b) Ship was designed at Scott Field, Belleville, Illinois.

(c) No modifications were later found to be necessary.

(c) No difficulty in placing patient in ship or removing from same. Principal disadvantage is that there is only room for patient and pilot.

William O. Stephenson,
Captain, Medical Corps.

Report from Chanute Field, Rantoul, Illinois.

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(b) Ship was designed at Scott Field, Belleville, Illinois.

(c) No modifications were later found to be necessary.

(c) No difficulty in placing patient in ship or removing from same. Principal disadvantage is that there is only room for patient and pilot.

William O. Stephenson,
Captain, Medical Corps.

Report from Taliaferro Field, Hicks, Texas.

(a) First airship ambulance completed at this field December 17, 1918.

(b) Ship was designed by Captain Frank W. Wright, S.C., J.M.A., and Major Arthur J. Boyd, M.C.

(c) Tail heavy, had to remodel fairing on rear of fuselage. Remodeling of carriers for litter. It was found that the painting (white) of the hospital ship added materially to the weight.

(d) Advantages: early arrival of first aid to wounded.

Disadvantages: inability to return but one patient. Should the patient be unconscious with delirium, strapping is not safe.

Arthur J. Boyd,
Major, Medical Corps.

Feb. 8, 1919

R. Snyder, Francis J. Romer, Dewey R. Powell, Allen E. Scott, Eddy T. Boyd, Roy N. Fuller, Harold E. Farnsworth, Wilfred Bishop, Doxey R. Wilson, William E. Rideout, Franklin H. Cookingham, Frank C. Bishop, Goy E. Cornelius, Linwood Doxier, Arthur C. Kennedy, Arthur G. Waidelich,

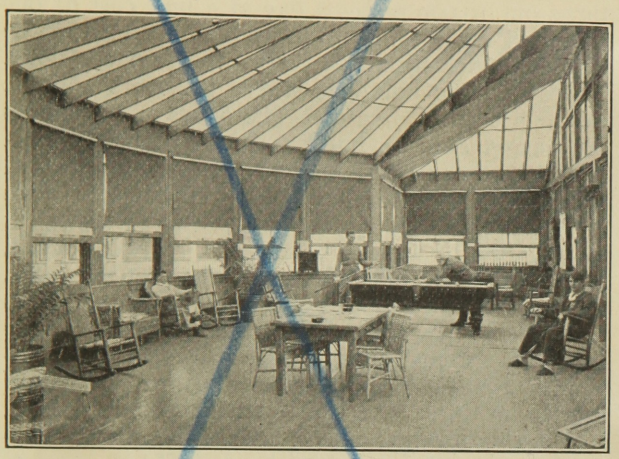


FIG. 5.—Recreation room, Letterman General Hospital.

Claude E. Huestis, and Contract Surgeons Charline R. Smith and May Mathewson. There is no doubt that close cooperation between the regular medical officers of the service and those who came in for the duration of the war has been of great benefit to both. Each has learned something, and upon demobilization both the regulars and civilians will continue their profession with a broader and bigger viewpoint.

(Published by authority of the Surgeon General, United States Army.)

THE FLIGHT SURGEON AND THE FLYING AMBULANCE.

BY "THE CARE OF THE FLIER SECTION,"

AIR SERVICE DIVISION, SURGEON GENERAL'S OFFICE,

Washington, D. C.

The duty of the medical branch of the air service has been not only the selection of the flier, but, once he is in the service, to keep him in such physical condition as will tend to eliminate his liability to crash or go stale—to keep him fit to fly. Very early it became apparent that the flier, in pursuance of his duties, acquired certain characteristics peculiar to the unusual nature of his work. In other words, he became an intricate, highly sensitized piece of machinery. It was soon obvious to the air medical service that to keep this organism physically fit a master mechanician must be provided—a physician with special knowledge of eye and ear problems as well as general physical, and also preferably one who is willing to take flying instruction so that he will have first hand comprehension of the air game. From this necessity evolved the flight surgeon.

The prospective flight surgeon received his first instruction in the medical research laboratory at Mineola. Here he became not only familiar with the duties of his office but with the special equipment designed for examination and reexamination of fliers. One of the main studies at the research laboratory, and at the branch laboratories in the flying schools, is the classification of the fliers on an altitude basis. Oxygen shortage has been one of the problems of aviation, for present warfare has necessitated much flying at altitudes ranging from 16,000 to 22,000 feet. The research laboratory was established to study the effects of altitudes on man, and to determine the individual fitness of our aviators for various altitudes, classifying them according to their ability to withstand the effects of oxygen lack. This has been accomplished by means of the rebreathing apparatus with which the flight surgeon is familiarized while at Mineola. After this course of instruction he is assigned to a flying field where he at once takes measures to establish such relations with the cadets and officers as will give him an intimate personal knowledge of each flier.

The aviator needs special and constant attention, as to diet, exercise, and habits. Also, his fitness for flying depends largely upon his mental state, and all conditions which tend to disturb his poise are apt to react against his efficiency in the air. It is the duty of the flight surgeon to watch for the unmistakable signs of individual deterioration in the fighting strength of our air force, and to take such measures as are necessary to combat these conditions. His all important duty is to see that no man risks his life by flying when he is not fit. He is given wide latitude in meeting and developing his work, and his methods vary according to the field to which he is assigned. At the same time he keeps in close touch with the central office by personal and standardized reports which he sends in at regular intervals. When in his opinion a flier should be relieved of flying duty, either temporarily or permanently, his recommendation carries weight, as it is recognized that it is his special duty, through sick call and reexamination, to know the physical and mental condition of each flier in the command. The flight surgeon always bears in mind that his mission is not to eliminate, but through every means

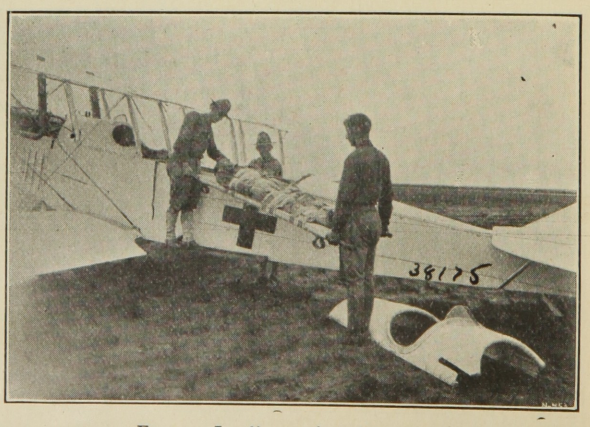


FIG. 1.—Loading patient into plane.

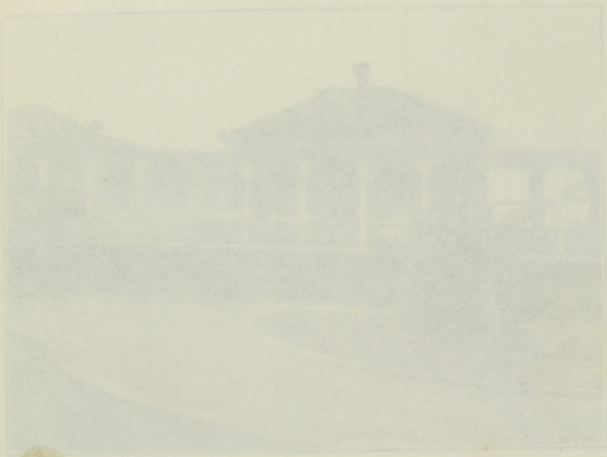
placed at his disposal to keep the flier in active service.

THE FLYING AMBULANCE.

But even with this personal care accorded the flier, combined with all other measures taken to guard against accident, the aviator sometimes comes

ture of Letterman. In the orthopedic ward some remarkable results have been accomplished.

The equipment of Letterman is quite in keeping with its setting, and its present standing as one of the principal base hospitals in the country reflects



Patients in the open air in wheeled chairs at Letterman General Hospital.

credit upon the staff of the institution. Immediately upon the declaration of war by the United States the evacuation of the hospital took place, with the result that in a very short time 1,400 patients were cared for at one time and the best of attention was given them.

Fig. 3.—Operating room, Letterman General Hospital.

to their proper part in winning the war. Among the principal officers are Major J. Wilson Shiels, Chief of Medical Service; Major Herbert C. Moffitt, Medical Service; Major Henry L. Wagner, Chief of Eye, Nose, and Throat Service; Major Albert C. Carlton, Assistant in the latter department; Major Robert Hull, Chief of Orthopedic Service; Major Samuel Robinson, Chief of the Surgical Department; Major Samuel W. Hussey, Chief of the Dental Service; Major Harry A. Foster, Chief of the Laboratory, and Major Allan Gullstrand, Chief of Educational Service.

The remainder of the staff is composed of Captains Emil O. Jellinek, David C. Twichell, Frank E. Topping, John Wilander, Wood C. Baker, Harold Zimmerman, Arthur E. Brown, Gordon McCracken, Frank Doane, Thomas R. Petch, Ernest [illegible], Frank B. Reardan, Richard H. [illegible], T. Parker, Frank N. Cheesman, Henry [illegible], Lewis E. Meyers, Emel L. Cottrell, [illegible], [illegible] Wm. William F. Clarke, [illegible], Joseph Raymond A. Kelser, David A. Conrad, John [illegible], Wm. [illegible], Barbour, Lieutenants John

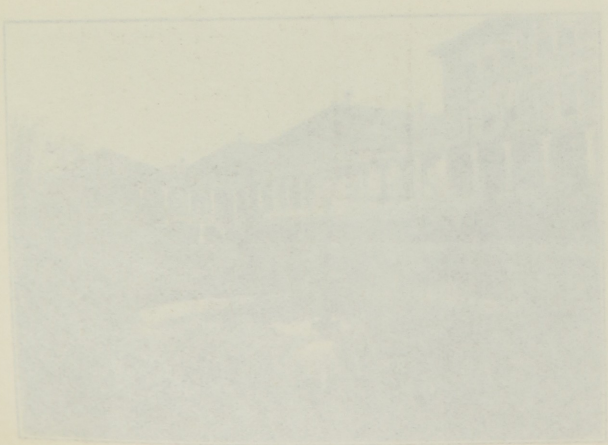


Fig. 4.—Court, Letterman General Hospital.

to grief. Unless the crash is immediately fatal, when it occurs and where it occurs bear a close relation to the probable recovery of the man in the fuselage. The accident may occur on a cross country flight, many miles away from the necessary facilities for applying the proper treatment. It is

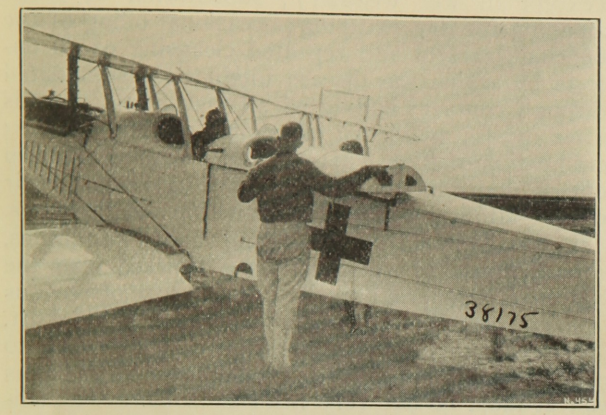


FIG. 2.—Removal of cowl.

all important that the patient receive first aid within the shortest possible time. It is here that the hospital ship carrying the medical officer can be of great use. It has no rough roads to contend against; its bright markings, easily seen in the air, give it right of way; and it arrives in a comparatively short time on the scene of the accident. After supplying first aid to the injured aviator, if the surgeon suspects brain injuries by concussion or possible fracture of the skull, it is believed by this office to be wisest not to remove the flier, but to "build a hospital around him"; in other words, to keep him absolutely quiet, provide the necessary shelter, and give the required medical and surgical attention without incurring the risk of removing him until his condition is improved.

If, on the other hand, the flier's injuries are such that moving does not endanger his life, the hospital ship as a rapid and comfortable means of transportation is considered immeasurably superior to the ordinary motor ambulance.

The hospital ships are in use at many of the fields. They vary in design. In a new ambulance ship now in use, the injured flier is carried in the compartment just back of the pilot—the second seat usually occupied by the observer folding up so that the medical officer can be taken to the accident, and then the same space utilized in bringing the patient to the hospital. The top of the turtle back opens up, and the ordinary Army stretcher can then be lifted directly into the body of the plane. A device is made so that the patient's shoulders are held in place by two curved braces well padded, while a footrest eliminates any motion downward. A pneumatic pillow is used for his head and canvas straps are buckled across to prevent any lateral movement. The following report of transporting a patient by ambulance a distance of ninety miles is of interest:

"The flier suffered a fracture of the left leg (tibia and fibula) and contusions of the face and head following an aeroplane crash. He was immediately taken to the local hospital where splints were applied to the leg. and the contusions dressed. On the following day, the ambulance ship (Curtiss H) left the flying field at one thirty p. m., with the pilot and medical officer, arriving at the scene of crash at three fifteen p. m., making the ninety miles in one hour forty-five minutes, in spite of adverse winds. On return trip, left at five fifty p. m., arrived at the flying field at six forty-five p. m., making the trip in fifty-five minutes with the aid of favoring winds. The patient stated that he felt the take off and landing very slightly. The trip across was very smooth, so much so that he almost went to sleep. The loading and unloading did not bother him at all. The difference between the ease and lack of jarring in the ship and the ambulance carrying him to the ship was marked."

The ambulance ship has come to stay—its usefulness is beyond question, where the scene of accident is far removed from the peace and quiet of the hospital bed. To its prompt appearance and kindly aid, many a flier will owe his future usefulness to the service, if not life itself. The flight surgeon's work is the ounce of prevention, the duty of the

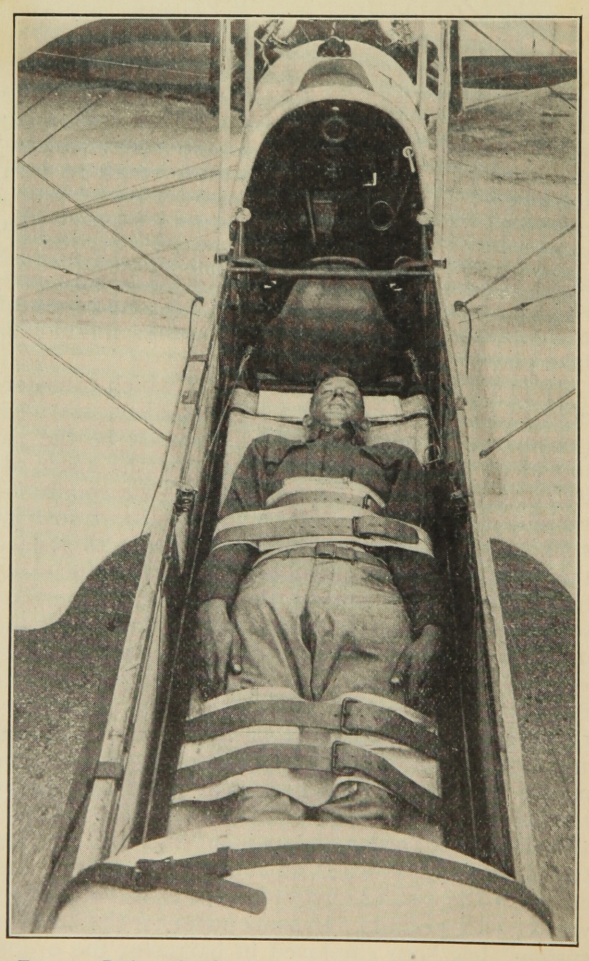


FIG. 3.—Patient in fuselage ready. A pillow has since been provided.

ambulance ship, to pick up the pieces. The mission of both is the care of the flier. As the work of the flight surgeon develops, we will find less and less need for the ministrations and uses of the hospital ship.

Copy of preceding article.

(The following article copied from the New York Medical Journal of Feb. 8, 1919.)

THE FLIGHT SURGEON AND THE FLYING AMBULANCE

By

"The Care of the Flier Section",

Air Service Division, Surgeon General's Office, Washington, D. C.

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THE FLYING AMBULANCE

But even with this personal care accorded the flier, combined with all other measures taken to guard against accident, the aviator sometimes comes to grief. Unless the crash is immediately fatal, when it occurs and where it occurs bear a close relation to the probable recovery of the man in the fuselage. The accident may occur on a cross country flight, many miles away from the necessary facilities for applying the proper treatment. It is all important that the patient receive first aid within the shortest possible time. It is here that the hospital ship carrying the medical officer can be of great use. It has no rough roads to contend against; its bright markings, easily seen in the air, give it right of way; and it arrives in a comparatively short time on the scene of the accident. After supplying first aid to the injured aviator, if the surgeon suspects brain injuries by concussion or possible fracture of the skull, it is believed by this office to be wisest not to remove the flier, but to "build a hospital around him"; in other words, to keep him absolutely quiet, provide the necessary shelter, and give the required medical and surgical attention without incurring the risk of removing him until his condition is improved.

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The hospital ships are in use at many of the fields. They vary in design. In a new ambulance ship now in use, the injured flier is carried in the compartment just back of the pilot - the second seat usually occupied by the observer folding up so that the medical officer can be taken to the accident, and then the same space utilized in bringing the patient to the hospital. The top of the turtle back opens up, and the ordinary Army stretcher can then be lifted directly into the body of the plane. A device is made so that the patient's shoulders are held in place by two curved braces well padded, while a foot rest eliminates any motion downward. A pneumatic pillow is used for his head and canvas straps are buckled across to prevent any lateral movement. The following report of transporting a patient by ambulance a distance of ninety miles is of interest:

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August 13, 1919.

From: Post Surgeon, Carlstrom Field, Arcadia, Florida.

Subject: Aero Ambulance.

1. It is recommended that the following points be considered in the ambulance design:

(a) Simplicity, as complicated mechanical devices, such as windlasses, are prone to be out of order at the critical moment, and also require more attention in the upkeep of the ship.

(b) That as few changes as possible be made in the original design of the ship. The fuselage brace wires and the fuselage compression struts should not be removed at the expense of the strength of the ship.

2. That the patient ride with his head toward the tail of the ship, rather than his head toward the motor, because of two reasons:

(a) The greater number of injuries due to aviation involve the head, which theoretically after injury should be kept elevated. Gaining altitude requires less time and less sensation than losing altitude. In losing altitude the ship is nosed down markedly.

(b) The greatest danger in flying today lies in the "take off" and "landing". When crash occurs the motor frequently "comes back" into the ship. It would be preferable to have the motor come back on the patient's feet rather than on his head. Further, if the patient to be conveyed in the ambulance is a flier who has just been injured as a result of a crash he will naturally be apprehensive when taken into the air in the aero ambulance, and any marked increase in this apprehension in the part of the patient will increase the liability to shock.

S. M. Strong,
Major, R. M. A., M. C., U. S. A.

AIR SERVICE
MEDICAL RESEARCH LABORATORY
Mitchel Field
Garden City
Long Island, New York

November 19, 1919.

From: Officer in Charge.

To: The Chief Surgeon, Air Service, Washington, D. C.

Subject: Airplane Ambulance.

1. The subject of airplane ambulance has been considered at this office, together with the Engineer Office at Mitchel Field. As a result the following conclusions have been reached.

2. It is the opinion of both offices that an airplane should be designed for this purpose. The training or combat plane has not adequate room, balance, or rate of speed to be an ideal ambulance vehicle. Practically all of the reports which have been sent in to this office from flying fields on the airplane ambulance in use at those fields show difficulties or one sort or another. None of them are completely satisfactory.

The report from Ellington Field, where a Curtiss plane was used, shows the difficulty in getting the litter in and out of the ship.

Report from Kelly Field, where a Canadian plane was used, shows that four men were required to put the stretcher in place, and that it was generally unsatisfactory.

At Rich Field a JN4 plane was used and here the litter and patient were held in place by a wheel pulley and chains which were apt to give way under continual tension and required too much help in loading and unloading, and the tail of the ship had to be held up while the patient was being loaded and unloaded.

At Gerstner and Love Fields the type of plane was not reported, but report was made that the ships were unsatisfactory, as the patient was transferred in a semi-sitting posture, and that the proper balance of the plane was interfered with.

At Barron Field a JN6H plane was used and the report was that the removable deck was too high and not sufficiently stream lined. The high construction of the removable deck created an eddy around the vertical stabilizer and affected its stability.

At Carlstrom Field a windlass was used in loading, which was not recommended as it is prone to get out of order at critical times. A JN6 plane was used and it was stated that there was insufficient room between the litter and the turtle-back for a large patient.

At Eberts Field complete report was given and this appeared to be the most satisfactory ambulance that was constructed. A complete report of this follows:

AIR SERVICE
MEDICAL RESEARCH LABORATORY
Mitchel Field
Garden City
Long Island, New York

November 10, 1918.

From: Officer in Charge.

To: The Chief Surgeon, Air Service, Washington, D. C.

Subject: Airplane Ambulance.

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The report from Billingham Field, where a Curtiss plane was used, shows the difficulty in getting the litter in and out of the ship.

Report from Kelly Field, where a Canadian plane was used, shows that four men were required to put the stretcher in place, and that it was generally unsatisfactory.

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At Alberta Field complete report was given and this appeared to be the most satisfactory ambulance that was constructed. A complete report of this follows:

(Letter from Officer in Charge, Medical Research Laboratory, to Chief Surgeon, Air Service.)

Type of plane: Curtiss JN4D. - From the rear cockpit there were removed the seat, instrument board, gas throttle, switch, stick, and rudder bar and the following additions were made:

(a) Metal cross piece fuselage bottom to support the foot of the litter.
(b) Two rests, one on either side of the ship, to support the center litter bars.
(c) Two straps at the top of the cockpit in the rear, one on either side, to make the head of the litter fast.
(d) Platform on top of fuselage at rear of cockpit.
(e) Straps across the back of the ship to hold down the metal section of the turtle-back.
(f) A step on either side of the fuselage.

The ship was remodeled as follows:

(a) Floor boards were placed in rear of cockpit.
(b) Two metal pipe fuselage braces were substituted for the original wood braces.
(c) The cockpit metal covering was lengthened 24 inches.

The litter is made of pipe about 6 feet in length, shaped so as to give two separate leg pieces, which may act as splints if necessary. The litter is covered with canvas, laced on, making it easy to remove, with broad canvas straps, so placed as to cross the chest of the patient or support an injured arm. One strap is attached for each leg. The head is placed on a shaped head rest, which is adjustable, moving up and down on the frame to fit tall or short patients. To load the ambulance, the metal section of the turtle-back is removed and loaded. The litter with patient is now lifted and placed upon the platform on the top of the fuselage. One litter bearer now goes to the other side of the ship and both men, now standing upon the step at the side of the ship, gently lift and slide the litter into its proper position in the cockpit, the foot of the litter passing under a safety hook on either side. The usual life belt is tightened across the abdomen of the patient. The head of the litter is tied by two straps to the metal pipe of the fuselage brace and the metal turtle-back is replaced and strapped. Loading is then complete, the operation requiring only three minutes. The patient's head rests back across the shaped cushion fastened on the litter and protects his head from rolling. The jar of the landing is absorbed by the spring of the metal frame of the litter and canvas and is practically without sensation of a jar. Test rides have proven that loading and transportation are very comfortable.

3. The engineer officer at this field recommends if a training or combat plane is used that the following changes be made:

All wires and braces removed from the pilot and observer's seats qnd the pilot seat installed as far back on the fuselage as the balance of the plane will permit. In place of braces and wire, heavy three-ply

veneer glued on the fuselage longerons on the side and bottom, from the engine section, to and including the pilot seat section, is suggested. The litter should be installed directly back of the engine and in front of the pilot on the center of gravity of the plane, allowing the patient to ride at an angle of 60°, feet first, with his head elevated to a level with the top of the fuselage, allowing him to see out and be attended by the pilot. By having the stick control removable the pilot can materially help load and unload the litter. Using this method all the advantages of previous experience will be retained and all disadvantages eliminated.

4. This office is in agreement with these recommendations with one exception. It is believed that the patient's head should be sufficiently below the top of the fuselage to prevent the wind striking the patient's face. In airplane accidents the face is apt to be pretty well smashed up and should be protected from the wind.

5. Whatever type of plane is used, it is recommended that the Stokes Navy litter be used. So far as is known this has never been used in airplane ambulances, but it is believed that this particular type of litter will adapt itself more readily to our needs than any other type of litter, and it will be safer and more comfortable for the patient.

6. Whatever type of plane is used, its practical value can be determined only by experiment. It is recommended that modification of training plane along the lines suggested by the engineer officer, as above, be made for use at some field where there is considerable flying going on. It is believed that this will prove to be the most satisfactory solution of the question of alteration of a training of combat plane. The question of motor is very important as speed is a factor, and the ability to get out of a small field is often exceedingly important. Therefore, a Liberty motor or Hispano Suiza motor should be used.

7. It is believed that a satisfactory plane could be constructed for this purpose alone, which would be better than the modification of any existing plane. Such a plane should take into account the following requirements: There should be room for two passengers beside the pilot. The ideal arrangement, from the medical standpoint, would be a place for two Stokes Navy litters. Arrangements should be made for a medical officer to ride out to the scene of accident in the plane with the pilot, occupying the space for one of the patients. If there are two patients, both patients can be placed in the litters and brought back. If one patient, he can be placed in one litter and the medical officer can accompany him back. If practicable, a detachable seat, which can be folded up out of the way when not in use, should be available for the medical officer. Construction should be so arranged that it is possible for two men to load and unload the litters. It is immaterial, from the medical point of view, whether the patients are in front or behind the pilot. Litters should be installed so that the patient's head be slightly elevated.

(Letter from Officer in Charge, Medical Research Laboratory, to Chief Surgeon, Air Service.)

In the ordinary type of plane it is believed this would be more readily obtained if the patient rides feet first if he is located in front of the pilot, and head first if he is located in the rear of the pilot. If such a plane is not considered practical, then similar arrangements should be made so that the medical officer can ride out to the scene of the accident with the pilot and attend to the patient. The medical officer, after loading the patient, can remain at the field until another plane picks him up.

L. H. Bauer,
Lieut. Colonel, M. C.

December 3, 1919.

MEMORANDUM for: The Administrative Executive.

1. Attention is invited to the attached copy of memorandum from the Assistant Executive concerning airship ambulances. Acting in accordance with the suggestions therein contained and which this office approved, the Medical Research Laboratory at Garden City, L. I., N. Y., has collected plans of the improvised airplane ambulances in use at various Air Service stations during the past two years. The arrangements in all of them are crude and no one of them thus far used is without objectionable features. The Officer in Charge of the Laboratory consulted the Engineering Office at Mitchel Field, L. I., N. Y., concerning the plans on hand, and that office was of the opinion that the most satisfactory airplane ambulance would be an airplane devised for the sole purpose of use as an ambulance. It is requested that the Engineering Division draw plans for such an airplane, taking into consideration the following requirements:

"There should be room for two passengers in addition to the pilot. The ideal arrangement, from the medical standpoint, would be a place for two Stokes Navy litters. Arrangements should be made for a medical officer to ride out to the scene of accident in the plane with the pilot, occupying the space provided for one of the patients. If there are two patients, both patients can be placed in the litters and brought back. If one patient, he can be placed in one litter and the medical officer can accompany him back. If practicable, a detachable seat, which can be folded up out of the way when not in use, should be available for the medical officer. Construction should be so arranged that it is possible for two men to load and unload the litters. It is immaterial, from the medical point of view, whether the patients are in front or behind the pilot. Litters should be installed so that the patient's head be slightly elevated. In the ordinary type of plane it is believed this would be more readily obtained if the patient rides feet first if he is located in front of the pilot, and head first if he is located in the rear of the pilot. If such a plane is not considered practical, then similar arrangements should be made making provision for but one patient. Provision should be made so that the medical officer can ride out to the scene of the accident with the pilot and attend to the patient. The medical officer, after loading the patient, can remain at the field until another plane picks him up."

2. If this work is done at McCook Field, recommend that the Flight Surgeon at that station be consulted during the progress of the plans for such advice as may be given from a medical point of view.

Albert E. Truby
Colonel, Medical Corps, U. S. A.
Chief Surgeon, Air Service.

December 3, 1919.

MEMORANDUM for: The Administrative Executive.

1. Attention is invited to the attached copy of memorandum from the Assistant Executive concerning airship ambulances. Acting in accordance with the suggestions therein contained and which this office approved, the Medical Research Laboratory at Garden City, L. I., N. Y., has collected plans of the improvised airplane ambulances in use at various Air Service stations during the past two years. The arrangements in all of them are crude and no one of them thus far used is without objectionable features. The Officer in Charge of the Laboratory consulted the Engineering Office at Mitchel Field, L. I., N. Y., concerning the plans on hand, and that office was of the opinion that the most satisfactory airplane ambulance would be an airplane devised for the sole purpose of use as an ambulance. It is requested that the Engineering Division draw plans for such an airplane, taking into consideration the following requirements:

"There should be room for two passengers in addition to the pilot. The ideal arrangement, from the medical standpoint, would be a place for two Stokes Navy litters. Arrangements should be made for a medical officer to ride out to the scene of accident in the plane with the pilot, occupying the space provided for one of the patients. If there are two patients, both patients can be placed in the litters and brought back. If one patient, he can be placed in one litter and the medical officer can accompany him back. If practicable, a detachable seat, which can be folded up out of the way when not in use, should be available for the medical officer. Construction should be so arranged that it is possible for two men to load and unload the litters. It is immaterial, from the medical point of view, whether the patients are in front or behind the pilot. Litters should be installed so that the patient's head be slightly elevated. In the ordinary type of plane it is believed this would be more readily obtained if the patient rides feet first if he is located in front of the pilot, and head first if he is located in the rear of the pilot. If such a plane is not considered practical, then similar arrangements should be made making provision for but one patient. Provision should be made so that the medical officer can ride out to the scene of the accident with the pilot and attend to the patient. The medical officer, after loading the patient, can remain at the field until another plane picks him up."

2. If this work is done at Mccook Field, recommend that the Flight Surgeon at that station be consulted during the progress of the plans for such advice as may be given from a medical point of view.

Albert E. Truby
Colonel, Medical Corps, U. S. A.
Chief Surgeon, Air Service.

WAR DEPARTMENT
Office of the Chief of Air Service
WASHINGTON

June 4, 1919.

MEMORANDUM for the Medical Division.

At the present time there are being used throughout the various fields of the United States various types of airplane ambulances. It is recommended that the question of having an airplane ambulance properly designed to be used for that purpose alone be taken up by the Medical Division with the Engineering Division of the Supply Group. It is believed that if a special airplane ambulance embodying all the requirements desired by the Medical Division could be designed by the Engineering Division, containing all the desirable features of those ambulance airplanes already in use, making one standard plane to be used for this purpose, that it would be greatly for the interests of the Air Service. Upon the design and approval of a proper type from the Engineering Division, it is recommended that a sufficient number of this type of planes be ordered and delivered so as to supply each activity in the United States participating in flying duty with at least two of this type of planes.

W. H. Frank,
Major, A. S. A.,
Assistant Executive.

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W. H. Frank,
Major, A. S. A.,
Assistant Executive.

December 19, 1919.

From: The Engineering Division, Air Service, McCook Field, Dayton, Ohio.

To: The Director of Air Service, Washington, D. C.

Subject: Airplane Ambulances.

1. In answer to your letter of December 6, 1919, relative to modification of one or more existing types of airplanes transforming them into Airplane Ambulances, this Division is of the opinion that the DH-4 is best suited for this and that the requirements of the Chief of the Medical Service can be met.

2. Request that this Division be advised what action is desired. Our suggestion would be to have this Division modify one at McCook Field and have it inspected by a representative of the Medical Service. If satisfactory drawings and specifications can be made, further machines may be modified either at McCook Field or at some factory.

Thurman H. Bane,
Colonel, A. S. (A),
Chief of Division.

By:

H. S. Martin,
Major, A. S., A. P.,
Engineering Assistant.

- - - - - - - - - -

January 3, 1920.

MEMORANDUM for: The Administrative Executive.

1. This office approves the suggestion in paragraph 2 of above communication that the Engineering Division modify a DH-4 and convert it into an airplane ambulance. It is requested that Captain Charles C. Bayless, M. C., Flight Surgeon at McCook Field, be consulted regarding plans and drawings and allowed to inspect the airplane ambulance when completed to see that it comes up to all specifications from a medical point of view.

2. Further request that copies of drawings and specifications be sent to this office.

Albert E. Truby,
Colonel, M. C., U. S. A.,
Chief Surgeon, Air Service.

AIR SERVICE
MEDICAL RESEARCH LABORATORY
Mitchel Field
Garden City
Long Island, New York

August 19, 1920.

From: Officer in Charge.

To: Chief Surgeon, Air Service, Washington, D. C.

Subject: Report on DH-4 Airplane Ambulance.

1. The DH-4 Airplane Ambulance has been tested out at this field with both dead weight and live weight, and the following points have been noted:

2. The ship has an excellent motor and flies well, both loaded and unloaded. During the first flight loaded, it was noted that the ship was quite tail heavy, but it was found that this was due to the stabilizer being jammed. When this was corrected and the stabilizer worked freely, there was no further difficulty. In landing with the ship loaded, attention must be paid to the stabilizer, as it would be very easy to send the ship over on its nose. So far as taking-off and landing are concerned, this ship will go into and take-off from any field on which any DH plane can land, or take-off from. The disadvantage of a DH plane as an ambulance, however, is that there is less likelihood of an accident happening on a field in which a DH plane can make a landing. The DH ambulance, therefore, would be of no use for such accident. For fields which can handle a DH plane, or for transporting patients from one point to another, this type of plane will be valuable.

3. In future ambulances, it is suggested that the gas tank be removed from the present position, the berths brought up close to the pilot's seat and the tank spread out under the lower berth in the bottom of the fuselage, if practicable. This will make the plane safer for both pilot and patients, for at present the pilot is seated between the engine and tank, and the patients' heads come against the tank.

4. The upper berth is very comfortable and is well ventilated. The lower berth is very poorly ventilated and arrangements should be made to increase the ventilation for this berth. It is believed this could be done by having an opening, or openings, in the trap-door in the side of the fuselage. The lower berth is not deep enough. In loading the patient it is necessary for him to turn his feet to one side while the litter is being shoved into place. This would be disadvantageous in case of a fractured leg. Two or three inches more depth in this berth would improve it considerably. The Stokes litters should be equipped with a pad or cushion along the head of the litter to prevent injury to the head in landing. Adjustable shoulder-caps, similar to those used on operating tables, would also be very valuable additions to these litters, as well as increasing the safety of the patient. In a

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(Letter from Officer in Charge, Medical Research Laboratory, to Chief Surgeon, Air Service.)

rough landing, the patient's head is thrown against the top of the litter and it would be quite possible in a patient weak from shock of injury, to break his neck. These shoulder-caps would take the weight of the patient and protect his head and neck. It is believed that these additions to the litters (cushions and shoulder-caps) would be necessary, no matter what the type of plane used.

L. H. Bauer,
Major, M. C.

Office of the Chief Surgeon, Air Service, September 10, 1920.
Copy for all Medical Officers on duty with the Air Service:

It is directed that surgeons having airplane ambulances which are equipped with Stokes litters, provide the pads and cushions recommended in this report.

Albert E. Truby,
Colonel, Medical Corps, U. S. A.

(Letter from Officer in Charge, Medical Research Laboratory, to Chief Surgeon, Air Service.)

ARMY DEVELOPS AIRPLANE AMBULANCE

There can be little doubt that much of the success which attended the efforts of the Army surgeons in the World War was due to the short time which elapsed between the wounding of a man and his arrival at a well-equipped hospital. Stationary warfare alone made this possible with our present means of transportation, the evacuation and base hospitals being brought almost to the firing line. But the situation would be entirely different in such regions as our own great Southwest, with its scattered railroads and undeveloped desert roads.

This is a field of development for the airplane, and the Army is fully awake to its possibilities, as indicated by the construction of airplane ambulances, a new design of which was recently completed at the Army experimental station, McCook Field, Dayton, Ohio, and flown to Bolling Field at Washington.

Many previous models of airplane ambulances were in use at the flying fields in this country during the war and rendered valuable service on many occasions, proving both actually and potentially the value of such a service. These old models were all simple modifications of the Curtiss training planes, but in the new ambulance, for the first time, a fuselage designed primarily for the transportation of the sick or wounded is used, providing space for two litter patients, a medical attendant and a pilot.

The basis for this new ambulance is the DH-4 type of airplane, but many modifications have been made to increase its safety and stability. Thus the landing gear has been moved forward about 12 inches and the dihedral angle increased to 2.75 per cent. The wings have a 12-inch stagger and the angle of incidence is 3 degrees.

Necessary accommodations for the wounded are provided by increasing the depth of the fuselage behind the pilot's seat and dividing the space thus provided into an upper and lower compartment by means of a longitudinal partition. These compartments are reached through doors running their entire length, opening on the side of the fuselage. Each compartment is furnished with a Stokes litter, which can be securely fastened in its compartment and is easily handled by two men. Adequate light and ventilation is provided by means of windows in each compartment. About the upper compartment is a cockpit with a portable seat which can be used by a medical officer going to aid of the injured.

The entire plane is finished in white paint with the Army air service insignia on the wings, and the Red Cross on the sides of the fuselage and landing wheels.

The performance of this ship on its trial flights has been most creditable. After the usual preliminary flights at McCook Field it was flown to Washington, and from there to Langley Field and return, the flight from Washington to Langley Field being made in 65 minutes and the return in 105 minutes, the distance each way being approximately 180 miles.

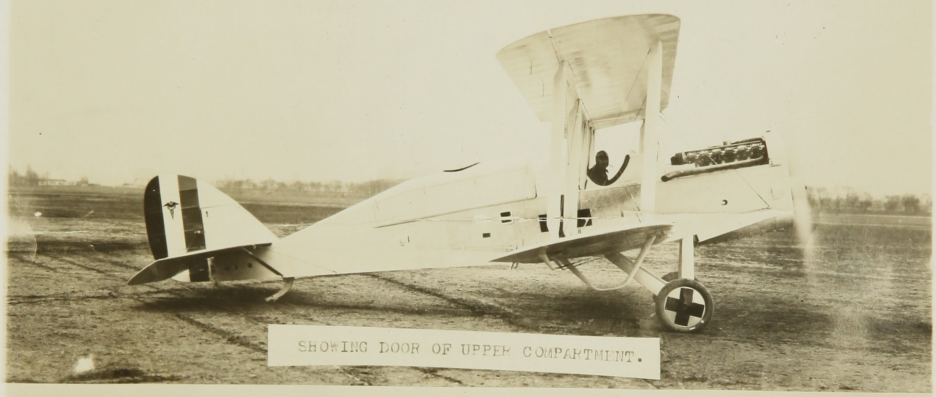
Several ambulances of this type are now being constructed for use on the Mexican border, and what they will mean for our soldiers on the Mexican border can best be appreciated by those who have seen duty at the hospitals in that section.

ARMY AND NAVY REGISTER - June 26, 1920.

5912

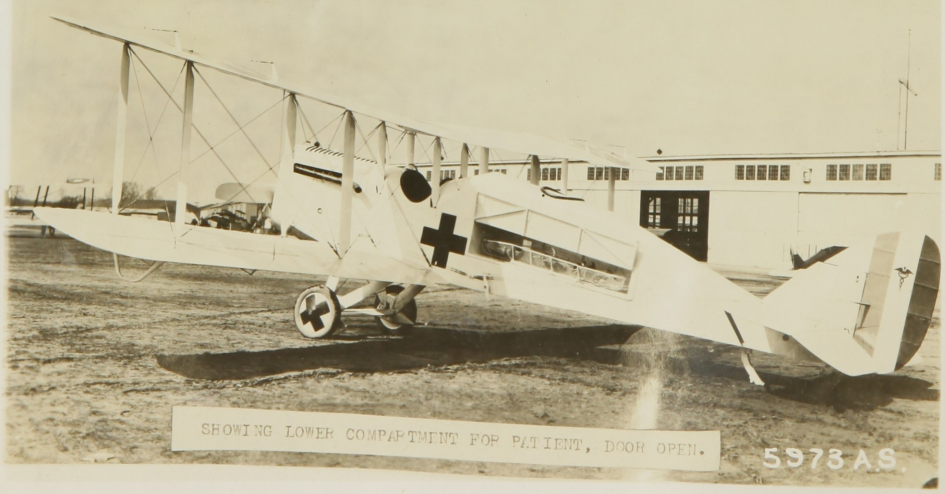
DH 4 A AMBULANCE PLANE, MC COOK FIELD, OHIO.
CONSTRUCTED FEBRUARY, 1919.

5911



SHOWING DOOR OF UPPER COMPARTMENT.

5913



SHOWING LOWER COMPARTMENT FOR PATIENT, DOOR OPEN.

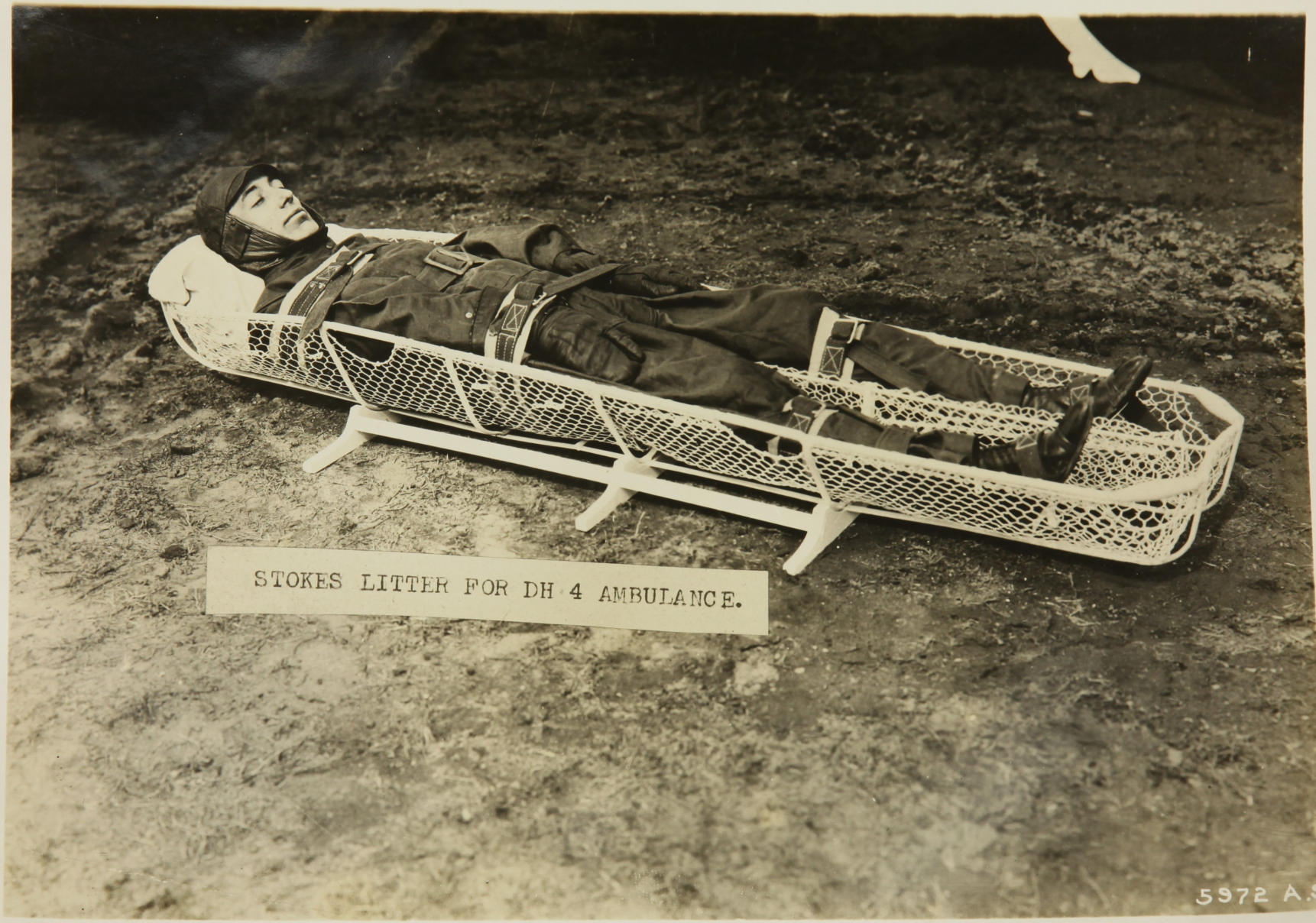
5973 A.S.

DeHAVILAND AMBULANCE PLANE FOR TWO PATIENTS.
PATIENT PREPARED FOR LOADING.

PATIENT IN AMBULANCE PLANE.

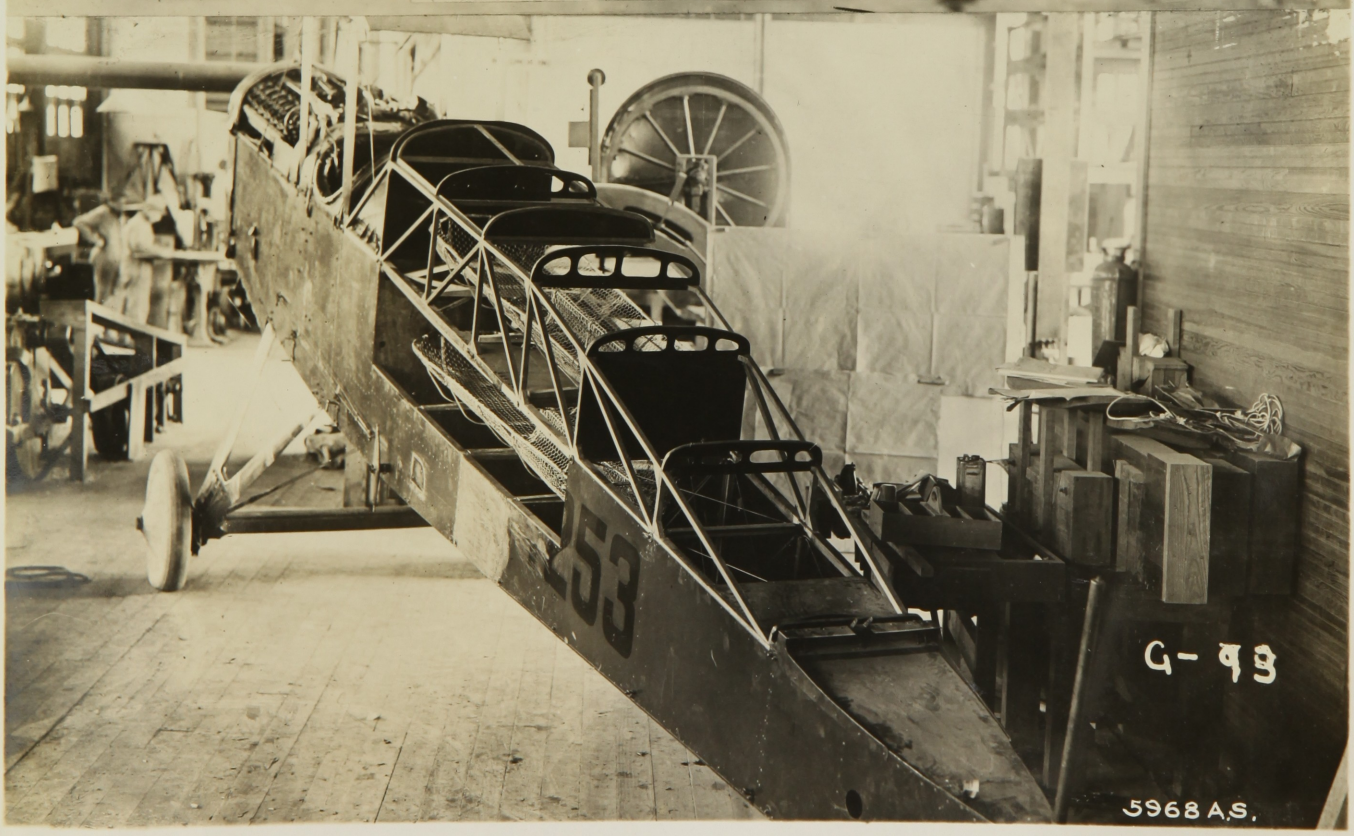
AMBULANCE PLANE LOADED WITH TWO PATIENTS.
DOOR FOR LOWER COMPARTMENT OPENS ON LEFT
SIDE OF PLANE.

6544 A.S.


STOKES LITTER FOR DH 4 AMBULANCE.
5972 A.S

SHOWING DH 4 A UNDER CONSTRUCTION,
KELLY FIELD, TEXAS, MARCH 1919.

SHOWING DH 4 A, KELLY FIELD, TEXAS, UNDER CONSTRUCTION.



DH 4 AIRPLANE AMBULANCE, LANGLEY FIELD, VA.

5548-AS.

DH 4 AIRPLANE AMBULANCE SHOWING PATIENT IN LOWER COMPARTMENT, LANGLEY FIELD, VA.

5549-A

DH 4 AIRPLANE AMBULANCE IN FLIGHT, LANGLEY FIELD, VA.

A-9765-AS.

DH 4 AIRPLANE AMBULANCE IN FLIGHT, LANGLEY FIELD, VA.

B-9765As.

DH 4 AIRPLANE AMBULANCE IN FLIGHT, LANGLEY FIELD, VA.

9765-A.S.

April 23, 1921.

From: Office, Chief of Air Service.

To: The Adjutant General of the Army.

Subject: Transfer of Patients at Hospital, Mitchel Field, to Walter Reed Hospital.

1. Authority is requested to transfer from Mitchel Field to Bolling Field by airplane, with a view to transferring them to Walter Reed Hospital for treatment, such patients in the hospital at Mitchel Field as the proper authorities there may consider as in need of treatment at the Walter Reed Hospital. It is to be understood that if such authority is granted, no patient be so transferred unless he signs a written agreement for such transfer.

2. Attached hereto are memoranda from the Surgeon General of the Army, Chief Surgeon, Air Service, and Assistant Chief of Air Service, relative to the transportation of sick from Mitchel Field to this city with a view to transferring them to Walter Reed Hospital.

By authority of the Chief of Air Service:

Wm. F. Pearson,
Major, Air Service,
Administrative Executive.

April 20, 1921.

MEMORANDUM for the Chief of Air Service:

1. I have flown the Curtiss Eagle ambulance ship, now at Mitchel Field, and I consider it exceptionally stable, and equipped with a very reliable motor.

2. I consider the transport of patients from New York to Washington by this machine a very progressive step, and one that is in no way hazardous. This airplane is well adapted to this particular kind of work.

3. I might further state that the idea of bringing patients to Washington via the air route is the initial step in perfecting a very satisfactory means of transporting badly wounded men.

Wm. Mitchell,
Brigadier-General, Air Service,
Ass't Chief of Air Service.

April 21, 1921.

MEMORANDUM for: The Surgeon General, U. S. Army.

1. The Air Service contemplates asking the War Department for authority to transport a load of from four to six patients from Mitchel Field, Long Island, to Bolling Field, Washington, by airplane ambulance. The persons selected for the trip, if authorized, will be such as require treatment at the Walter Reed Hospital, and all of them, as well as the attending medical officer and nurse, will be required to make a written statement to the effect that they have no objection to this mode of transportation and are willing to make the trip.

2. The new Curtiss Eagle airplane ambulance will carry about ten patients (four in litters and the remainder sitting). This plane is considered extremely safe and reliable by the Air Service authorities, and is flown by one of the best pilots in the Air Service. It is very desirable to demonstrate to the army and to the public the great possibilities of this mode of transportation in the saving of life and the lessening of suffering through the rapidity and comfort with which seriously wounded patients can be transported to large hospitals. In past wars about eight per cent of the wounded were so seriously injured that they could not be transported by wheeled transportation over the rough and congested roads usually found at the front. Many of this class of patients will in the future be transported by airplane ambulances direct to well equipped hospitals without difficulty. Likewise small, isolated commands, in peace or war, will have a rapid means of getting serious cases to places where they can get proper care and treatment. As commercial aviation develops such service will also be utilized in transporting emergency cases from rural districts to city hospitals. The Air Service has had airplane ambulances in operation at its fields in the United States since early in 1918. No accidents have happened to patients transported in this way, and it is known that lives have been saved and suffering lessened through the rapidity and comfort with which very seriously injured officers have been transported to hospitals. Many of the cases transported followed crashes in inaccessible places which could not be reached by any other means of transportation.

3. Before taking this up with the War Department, your views and recommendations as to the proposed trip are requested.

Albert E. Truby,
Colonel, Medical Corps, U. S. A.
Chief Surgeon.

April 22, 1921.

MEMORANDUM for Colonel A. E. Truby, Chief Surgeon, Air Service:

1. I have received your memorandum of April 21, 1921, in regard to the transportation of patients from Mitchel Field, Long Island, to Bolling Field, Washington, by airplane ambulance.

2. I have considered the matter carefully and it is my opinion that it should, by all means, be done. I would suggest, however, that you apply for authority to transport patients by airplane from Mitchel Field to Bolling Field with a view to sending them to Walter Reed Hospital for treatment from time to time, as may be considered necessary, and not limit the authority to the trip in question. I understand that patients have for a considerable time been transported by airplane ambulance at various flying fields and I see no reason why general authority should not be given for this means of transporting sick and wounded.

M. W. Ireland,
Surgeon General, U. S. Army.

CURTIS-EAGLE AIRPLANE AMBULANCE, 1920.
CAPACITY 4 LITTER PATIENTS AND 6 SITTING
PATIENTS PER TRIP.

8-14-21

CURTIS-EAGLE AIRPLANE AMBULANCE, 1920.

B-15-21

CURTIS-EAGLE AIRPLANE AMBULANCE, 1920.

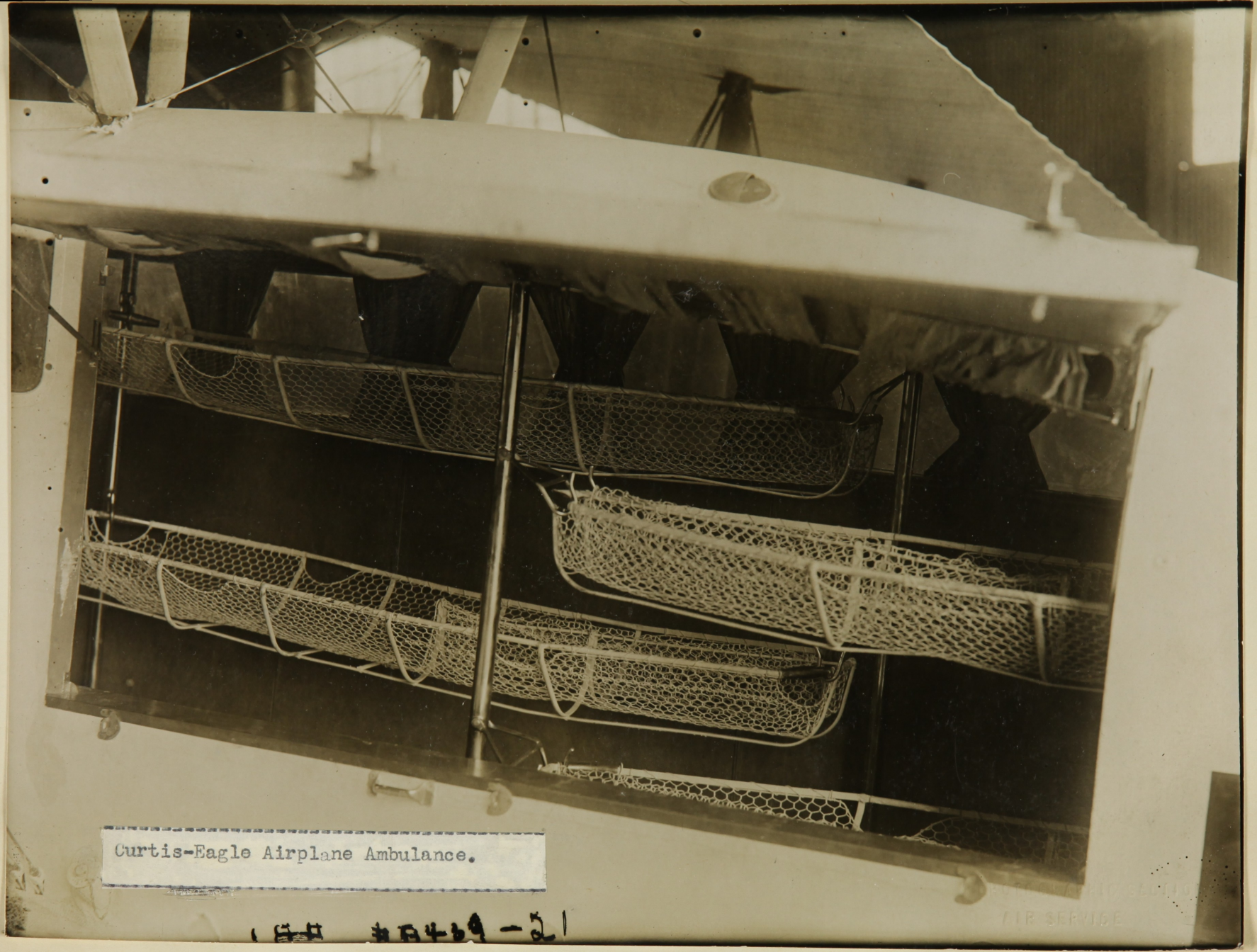
6-13-21

Curtis-Eagle Airplane Ambulance.

B-16-21

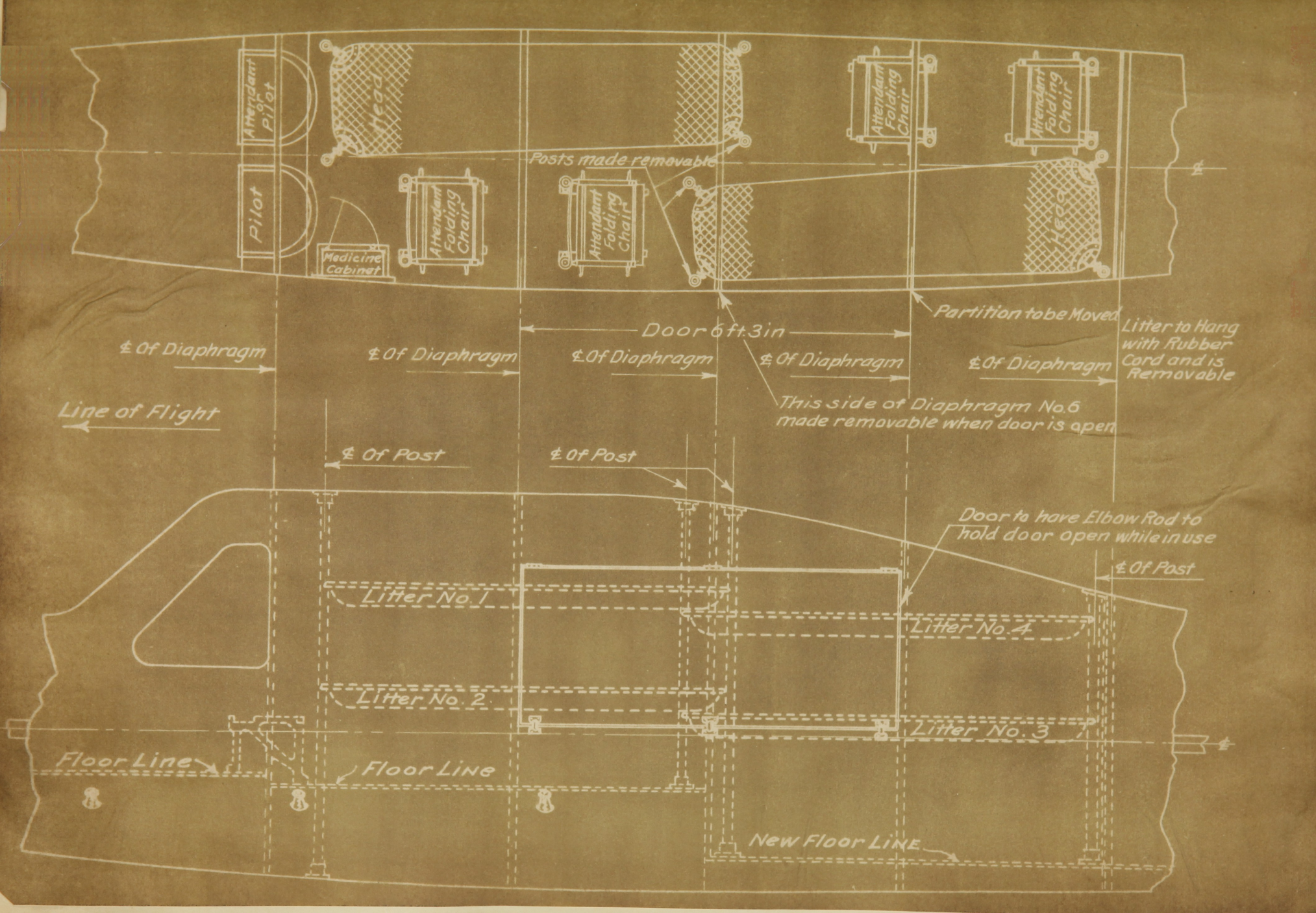
Cutis-Eagle Airplane Ambulance.

B-12-21



Curtis-Eagle Airplane Ambulance.

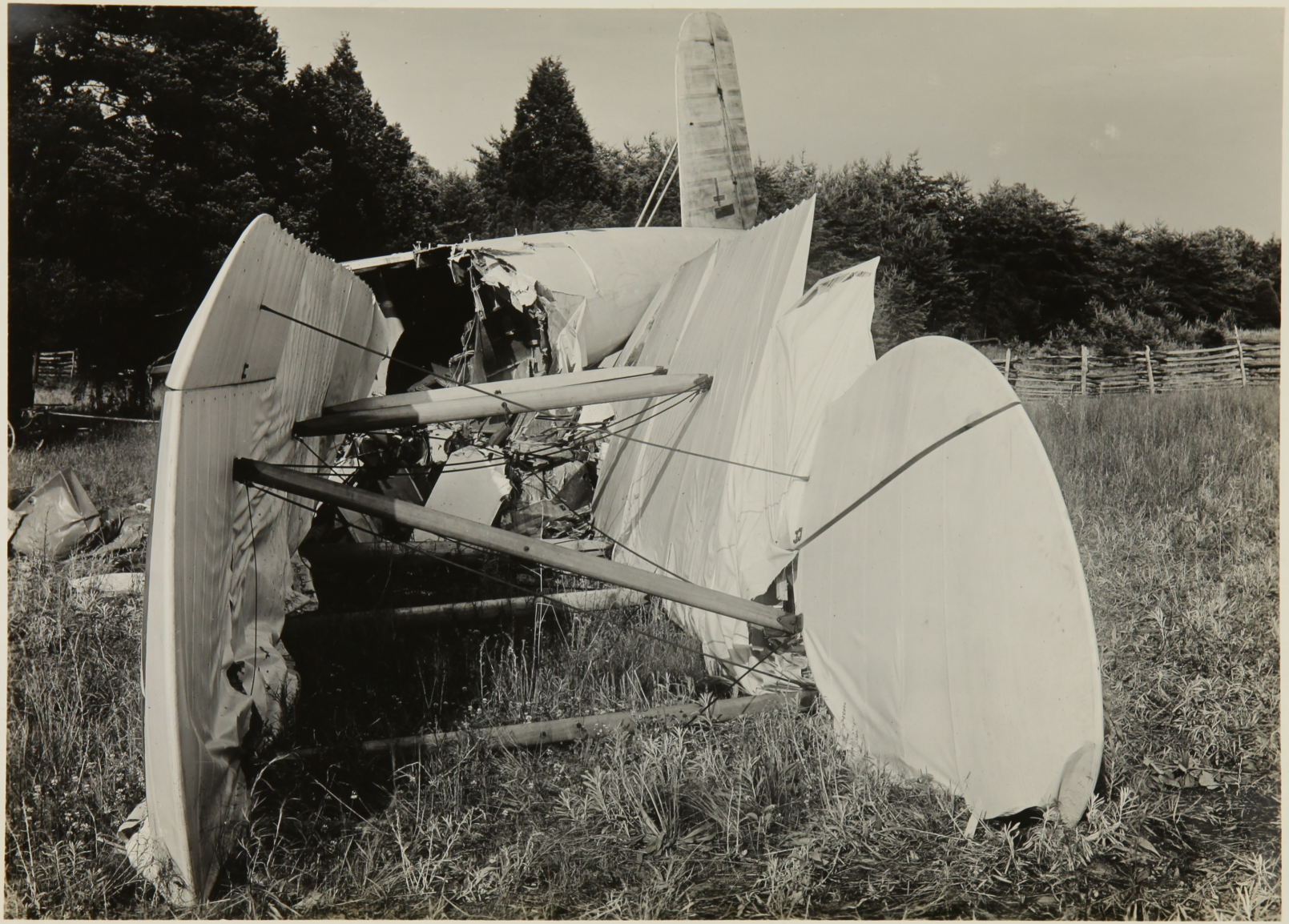
(SC #5449-21)


Attendant's Pilot
Pilot
Medicine Cabinet
Attendant Folding Chair
Posts made removable
Attendant Folding Chair
Attendant Folding Chair
Attendant Folding Chair
Partition to be Moved
Door 6 ft 3 in
Litter to Hang with Rubber Cord and is Removable
℄ Of Diaphragm
℄ Of Diaphragm
℄ Of Diaphragm
℄ Of Diaphragm
℄ Of Diaphragm
This side of Diaphragm No. 6 made removable when door is open
Line of Flight
℄ Of Post
℄ Of Post
Door to have Elbow Rod to hold door open while in use
℄ Of Post
Litter No. 1
Litter No. 4
Litter No. 2
Litter No. 3
Floor Line
Floor Line
New Floor Line

The following photographs, marked, Cutis-Eagle, 1 to 7, inclusive, show the Curtis-Eagle Airplane Ambulance as seen after Crash, which occurred at Morgantown, Maryland, about 6:25 P.M., May 28, 1921, resulting in death of, Lt.Col. Archie Miller, A.S., 1"Lt. Stanley M. Ames, A.S., pilot of plane, 1"Lt. Cleveland W. McDermott, A.S., 1"Lt. John Pennewill, A.S., Sergt. Richard C. Blumenkranz, A.S., Mr. A.S. Batchelder and Mr. Maurice Connolly.

According to the findings of a board of which Captain William C. Ocker, A.S. was president, which convened at Bolling Field, D.C., May 30, 1921, the plane was flying in a violent electrical storm; the pilot had chosen a landing field and circled it. He came down low to view the ground. While passing over some trees, a powerful gust of wind threw the plane into a vertical dive . Being so low it was impossible to right the airplane before it crashed into the ground.

Curtis-Eagle, 1.



AIR SERVICE INFORMATION
REVIEW OF DAILY PRESS AND RECENT PERIODICALS
THURSDAY, MARCH 24, 1921.

* * * * * * * * *

AMBULANCE AEROPLANE

The Vickers "Vimy" ambulance aeroplane, which is illustrated in the London Times 3-11-21, has just been taken over by the Air Ministry. It was designed by Mr. R. K. Pierson and built by Messrs. Vickers, Limited. It is the colour of aluminum, and is decorated with a large red cross. The machine is capable of carrying, for five hours at 109 miles an hour, the following load: One pilot, one mechanic, one doctor, one nurse, and four stretcher or eight sitting cases. A hundred pounds' weight of medical stores may be carried in addition to the foregoing.

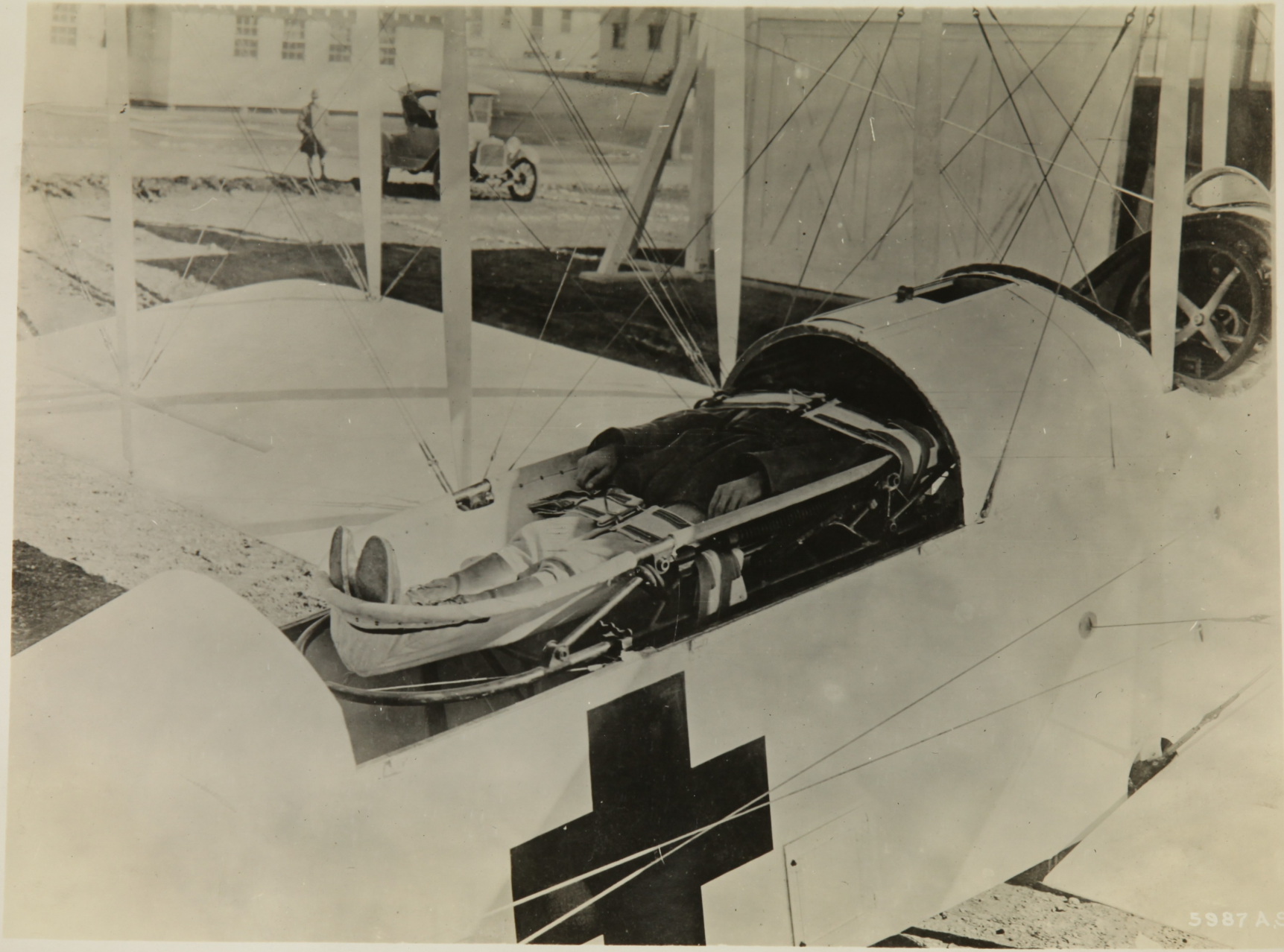
It is fitted with two Napier "Lion" engines giving a total horse power of 900, and is equipped with wireless.

The stretcher cases are put aboard this machine through a tunnel in the nose of the aeroplane. Sitting and other cases can be taken in through the side doors. The photograph of the interior of the aeroplane ambulance shows the racks set up to take and retain the stretchers. These racks are telescopic. When not in use they are folded against the wall of the cabin. The trap in the nose of the machine and the provision of ample floor space make it possible to carry a stretcher case into the aeroplane and place the stretcher on the rack without making a right angled turn and without tilting. Runners are fitted on the floor to facilitate the sliding of the stretchers into the cabin. A fan is fitted in which drives air through a screen, which is kept constantly moistened. This device maintains the atmosphere of the cabin at an even temperature, and will be particularly useful in hot climates. Complete lavatory and sanitary equipment is fitted in the ambulance, and there is accommodation for 15 gallons of water, while from a storage plant inside the cabin eight patients can be supplied with oxygen.

In cases of emergency the Vickers "Vimy" ambulance can be flown at 120 miles an hour. Rapid transport in a realm where roads crowded with walking wounded, with stores, and with prisoners do not exist, will be a priceless boon for casualties.

AMBULANCE WITH FLYING FIELD EQUIPMENT, WIBUR WRIGHT FIELD.

5962 A.S.


5987 A.S

8-Z
C-839
18460

STATISTICAL REPORT ON CRASHES IN THE AIR SERVICE DURING

1920

PREPARED IN THE OFFICE OF THE CHIEF SURGEON, AIR SERVICE.

Return to
OFFICE CHIEF SURGEON, AIR SERVICE,
WASHINGTON, D. C.

STATISTICAL REPORT ON CRASHES IN THE AIR SERVICE DURING 1920.

(Perpared in the Office of the Chief Surgeon, Air Service)

A total of 312 crashes were reported by Flight Surgeons at Air Service stations during 1920. Those include all crashes of military aeroplanes in which damage was done to the aeroplane and is thought to include practically all crashes during the year and certainly includes all serious crashes.

Table 1 CRASHES BY STATIONS (The crash is charged to the station at which the pilot was flying)

4	Aberdeen	14	March
15	Bolling	7	Marfa
1	Camp Bierne	6	Mather
2	Camp Benning	2	Middletown
26	Carlstrom	36	Mitchel
1	Chanute	1	Montgomery
9	Clark	1	Park
2	Coblenz	14	Post
9	El Paso	2	Rich
2	Fairfield	7	Rockwell
5	France	1	Ross
39	Kelly	10	Sanderson
3	Kindley	3	Souther
18	Langley	7	Border Service Activities
12	Laredo	1	Ream
2	Love	2	Red Bluff
9	Luke	5	Fresno
17	McAllen	312	Total
17	McCook		

Table 2 NUMBER OF CRASHES IN EACH MONTH

	CRASHES
January	16
February	24
March	33
April	43
May	34
June	24
July	25
August	26
September	23
October	15
November	24
December	25
Total	312

Table 3 CRASHES ACCORDING TO RANK OF PILOT

	CRASHES
Not given	1
Enlisted	17
Cadet	46
Second Lieutenant	159
First Lieutenant	44
Captain	24
Field Officer (Maj. and Lt. Col.)	14
Foreign and Naval Officers	7
Total	312

Note: The number of officers in the Air Service in each grade in June 30 and December 31 were as follows:

June 30

Colonels	11
Lt. Colonels	14
Majors	31
Captains	259
First Lts	249
Second Lts	507
Total	1071

December 31

Major Generals	1
Brig. Generals	1
Colonels	1
Lt. Colonels	15
Majors	130
Captains	86
First Lts.	284
Second Lts.	497
Total	1015

The average number of cadets under training was 220

Table 4 CRASHES ACCORDING TO RATING OF PILOT

	CRASHES
Not given	50
No rating	14
Airplane Pilot and J.M.A.	207
Airplane Observer	1
Balloon Pilot	2
R.M.A.	34
M.A.	4
Total	312

Note: The number of officers in the Air Service with flying ratings during 1920 was as follows:

June 30

Air Pilots	615
M. A.	39
J.M.A.	66
Total	720

December 31

Air Pilots	575
M.A.	5
Total	580

Table 5

AGE OF PILOT	CRASHES
Not given	6
Under 20	6
21 to 27	183
28 to 30	56
31 to 35	52
36 to40	5
41 to 45	4
Total	312

Table 6

CRASHES ACCORDING TO CLASS OF TRAINING WHICH PILOT HAD RECEIVED	CRASHES
Not given	84
Cadet training	9
Pursuit	133
Reconnoisance	43
Bombing	43
Total	312

Table 7

HOURS DUAL INSTRUCTION OF PILOT PRIOR TO CRASH	CRASHES
Not given	29
Less than 6	54
6 to 10	123
11 to 15	40
16 to 20	26
21 to 25	5
26 to 30	13
31 to 35	4
36 to 40	5
41 to 45	13
Total	312

Table 8

HOURS SOLO FLYING BY PILOT PRIOR TO CRASH	CRASHES
Not given	19
1 to 5	4
6 to 10	2
11 to 20	10
21 to 30	10
31 to 50	13
51 to 70	9
70 to 100	10
100 to 200	36
Over 200	199
Total	312

Table 9 HOURS FLOWN BY PILOT DURING MONTH PRECEDING CRASH

	CRASHES
Not given	39
5 or less	50
6 to 10	63
11 to 15	41
16 to 20	37
21 to 25	18
26 to 30	24
31 to 40	16
41 to 50	17
Over 50	7
Total	312

Table 10 MONTH IN WHICH PILOT WAS LAST PHYSICALLY EXAMINED PRIOR TO CRASH

	CRASHES
Not given or more than 12 months previous	59
January	86
February	23
March	13
April	3
May	6
June	20
July	73
August	14
September	12
October	1
November	1
December	1
Total	312

Table 11 NUMBER OF PREVIOUS CRASHES OF PILOT

	CRASHES
139 pilots	0
77 pilots	1
37 pilots	2
31 pilots	3
15 pilots	4
5 pilots	5
5 pilots	6
2 pilots	7
1 pilots	10
312 Total	

Note: The number of pilots in the Air Service on June 30, 1920 was 720 and on December 31, 1920 was 580.

Table 12 PHYSICAL DEFECTS OF PILOTS WHO CRASHED AS AS DETERMINED BY LAST PRIOR PHYSICAL EXAMINATION

	CRASHES
No physical defects	284
One eye 20/20 to 20/30	3
Both eyes 20/20 to 20/30	1
One or both eyes less than 20/40	1
Defective depth perception	1
Esophoria	1
Exophoria	1
Hyperphoria	5
Hyperphoria and Esophoria	1
Low prism divergence with Esophoria	1
Ear Drum retracted	1
Unstable Nervous system	2
Elbow deformity	1
Color blindness	1
Nystagmus	1
Otitis media	1
Nasal obstruction	2
Hypertrophied tonsils	2
Defective teeth	1
Perforated ear drum	1
Total	312

The majority of physical defects noted in this table were not causative factors of the crashes reported.

Table 14 PREVIOUS FLIGHTS MADE BY PILOT ON DATE OF CRASH

	CRASHES
None	185
One	77
Two	20
Three	11
Four	6
Five	8
Six	2
Seven	1
Nine	2
Total	312

Table 15 DURATION OF FLIGHT BEFORE CRASH

	CRASHES
Not given	18
Less than 15 minutes	87
15 to 30 minutes	54
30 to 60 minutes	65
One to two hours	58
One to three hours	19
Three to four hours	6
Four to five hours	3
Five to six hours	1
Over six hours	1
Total	312

Table 16 NATURE OF WORK BEING PERFORMED AT TIME OF CRASH

	CRASHES
Not given	22
Instructing	8
Receiving Instruction	15
Practice Flight	89
Stunting or Acrobatics	16
Ferrying	9
Testing	23
Border patrol	46
Cross country flights	104
Total	312

Table 17 NATURE OF PILOT'S DUTIES AT FIELD

	CRASHES
Not given	23
Under flying training	51
Flying Instructor	17
Administrative (Adjutant, Squadron officer, Flight Surgeon, Engineer, Radio, Supply etc.)	158
Regular flying duty including officers on border patrol	63
Total	312

Table 18 RESULT OF CRASH FOR PILOT

	CRASHES
Uninjured	217
Slightly Injured	48
Severely Injured	13
Killed	34
Total	312

Table 19 COCKPIT OF PILOT

	CRASHES
Not given	23
Front	217
Rear	45
Single Seater	27
Total	312

Table 20 RESULT OF CRASH FOR PASSENGER

	CRASHES
No passenger	84
Uninjured	160
Slightly Injured	46
Severely Injured	10
Killed	12
Total	312

Table 21 TYPE OF PLANE

	CRASHES
Not given	3
JN4H	26
JN4HG	1
JN6H	26
JN6HG1	9
JN6HO	1
Curtis unclassified	16
DH4	68
DH4B	124
De Haviland unclassified	1
SE5	13
SE5A	5
LaPere	2
Nieuport	3
Sopwith	1
Fokker	4
Vought	2
Thomas Morse	2
Avro	1
All Others	4
Total	312

Table 23 DAMAGE TO PLANE

	CRASHES
Not given or not known	6
Undercarriage broken	16
Propeller broken	10
Wings broken	15
Undercarriage and Propeller broken	37
Undercarriage and Wings broken	26
Propeller and Wings broken	26
Fuselage broken	26
Complete Wreck or washout	134
Plane burned	16
Total	312

Table 24 DAY OF WEEK

	CRASHES
Monday	51
Tuesday	50
Wednesday	54
Thursday	47
Friday	47
Saturday	40
Sunday	23
Total	312

Table 25 TIME OF DAY

	CRASHES
Not given	1
1 to 6 A.M.	6
6 to 8 A.M.	7
8 to 10 A.M.	49
10 to 12 M.	100
12 to 2 P.M.	33
2 to 4 P.M.	65
4 to 6 P.M.	43
6 to 8 P.M.	8
Total	312

Table 26 WEATHER

	CRASHES
Clear	238
Hazy	11
Windy	21
Gusty	4
Cloudy	17
Stormy	7
Rain or Snow	5
Foggy	9
Total	312

Table 27 TERRAIN

	CRASHES
Not given	29
Level	138
Woody	15
Hilly	23
Rolling	38
Marshy	9
Soft (ploughed or muddy)	48
Rough	2
Water	10
Total	312

Table 28 STAGE OF FLIGHT AT WHICH ACCIDENT OCCURRED

	CRASHES
Not given	5
Getting off	43
In air	81
Landing	183
Total	312

Table 29

ALTITUDE AT WHICH TROUBLE BEGAN	CRASHES
On ground	110
Less than 100 feet	69
100 to 300 feet	39
300 to 600 feet	21
600 to 1000 feet	12
1000 to 3000 feet	43
3000 to 6000 feet	14
6000 to 10000 feet	1
10000 to 15000 feet	2
Over 15000 feet	1
Total	312

Table 30

DISTANCE OF SITE OF CRASH FROM FIELD	CRASHES
On home field	106
One half mile or less	23
One half to one mile	5
One to two miles	15
Two to four miles	9
Four to six miles	4
Six to eight miles	4
Eight to ten miles	5
Ten to fifteen miles	20
Over fifteen miles	121
Total	312

Table 31

CAUSE OF CRASH AS REPORTED BY FLIGHT SURGEON	CRASHES
Not known	5
Failure of Engine	94
Defect of Plane	26
Fire	4
Flat turn	5
Collision	20
Nose Dive	1
Side slipping	3
Stall	16
Misjudged landing	19
Pancaking	9
Terrain Conditions	45
Weather Conditions	27
Unavoidable	6
Controls refusing to work	3
Inexperience	7
Air Pocket	1
Gasoline exhausted	8
Spin	6
Poor Pilotage	7
Total	312

Table 32 CAUSE OF CRASH AS DETERMINED BY CRASH BOARD

	CRASHES
Not known	70
Failure of Engine	45
Defect in Plane	11
Fire	3
Flat Turn	4
Collision	10
Nose Dive	1
Side slipping	3
Stall	8
Misjudged landing	3
Pancaking	2
Terrain Conditions	17
Weather Conditions	6
Unavoidable	4
Inexperience	6
Air Pocket	1
Gasoline Exhausted	5
Spin	3
Poor pilotage	6
No crash board	104
Total	312

Table 33 ARRIVAL OF FIRST AID

	CRASHES
Nor given or not needed	98
Immediately	70
5 Minuted	98
10 minutes	19
20 minutes	7
30 minutes	6
One hour	8
Two hours	4
Three hours	1
Four hours or over	1
Total	312

Table 34 AMBULANCE

	CRASHES
None	193
Horse drawn	3
Motor	106
Airplane	10
Total	312

Number of flying hours from January 1, 1920, to Dec. 31, 1920: 74,105

Note: As an example of the information which can be secured, the following correlated data on crashes and injuries in crashes of DH-4's and DH4B's is given.

Comparison of results between crashes of DH-4and DH4B Aeroplanes

	Total	No Passenger or Not given	Uninjured		Slightly Injured		Severely Injured		Killed	
			No.	Rate	No.	Rate	No.	Rate	No.	Rate
Total No. of DH-4 Crashes: 68										
Result to Pilot:	68	0	55	80.86	4	5.88	3	4.42	6	8.84
Result to Passenger:	68	9	41	69.48	13	22.03	2	3.38	3	5.08
Total No. of DH-4B Crashes: 124										
Result to Pilot:	124	0	104	83.87	10	8.06	3	2.41	7	5.64
Result to Passenger:	124	11	90	79.64	18	15.92	0	0	5	4.42

Of the above aeroplanes which crashed,

1 DH-4 was burned

8 DH4B's were burned

According to information obtained fromtthe Supply Group, the total number of flights made by the DH-4 plane was 6713, total flying time 111.62.21 hours. The total number of flignts made by the DH4B plane being 12322 and total flying time 24404.90 hours.

From the above comparison it appears that the DH4B is much safer for the pilot than the DH-4. The degree of safety as shown by the percentages of killed and seriously injured being as 8.05 in the DH4B's to 13.26 in the DH-4's. The danger to the passenger is also less in crashes of the DH4B than in crashes of DH-4, the ratio being as 5.08 in the crashes of DH4B's to 8.64 in crashes of DH-4's.

In crashes of DH-4's in which pilots were injured or killed, 12 out of 13 pilots were piloting from the front cockpit. In the crashes of the DH4B's in which the pilots were injured or killed, all were piloting from the front cockpit.

The danger of fire in the DH4B however appears to be much greater than in the DH-4.

Note: Copy of Crash Report blank attached hereto showing how information was obtained.

Albert E. Truby,
Colonel, Medical Corps, U.S.A., Chief Surgeon

STATISTICAL REPORT ON CRASHES IN THE AIR SERVICE DURING 1921

PREPARED IN THE OFFICE OF THE CHIEF, MEDICAL SECTION.

Return to
OFFICE CHIEF SURGEON, AIR SERVICE,
WASHINGTON, D. C.

STATISTICAL REPORT ON CRASHES IN THE AIR SERVICE DURING THE PERIOD JANUARY 1, 1921, TO DECEMBER 31, 1921.

Prepared in the Office of the Chief, Medical Section.

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Table 5 Age of pilot.
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STATISTICAL REPORT ON CRASHES IN THE AIR SERVICE DURING THE PERIOD JANUARY 1, 1921, TO DECEMBER 31, 1921.

Prepared in the Office of the Chief, Medical Section.

A total of 328 crashes were reported by Flight Surgeons at Air Service stations of the Regular Army during the period covered by this report. These are all of the crashes occurring at stations where there was a Flight Surgeon. In addition, reports of two crashes, occurring at stations where there were no Flight Surgeons, and in which there were fatalities, were obtained from the Training and Operations Group. The two fatalities caused by a bomb explosion at Aberdeen are not included in these statistics, as this was not considered an aeroplane crash. The crashes reported include all accidents in which there was any material damage to the aeroplane as the result of a crash.

Table 1 CRASHES BY STATIONS (The crash is charged to the station at which the pilot was flying.)

Aberdeen, Md.	1	Fort Omaha	1
Bolling Field	15	Fort Sheridan	1
Border Service Activities	16	Godman Field	1
Camp Holabird	1	Kelly Field	39
Camp Lewis	2	Kindley Field	2
Carlstrom Field	33	Langley Field	65
Chanute Field	5	Luke Field	4
Clark Field	4	McCook Field	11
Coblenz, Germany	3	March Field	9
Crissy Field	1	Mather Field	26
Dorr Field	1	Mitchel Field	10
Ellington Field	12	Montgomery, Ala.	2
Eugene, Ore.	4	Pope Field	1
Fort Howard	1	Post Field	57
Fort McPherson	1	Scott Field	1

TOTAL: 330

Table 2

NUMBER OF CRASHES IN EACH MONTH	CRASHES
January	23
February	20
March	25
April	22
May	27
June	33
July	41
August	44
September	43
October	19
November	15
December	18
Total:	330

Table 3

CRASHES ACCORDING TO RANK OF PILOT	CRASHES
Not given	1
Enlisted	13
Cadet	62
Second Lieutenant	31
First Lieutenant	147
Captain	43
Major	21
Lieutenant Colonel	4
Foreign Officer	5
Marine Corps Officer	2
Naval Officer	1
Total:	330

The average number of cadets in training during the period covered by this report was 180.

Table 4

CRASHES ACCORDING TO RATING OF PILOT	CRASHES
Not given	35
No rating	89
Airplane Pilot and J.M.A.	198
R.M.A.	8
Total:	330

On December 31, 1921, there were 861 Air Service officers of the Regular Army with flying ratings. The number of Reserve officers with flying ratings, on December 31st, was approximately 5,000.

Table 5 AGE OF PILOT

	CRASHES
Not given	7
21 to 27	185
28 to 30	74
31 to 35	48
36 to 40	10
41 to 45	5
46 to 50	1
Total:	330

Table 6 CRASHES ACCORDING TO CLASS OF TRAINING WHICH PILOT HAD RECEIVED

	CRASHES
Not given	26
Cadet training	18
Pursuit	101
Reconnaissance	96
Bombing	69
Two or more of above	20
Total:	330

Table 7 HOURS DUAL INSTRUCTION OF PILOT PRIOR TO CRASH

	CRASHES
Not given	22
Less than 6	41
6 to 10	119
11 to 15	51
16 to 20	30
21 to 25	22
26 to 30	12
31 to 35	6
36 to 40	2
41 to 45 or above	25
Total:	330

Table 8 HOURS SOLO FLYING BY PILOT PRIOR TO CRASH

	CRASHES
Not given	14
1 to 5	5
6 to 10	5
11 to 20	7
21 to 30	12
31 to 50	22
51 to 70	10
71 to 100	21
100 to 200	73
Over 200	161
Total:	330

Table 9 HOURS FLOWN BY PILOT DURING MONTH PRECEDING CRASH

	CRASHES
Not given	14
5 or less	63
6 to 10	51
11 to 15	57
16 to 20	44
21 to 25	33
26 to 30	25
31 to 40	27
41 to 50	6
Over 50	10
Total:	330

Table 10 MONTH IN WHICH PILOT WAS LAST PHYSICALLY EXAMINED PRIOR TO CRASH

	CRASHES
Not given or more than 12 months previous	17
1920	
January	1
May	1
June	8
July	69
August	5
September	13
October	10
November	4
December	5
1921	
January	10
February	6
March	8
April	3
May	2
June	4
July	154
August	7
September	3
Total:	330

Table 11 NUMBER OF PREVIOUS CRASHES BY PILOTS

	PREVIOUS CRASHES
154 Pilots	0
87 "	1
49 "	2
23 "	3
8 "	4
4 "	5
1 "	6
2 "	7
2 "	9
330 Pilots	

Table 12 PHYSICAL DEFECTS OF PILOTS WHO CRASHED AS DETERMINED BY LAST PRIOR PHYSICAL EXAMINATION

	PILOTS
No physical defects	306
One eye between 20/20 and 20/30	1
Both eyes 20/20 to 20/30	2
Hyperphoria	4
Exophoria	1
Angle of convergence	1
Hearing - one ear defective	6
Hearing - both ears defective	1
Unstable nervous system	1
Flat foot	1
Varicocele	1
Overweight	1
Cardiac murmurs	1
Cardiac arrhythmia	1
Hypertrophied tonsils	1
Hypertrophied turbinate	1
Total:	330

The majority of physical defects noted in this table were not causative factors of the crashes reported.

Table 14 PREVIOUS FLIGHTS MADE BY PILOT ON DATE OF CRASH

	PREVIOUS FLIGHTS
215 Pilots	0
57 "	1
25 "	2
14 "	3
5 "	4
3 "	5
2 "	6
2 "	7
2 "	8
5 "	9
330 Pilots	

Table 15 DURATION OF FLIGHT BEFORE CRASH

	CRASHES
Not given	20
Less than 15 minutes	94
15 to 30 minutes	67
31 to 60 minutes	54
1 to 2 hours	58
2 to 3 hours	17
3 to 4 hours	14
4 to 5 hours	2
5 to 6 hours	2
Over 6 hours	2
Total:	330

Table 16 NATURE OF WORK BEING PERFORMED AT TIME OF CRASH

	CRASHES
Not given	1
Instructing	10
Receiving instruction	13
Practice flight	103
Stunting or acrobatics	7
Ferrying	17
Testing	21
Border or Forest Patrol	18
Cross country flight	129
Bombing or bombing practice	11
Total:	330

Table 17 NATURE OF PILOT'S DUTIES AT FIELD

	CRASHES
Not given	11
Under flying-training	122
Flying instructor	8
Regular flying duty, including Border and Forest Patrol,	52
Administrative - (Adjutant, Squadron Officer, Flight Surgeon, Engineer, Radio, Supply, etc.)	137
Total:	330

Table 18 RESULT OF CRASH FOR PILOT

	CRASHES
Uninjured	238
Slightly injured	40
Severely injured	14
Killed	38
Total:	330

RANK OF PILOTS KILLED

Enlisted	4
Cadet	6
2nd Lieutenant	6
1st Lieutenant	16
Captain	5
Major	1
Total:	38

Table 19 COCKPIT OF PILOT

	CRASHES
Not given	11
Front	243
Rear	32
Single seater	44
Total:	330

Table 20 RESULT OF CRASH FOR PASSENGERS

RESULT OF CRASH FOR PASSENGERS	PASSENGERS
No passenger	100
Uninjured	185
Slightly injured	26
Severely injured	13
Killed	31
Total:	355

There were 6 passengers, including 2 civilians, killed in one crash, and also 1 passenger severely injured, and 1 (civilian) killed in one crash. One other civilian passenger was killed, making a total of 4 civilians killed who were flying as passengers in Army aeroplanes. Three passengers were killed and one severely injured in a single crash, and in another crash two passengers were killed.

RANK OF PASSENGERS KILLED

Civilian	4
Enlisted	14
Cadet	5
1st Lieutenant	7
Lieut. Colonel	1
Total:	31

Table 21 TYPE OF PLANE

TYPE OF PLANE	CRASHES
JN4H	6
JN4HG	1
JN6H	33
JN6HG1	1
Curtiss unclassified	14
Caproni	1
DH4	6
DH4B	195
De Haviland unclassified	6
Handley-Page	1
Fokker	1
SE5	28
SE5A	9
Nieuport	1
Martin Bomber	10
Thomas Morse	5
All others	12
Total:	330

Table 23 DAMAGE TO PLANE

	CRASHES
Not given or not known	4
Undercarriage broken	13
Propeller broken	11
Wings broken	6
Undercarriage and propeller broken	39
Undercarriage and wings broken	25
Propeller and wings broken	10
Fuselage broken	42
Complete wreck or washout	154
Burned	26
Total:	330

Table 24 DAY OF WEEK

	CRASHES
Monday	60
Tuesday	40
Wednesday	62
Thursday	55
Friday	52
Saturday	36
Sunday	25
Total:	330

Table 25 TIME OF DAY

	CRASHES
Not given	3
1 to 6 A.M.	1
6 to 8 A.M.	8
8 to 10 A.M.	58
10 to 12 M.	87
12 to 2 P.M.	41
2 to 4 P.M.	66
4 to 6 P.M.	38
6 to 8 P.M.	19
8 to 12 P.M.	9
Total:	330

Table 26 WEATHER

	CRASHES
Not given	2
Clear	221
Hazy	6
Windy	35
Cloudy	22
Stormy	22
Rain or snow	7
Foggy	11
Dark or at night	4
Total:	330

Table 27 TERRAIN

	CRASHES
Not given	11
Level	151
Woody	12
Hilly	20
Rolling	20
Marshy	5
Soft (ploughed or muddy land)	31
Thickly settled or small	9
Rough	49
Water	22
Total:	330

Table 28 STAGE OF FLIGHT AT WHICH ACCIDENT OCCURRED

	CRASHES
Not given	2
Getting off	63
In air	89
Landing	175
On ground	1
Total:	330

Table 29 ALTITUDE AT WHICH TROUBLE BEGAN

	CRASHES
On ground	130
Less than 100 feet	60
100 to 300 feet	44
300 to 600 feet	18
600 to 1000 feet	11
1000 to 3000 feet	44
3000 to 6000 feet	16
6000 to 10,000 feet	6
10,000 to 15,000 feet	1
Total:	330

Table 30 DISTANCE OF SITE OF CRASH FROM FIELD

	CRASHES
On home field	102
One-half mile or less	18
One-half to one mile	9
One to two miles	14
Two to four miles	8
Four to six miles	11
Six to eight miles	8
Eight to ten miles	4
Ten to fifteen miles	13
Over fifteen miles	143
Total:	330

Table 31 CAUSE OF CRASH AS REPORTED BY FLIGHT SURGEON

	CRASHES
Not known	8
Acute physical impairment	1
Failure of engine	84
Defect in plane	31
Flat turn	1
Collision	17
Side slipping	5
Skidding	2
Stall	9
Misjudged landing	31
Pancaking	10
Terrain conditions	32
Weather conditions	24
Inexperience	4
Gasoline exhausted	10
Spin	6
Poor pilotage	19
At night	6
Out of oil	2
Tire trouble	5
Stoppage in gas feed	8
Bursted oil lead	1
Fatigue of pilot	1
Unavoidable	7
Controls jammed	4
Air pocket	1
Commercial gasoline	1
Total:	330

Table 32 CAUSE OF CRASH AS DETERMINED BY CRASH BOARD

	CRASHES
Not known	27
Failure of engine	27
Defect in plane	9
Collision	12
Side slipping	3
Skidding	2
Controls jammed	2
Air pocket	1
Stall	7
Misjudged landing	10
Pancaking	7
Terrain conditions	17
Weather conditions	12
Inexperience	1
Gasoline exhausted	3
Spin	4
Poor pilotage	6
At night	5
Out of oil	1
Tire trouble	3
Stoppage in gas feed	3
Unavoidable	7
No crash Board	161
Total:	330

Table 33 ARRIVAL OF FIRST AID

	CRASHES
Not given or not needed	97
Immediately	121
3 to 5 minutes	57
6 to 10 minutes	14
11 to 20 minutes	11
21 to 30 minutes	10
31 minutes to 1 hour	5
1 to 2 hours	5
2 to 3 hours	1
3 to 4 hours or over	9
Total:	330

Table 34 AMBULANCE

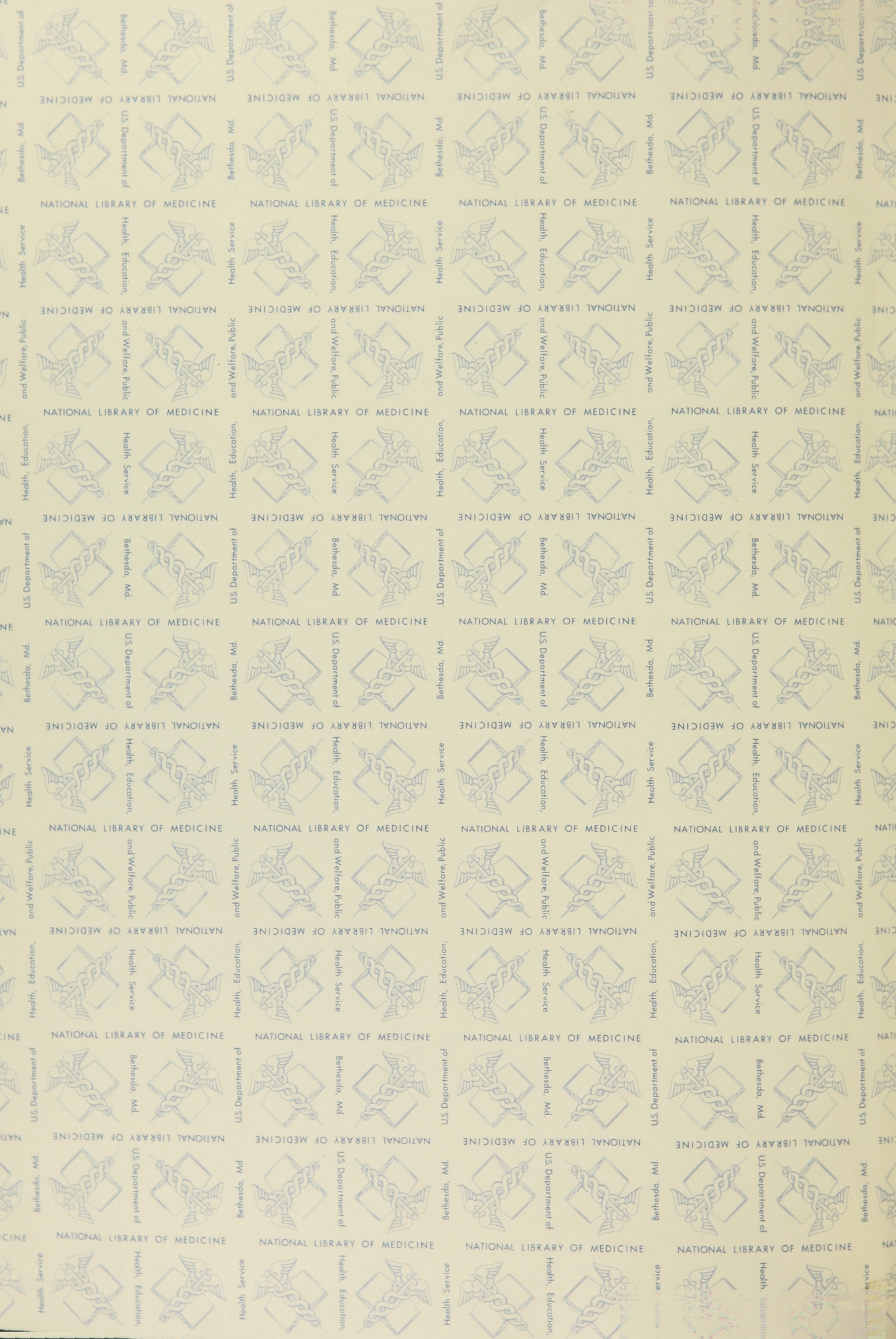
	CRASHES
None	190
Motor	109
Airplane	17
All others	14
Total:	330

Number of flying hours from January 1, 1921, to November 30, 1921: 65,882.53
The number of flying hours for December, 1921, is not at present available.

Note: The above statistics have not been analyzed or correlated, but all crash reports have been coded and code cards prepared and punched, so that analysis and correlation of any of the statistics given above can be made at any time and in a few minutes.

Albert E. Truby
Colonel, Medical Corps, U.S.A.,
Chief of Medical Section.

VHF.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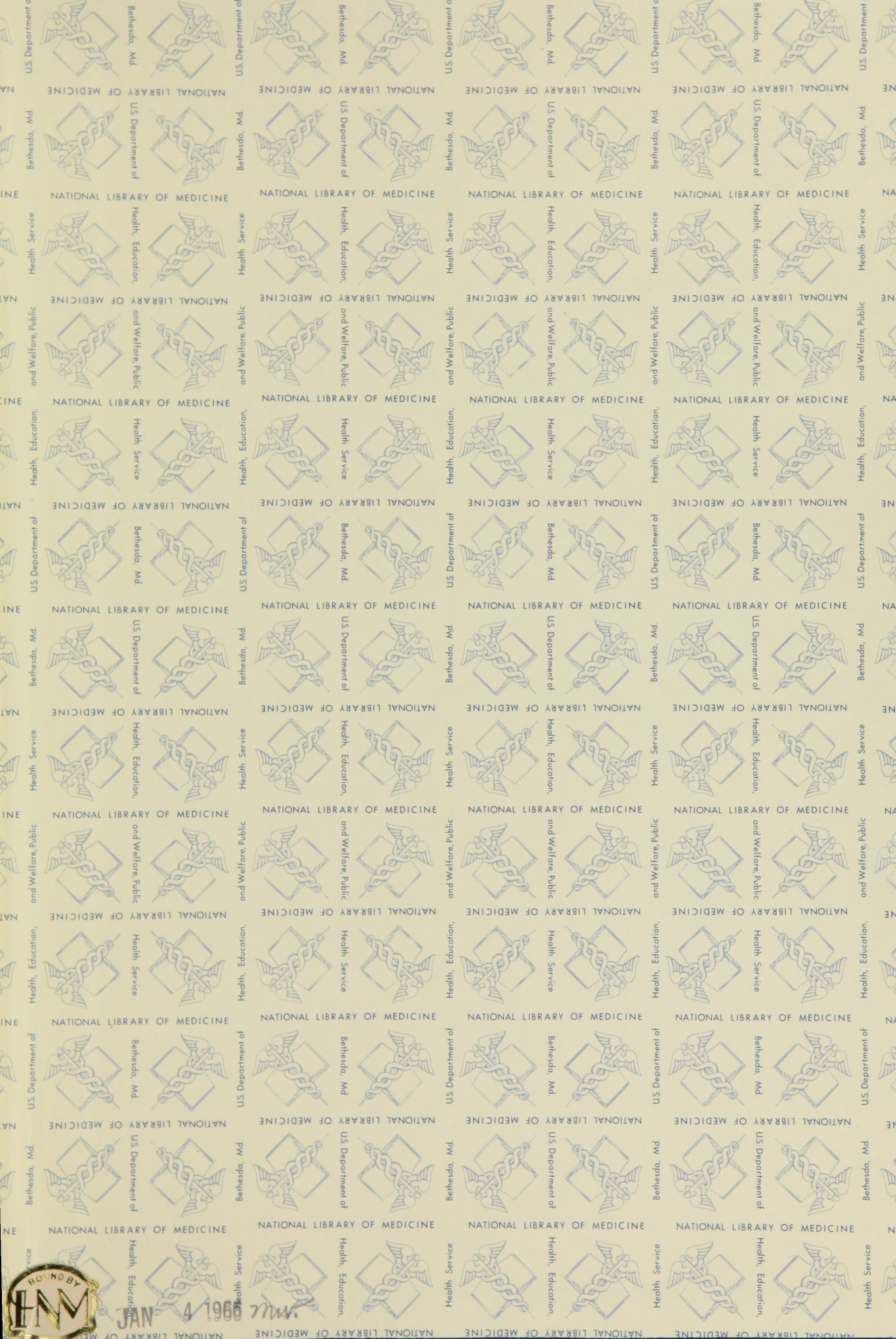

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