

THE AMBULANCE AIRSHIP*

A FACTOR MAKING FOR IMPROVED ARTICULATION BETWEEN THE MEDICAL DEPARTMENT AND
THE FLYING OFFICE

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QUITE independent of questions of humanitarianism and philanthropy, it is obvious that the rescue of the wounded, and their reclamation back to vigorous efficiency, is a wartime problem of prime importance. The modern army, divorced from its medical department and the usual activities compassed by a medical department, will degenerate, *ab initio*, into a defeated mob. It may be freely observed that salvaging the sick and wounded of the long established branches of the service offers problems that differ somewhat in types, but no basic differentiation is to be noted.

By contrast, however, not the least among sundry problems presented by, and peculiar to, the specialized air service is the most efficacious method of handling wounded flying officers. For the purpose of this article, reference is made, not to the surgical problems engendered by the air service, but rather to the procurement and transportation of the individual.

No special difficulty is encountered following casualties upon, or within the vicinity of, the flying field; particularly if the terrain be such that ambulances may be operated with reasonable ease. Difficulties multiply, however, when casualties occur remote from field or hospital, and upon a terrain difficult of access, or otherwise requiring an unreasonable loss of time. Nor should the fact be overlooked that airship casualties frequently include injuries to the cranium, vertebral column, thorax, abdomen (and those of the gravest type).

To meet the situation there has been developed a somewhat anomalous articulation between the flying office and the medical department. The former merely notifies the medical department of any accident (of which it may be cognizant) that occurs remote from the field; the latter coöperates by maintaining on the field a medical officer, with enlisted men of the medical detachment, an ambulance equipped with first-aid material, simple splints, dressings, axe, bolt cutter, and saw; and, in addition, holds itself subject to call, both day and night, for accidents that obtain remote from the field. It

* It may seem strange that a surgeon should attempt to solve a problem that would more naturally fall to the consideration of the Engineers of the Air Service, but to my mind the crux of the problem is a wounded man. Hence I have attempted its solution. In like manner it may seem strange to submit such an article to a surgical journal for publication, but I take it for granted that you would be glad to coöperate toward making successful a plan for salvaging wounded men.—NORVELLE W. SHARPE.

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is but reciting a well known fact that such accidents (particularly in cross-country flights) may and do occur many miles distant, and, not infrequently, the ship and its occupants are so successfully obscured by their environment that discovery is a matter tedious of accomplishment, and entailing an enormous wastage of time and effort, together with an unavoidable prolongation of suffering and shock to the fallen and wounded aviator.

It is obvious that this articulation of the flying office with the medical department has superimposed upon the latter a burden of responsibility disproportionately onerous. But it is to be noted that the medical department, in accord with its honorable traditions, has coöperated faithfully and efficiently.

The following points are stressed:

The usual ambulance equipment and service are inadequate for this specialized problem;

The medical department thereby works under a handicap;

Valuable time is lost, and needless suffering and shock (to the fallen and wounded aviator) accrue.

The most satisfactory solution would seem to lie in an improvement of ambulance equipment and ambulance service; and an appropriate assumption by the flying office of a task hitherto carried by the medical department. In a word, the usual motor ambulance of the medical department should be replaced by an ambulance ship under the control of the flying office.

It is obvious that the ambulance ship would not be restrained by the handicap inherent to motor ambulances; and that the flying office should control the aerial ambulance devoted largely, if not wholly, to search for, and salvaging of, the wounded aviator.

I assume that this problem has presented itself to other minds, and that the ambulance ship, as a possible solution, has received consideration. In fact, I have studied one specimen built at Gerstner Field during the period when I was in charge of the Gerstner surgical service; but I am unaware, either from personal observation or the opinions expressed by medical, flying, or engineering, officers that the original problem (of the ambulance ship as a solution) has been satisfactorily settled.¹

¹ Of interest in this connection is the following notation sent me by Lieutenant Colonel Garrison, Acting Librarian, Library, Surgeon General's Office: "Replying to your letter of August 6, relative to ambulance airships, I regret to inform you that this office has nothing of this sort on file. * * * we are unable to comply with your request and furnish you with such literature." Under ordinary circumstances one would assume that the dictum of the Librarian of the Surgeon General's Office would be the "last word." But, oddly enough, it chanced that while dictating these notes to a stenographer I was informed by a "trouble-shooter" that in England last year he had seen an ambulance built from a Livermore-Sunbeam-Coateliën, and that a memorandum concerning same had recently appeared in *Popular Mechanics*. Search in the Sacramento Library, through issues of 1918, proved fruitless, but a note in *Scientific American*, November 24, 1917, briefly recorded some experimental work of the French, conducted at the Villacoublay Aerodrome, with an aeroplane ambulance.

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As a contribution toward such solution, I submit the accompanying drawings of an ambulance ship (Figs. 1 and 2).

In contradistinction to any ship so built that the patient is compelled to sit in a more or less erect posture, this ambulance has been designed primarily for the welfare of the patient, his personal comfort, and his personal safety. It will be observed that no alteration of the stream-line fuselage has been made, nor alteration of the fuselage that would involve a structural weakening; that the requisite alterations are simple in design, inexpensive in material and labor, and well within the capability of the shop personnel of the flying field. The proposed ambulance ship may be built at the factory—but, equally well, may be constructed from a JN4D airplane in the shops of any properly equipped flying field.

The instrument board of the forward cockpit has been re-enforced by the customary supply of the rear cockpit. The latter has been abolished, and a chamber developed within the fuselage for the carriage of a litter and a man, with a maximum clearance of 17 inches and a minimum of 14 inches. Substantial modification of Stations 5, 6 and 7 has been made, and ancillary longerons (to serve as a bed for the litter) introduced as shown in Cross Section Drawing 208. This modification has compelled the removal of the top horizontal tuning wires, and the fuselage cross section wires of, and between, Stations 5, 6 and 7. In compensation is offered the bracing system exhibited in Cross Section Drawing 208 and Drawing 302.

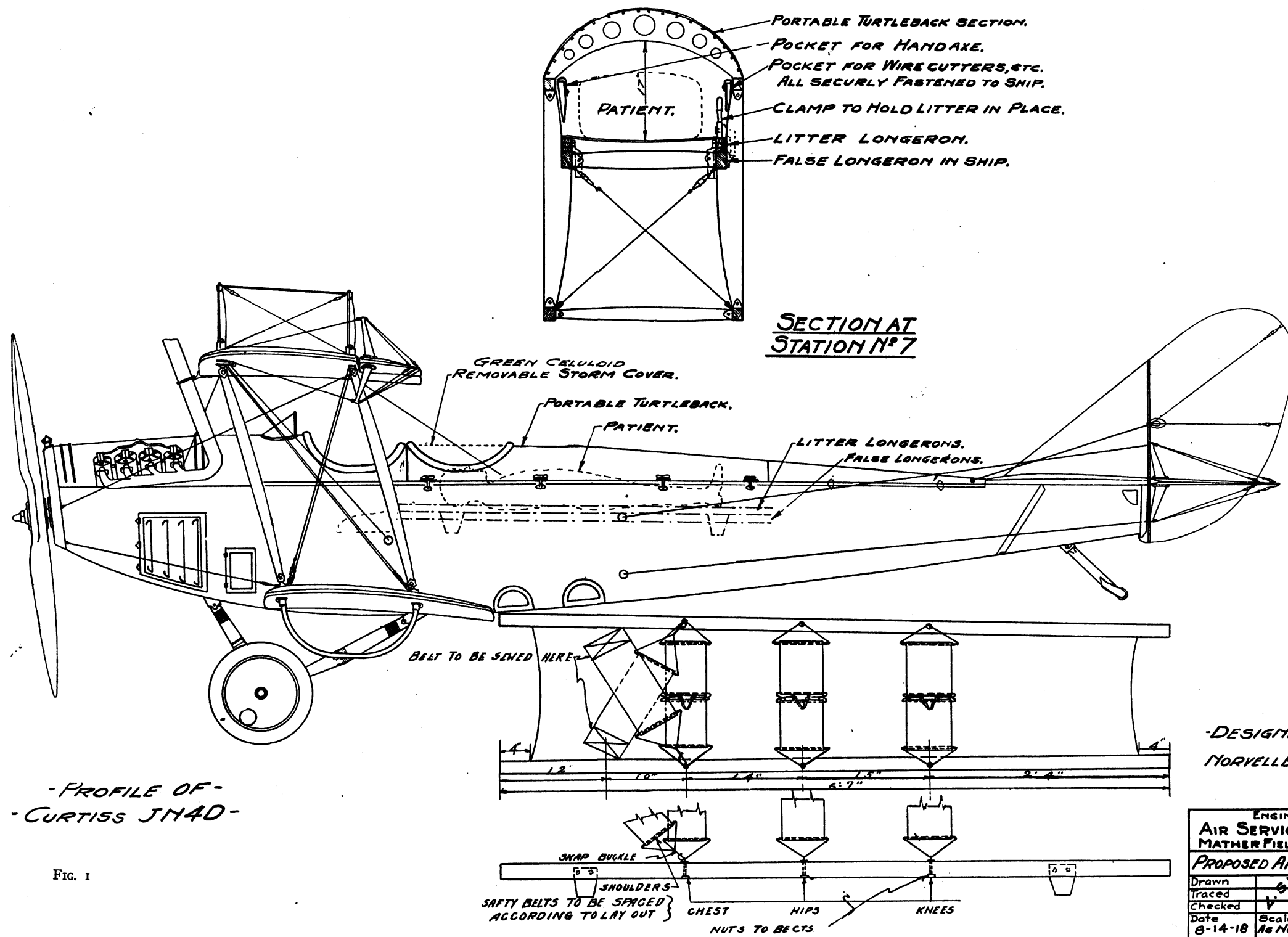
I have been assured by the engineering office of Mather Field that the ambulance fuselage is fully as strong as the original type; and, in fact, (due to the method of engaging the litter in the litter chamber, and the additional horizontal tuning wires introduced in the opening that was formerly the rear cockpit) substantially stiffened in its longitudinal axis.

The usual turtle-back is unchanged, save that a stronger and more dependable locking device has been employed. (See detail Drawing 302).

Additional protection against the air (especially in case of pronounced shock) may be secured by clamping into place the translucent celluloid shield indicated in Drawing 208. The use of this shield is optional. The litter (Drawing 208) is essentially the service litter with but scant modification. The stirrup feet have been replaced by strap iron feet of simple design and less weight, so placed that they will escape the fuselage longerons. The hinged braces have been replaced by lighter rigid iron braces. The former rectangular canvas bed has been slightly tapered toward the feet to conform to the usual taper of the fuselage.

Strong clamps, activating on the eccentric principle and attached to the longeron litter bed (detail, Drawing 302), engage in the litter longerons, which have been suitably metal-sheathed for their reception.

Substantial web belting with safety buckles (of the type commonly employed in the cockpits) pass over the patient at the level of the knees, the pelvis and the lower thorax. To control the possibility of the body slipping (in the event of forced acrobatics), similar belting, strongly attached, on



-PROFILE OF-
-CURTISS JN4D-

SECTION AT
STATION N° 7

-DESIGNED UNDER DIRECTION-
OF
MORVELLE WALLACE SHARPE.
CAPTAIN, M.C. U.S.A.

ENGINEERING DEPT.			
AIR SERVICE TRAINING SCHOOL			
MATHER FIELD, SACRAMENTO, CAL.			
PROPOSED AMBULANCE SHIP			
Drawn	5	Approved	A.W.A.
Traced		Approved	
Checked	V	Approved	
Date	8-14-18	Revised	
Scale		DWS N°	
As Noted		208	

FIG. 1

either side of the head, to the re-enforced canvas of the litter, passes over each shoulder to decussate at the mid-sternal line and find attachment, on the litter longerons, at the points which likewise control the chest belt. It seems highly improbable that the patient (well wrapped in blankets over which the belting should engage snugly) will appreciably shift position, even though the ambulance ship, pursued by the enemy, be compelled to engage in acrobatics.

The general plan of this ambulance ship would seem to be capable of ready adaptation to any ship, domestic or foreign, whose fuselage approximates in type the JN4D, and whose structure and power warrant the transportation of two men. Parenthetically, it may be noted that the burden of this ship, when loaded, is but slightly in excess of an unaltered twin ship carrying two men and the usual equipment. Furthermore, it is of practical interest that the weight centers of this ambulance ship will not be altered to any significant extent.

The ambulance airship should be distinctively differentiated from other ships. To that end it would seem wise that the entire color scheme be either white or cream-white; and that upon the upper surface of the upper wings and the lower surface of the lower wings, likewise upon the sides of the fuselage, the Geneva Cross, in brilliant red, be boldly displayed.

Such distinctive differentiation is likewise advised for ambulance ships in "the zone of the advance"; though it were but fatuous cherishing of a fond delusion to assume that the gentle Teutonic art of "schrecklichkeit" toward the sick and wounded, would be modified in favor of an aerial ambulance, be it differentiated ever so clearly.

Standard equipment should include an axe, a saw, pair of heavy bolt cutters, mesh splints, tourniquet, aromatic spirits of ammonia, hypodermic case, canteen of fresh water; not less than two substantial wool blankets should be included, and a vacuum bottle, replenished daily with hot coffee or hot soup, may prove of the greatest life-saving value, especially during the rigorous winter months. A first aid cabinet, extending the width of the fuselage (to house these necessary articles) will prove quite accessible, if carried as indicated in drawings 208 and 302.

But, as two men are requisite for proper manipulation of the patient, *two ships invariably should be sent to all remote plane accidents*: Ship 1 (ambulance) carrying pilot and empty litter; Ship 2 (ordinary) carrying flying officer and passenger (any ordinarily intelligent man will serve).

Without engaging in any comparison with other ambulances, the following technique is submitted for consideration, and attention is directed to its simplicity and effectiveness from the standpoint of the aviator-patient.

At the earliest moment following notice of a remote accident, the ambulance ship, accompanied by a companion ship (as above noted), proceeds to the indicated vicinity. A thorough search of the terrain by the two ships should identify the wreckage with reasonable promptitude; landing is accomplished; the aviator is freed from the wreckage (saw, axe and bolt-cut-

ters carried by ambulance ship) ; lifted on blanket covered litter ; first-aid relief extended (all material carried by ambulance ship) ; wrapped snugly in blankets ; strapped on litter ; deposited in ambulance-fuselage-litter-chamber ; litter clamped into position ; turtleback and celluloid shield clamped in position ; return flight begun.

Note: *The patient is handled but once.*

On reaching the field, patient (strapped on litter) is removed from the ambulance ship ; transported to operating room ; removed to operating table, again being handled but once.

NOTE.—Cordial recognition is made for the helpful coöperation and counsel tendered by Capt. Sylvanus C. Coon, Lieut. Royal Miller, Lieut. Mead T. Mulvihill, Lieut. Murray S. Vosburg and Lieut. S. S. Kingman.