

Signal Corps No. 21 settles in on jack rabbit flats — North Island, late 1913. Next step for Curtiss was model J and ultimately the JN Jenny. Fred C. Dickey, Jr.

## *The First Curtiss Military Tractor Planes*

by Francis H. Dean

In the year 1912, aeronautical progress in the U.S. Army was a painfully slow process. The reason was simply a complete lack of enthusiasm by the Congress, as well as by most ranking Army officers, concerning the possibilities of a military air arm. These attitudes were reflected in the appropriations of the period, which added up to a grand total of less than half a million dollars for the years 1908 to 1913. This figure covered both Army and Naval Aviation and was one-fiftieth of the expenditure made in Germany, one-quarter that made in Belgium, over the same period.

There were some indications of change in 1912, however. Not the least of these was the first official recognition of the professional U.S. Military Aviator and the authorization of a rather striking badge to be worn by qualified military fliers. The previous year, 1911, there had been only eight of these really special people, truly the astronauts of their day, and the ranks were not filling rapidly. After all, what could the future promise such men?

Another landmark that year saw the Army Signal Corps, with pitifully few dollars at hand, bravely set forth its

requirements for the military aircraft it intended to purchase. Only two types were of real interest — a single seat Speed Scout and a two-seat Scout (less speedy) with dual controls. It would appear that either someone forgot about pilot training or that the two-seater was to double in brass as a trainer, for above all, the Army needed training airplanes first.

Use of the scout designation may well have been as a palative to those demanding a real military mission for any aircraft purchased. Yet, it wouldn't have taken many Scouts to outnumber the few qualified Army pilots available from the early training efforts at North Island, Fort Sam Houston, the Wright School at Dayton and the Army College Park School. In fact, the meaning of Army qualified pilot was open to discussion. At this time the Army had not adopted specific pilot tests of its own but had merely adopted those of the F.A.I. as regulated in the United States by the civilian Aero Club of America.

The first Army requirements for the new airplane cited a high speed of 45 to 60 mph, a flight duration of at least three hours, and a maximum time of

10 minutes to climb, in fully loaded condition, to 2,000 feet. Equipment was to include a "wireless" or radio communication system, putting more meaning into the scout designation. It was also required that the machine be capable of quick and easy disassembly for road and rail transportation.

With the Army's needs in mind, the Curtiss organization at Hammondsport, New York decided to construct an aircraft on speculation to meet this military need and, hopefully, win themselves an order. Up to mid-1912, the Army had purchased a total of three Curtiss machines (against six Wright and two Burgess types), all being of the standard pusher biplane configuration.

The new Curtiss Military Tractor emerged from the Hammondsport shops in the winter of 1912-13 and caused a good deal of comment in aeronautical circles due to its deviation in arrangement from previous Curtiss design practice. The tractor configuration actually presaged the official disfavor which pusher biplanes would meet about a year later, and it was a reversal of Glenn Curtiss' previous negative attitude toward tractor machines.



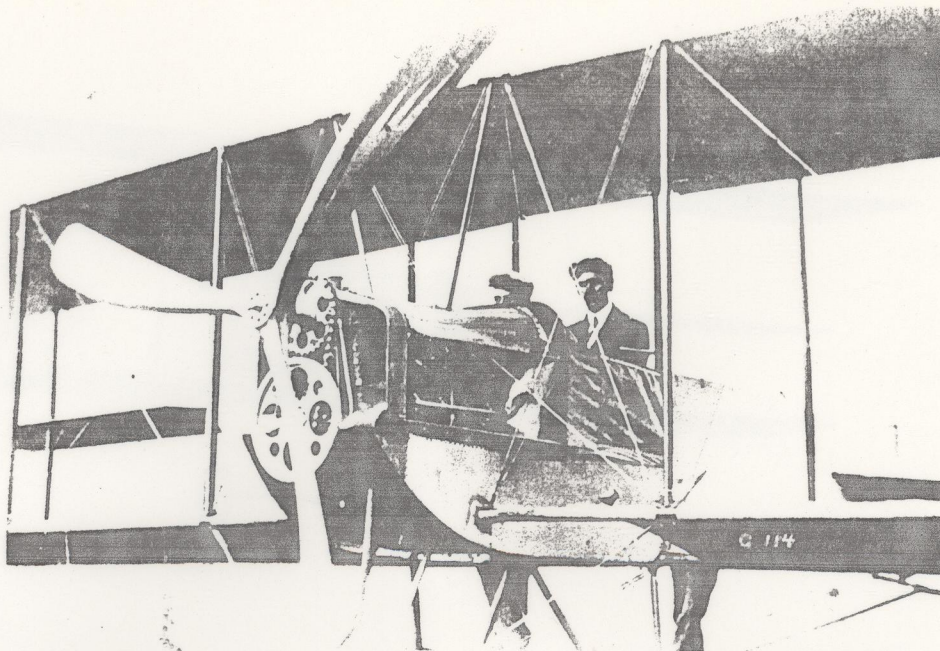
His tractor hydro, used in 1912 for the historic but abortive flight to the Navy cruiser Pennsylvania and back, had not pleased him and was revised back to a pusher design immediately thereafter. As a tractor aircraft it had lacked forward visibility, and the propeller slipstream blowing into his face had proven a source of added annoyance. His first attempt, in early 1912, at designing a flying boat with two chain-driven, tractor propellers was not at all satisfactory, but a second effort, using a pusher propeller, quickly emerged as a very successful design. Two Collier Trophies had been awarded to Curtiss for the development of aircraft of the pusher configuration. Still, the new airplane was a tractor.

In accordance with the 1912 military specifications, the new tractor was a two place, dual control machine with the seating arrangement, as in the earlier two place pushers, being side-by-side. A 70 hp Curtiss Model O V-8 engine was mounted in the nose, driving a rather large, 9 foot, three bladed Paragon propeller, through a chain and sprocket speed reduction system of 2:1 ratio. Forward visibility was reasonable, and excellent downward vision was gained by omitting the covering on the inboard twelve inches of the lower wing panels, on either side.

Despite the fact that "The Aero" magazine of May 1913 stated, "the disagreeable feature formed by a strong current of air driven backwards in the faces of the passengers in tractors is eliminated in the new Curtiss," this was an exaggeration of the truth. It referred to a deflector of sorts being provided by an upward curve to the pilot's dashboard. No windshield was used.

Other notable features of the design included a tricycle main landing gear, providing a normal tail-up ground attitude, a slight wing sweep, and both dorsal and ventral tail fins. Tail surfaces were of the F Boat configuration. Curtiss mid-gap ailerons and wheel and shoulder yoke control system were used. With the exception of the engine-bay sides, the whole fuselage was covered. Detachable canvas panels were rigged alongside the cockpit area and over the engine to provide added protection to the occupants and still allow easy access to the engine and cockpit. The outer wing panels could be detached and stowed alongside the fuselage, thus allowing compact road or rail transport as required by the military.

In order to facilitate disassembly and retain a minimum empty weight, the machine featured several structural innovations. The upper wing panels were of single piece construction outboard of the narrow center section, which remained attached to the fuselage via the



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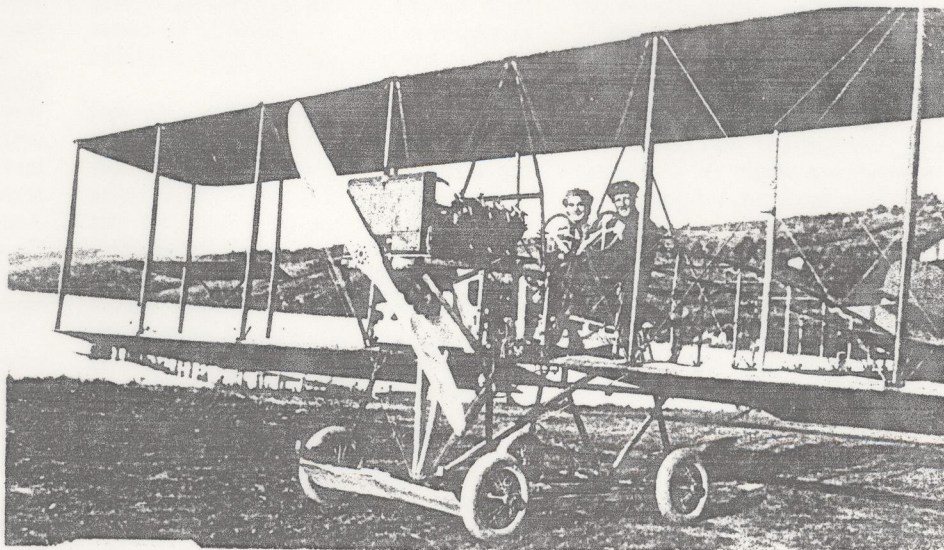
Glenn Curtiss and unknown associate pose in the first tractor type landplane developed by Curtiss. Photo at North Island, San Diego, late Jan. 1913. It became Signal Corps No. 21 and formally accepted June 12, 1913.

cabane struts. Lower panels were detachable at the fuselage juncture. The spruce fuselage longerons were tapered in section, with maximum thickness forward and bracing of the fuselage frame was accomplished in a manner that avoided piercing of longerons or crossmembers by bolts, thus obtaining maximum strength.

Location of the engine carburetor was so planned that it projected through the dashboard, allowing adjustment in flight. A 40 gallon main fuel tank was under the pilot seats, and a 2 gallon auxiliary tank, fed by an integral engine-driven pump, was part of the dashboard. This small tank contained a plate-glass window so the pilot could visually check

fuel level and pump operation in flight. An auxiliary hand, fuel pump was also installed in the cockpit.

After completion and initial checkout at Hammondsport, which did not include flying, the new tractor was shipped to the Curtiss Aviation Camp at North Island, San Diego, California to allow flight demonstration in good weather. It arrived there on January 24, 1913. Lt. Lewis E. Goodier, pioneer aviator and one of the Army Signal Corps' detachment, commanded by Lt. Harold H. Gieger, then assigned to San Diego, later remembered: "A tractor was shipped out with a chain-driven, geared-down propeller, a big cumbersome old thing."



USAF Photo

Charles Niles and John Dale Cooper seated in the second Curtiss military tractor at its 1913 Hammondsport, N.Y. debut. It was ordered as an improved model by the Signal Corps and eventually became their 22nd airplane. It's sister tri-cycle, geared model was delivered several months earlier.



Lt. Goodier watched John D. Cooper, the pioneer Curtiss employee then in charge of "grass-cutting" trainer operations, fly the new machine and recalled that Cooper once damaged it. Glenn Curtiss also demonstrated the tractor at North Island. During this period, at least one long distance flight was made, and it covered 254 miles in two stages with an elapsed time of four hours and 34 minutes.

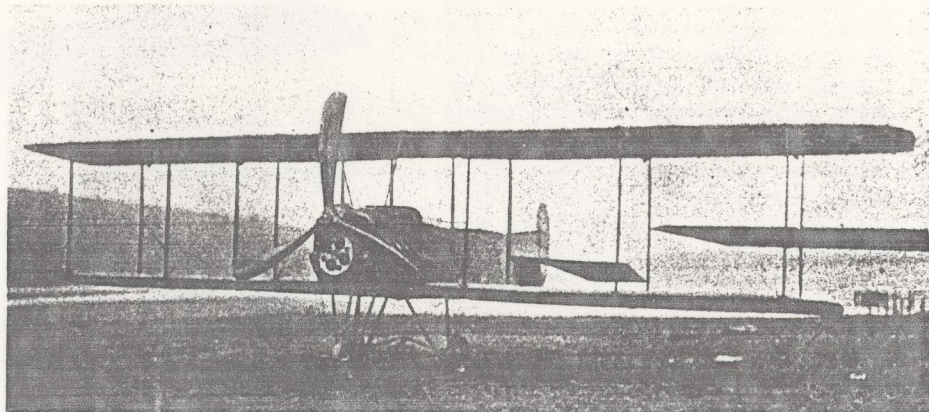
Toward the end of April 1913 the Army decided the Curtiss Tractor had fulfilled the 1912 specification requirements and purchased it, assigning the machine Signal Corps Serial #21. Formal Army acceptance took place on June 12, 1913. It is believed that the chain-driven propeller arrangement may have given trouble during testing so that by the time of acceptance, or immediately thereafter, the aircraft was modified to have a direct drive engine arrangement using a two blade propeller. In addition, the tricycle landing gear was reworked to a two wheel main gear and tail skid configuration, a configuration which would serve as a standard for airplanes for many years afterward.

Shortly after these changes were effected, Lt. Gieger and a contingent of 12 enlisted men, plus a civilian engine specialist, were assigned to Hawaii. They took with them a Curtiss Model E pusher, Serial #8, equipped as a hydro, and tractor #21, now rigged with floats for seaplane operations. The small Army group had orders to establish a new aviation school with the First Hawaiian Brigade at Fort Kamehameha near Honolulu. This was accomplished in the summer of 1913, and the school officially opened on July 14. Unfortunately, the venture was not to prove a success.

Flying conditions were found to be poor, with treacherous winds encountered in the area, proper ground facilities were not made available, and the aircraft were found to be unsuitable in the primitive conditions prevailing. All flying activities were forced to a halt in late November 1913. Army records for the first Curtiss military tractor indicate it was out of commission in July 1914 and was sold to private interests on November 12th of that year for \$250.00. It is believed the plane was wrecked shortly thereafter and abandoned.

Though it was apparently not so labeled during its operational life, Serial #21 has subsequently been labeled a Curtiss Model G. This occurred as early as 1919, and it is often so identified today in spite of the possibility of confusion with the experimental Curtiss Model G pusher type of 1917.

In April 1913, a few days prior to the purchase of the first Curtiss tractor



The first military tractor at Hammondsport, N.Y. featured extended exhaust stacks, b  
special 3-bladed Paragon propeller.

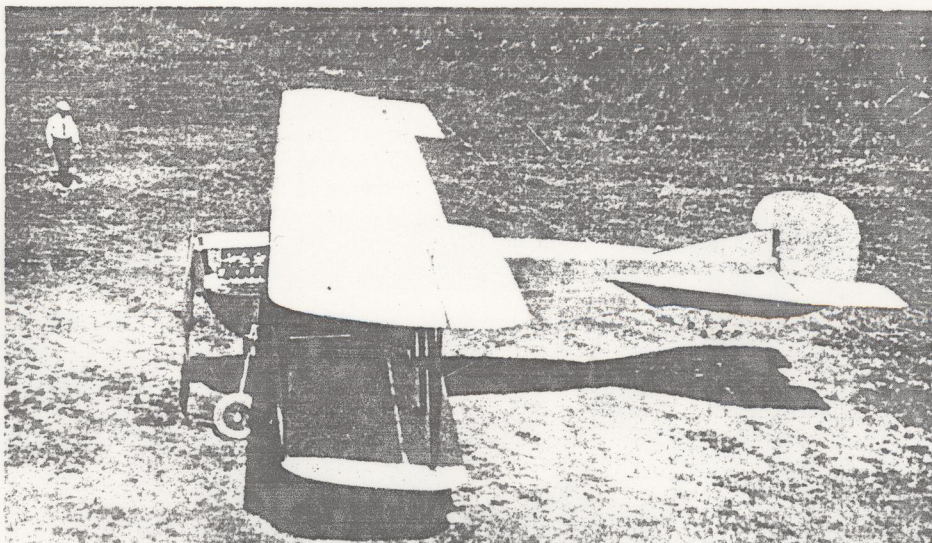
at North Island, a second two seat, side-by-side, dual control tractor was ordered by the Army and assigned Signal Corps Serial #22. Though similar in basic arrangement to #21, many differences were evident in the new machine, which was constructed and tested at Hammondsport during the good weather part of 1913. John Cooper, then back at Hammondsport, kept Lt. Goodier informed of progress on #22.

August 15th found him sending Goodier a picture of the new model, and inscribed on it was the personal note: "Showing the new 4-wheel landing gears am testing out. We are making some changes and will try again. This is unfinished." The photo showed #22 with a Curtiss OX, direct drive, V-8 engine of 90 hp which turned a two blade propeller, an uncovered fuselage and powerplant bay, no sweepback to the wings, mid-gap ailerons and a novel but complicated looking 4-wheel buggy type main landing gear, giving the machine a tailup ground attitude. The gear was elastically sprung from the fuselage by means of two rocking arms (walking

beams) and three sets of heavy rubber band windings. This was an effort to soften the effect of hard landings experienced during training operations.

Delivered to the North Island camp on December 1, 1913 and officially accepted by the Army 15 days later, #22 immediately became a favorite of Lt. Goodier, who had then taken over Lt. Geiger's job as head of Army training at the camp. It seems clear that "old #22" was intended and used solely as a trainer with the soft landing gear being a very practical feature.

On the day after Christmas 1913, two of Lt. Goodier's students, Lts. Joseph E. Carberry (piloting) and Walter R. Taliaferro, took #22 up to 7,800 feet altitude, thus setting a new Army altitude record for two place machines. Three days later it was entered in the Mackay Trophy Race held at Encinitas, California where it was to compete against a lone competitor, a Curtiss Model E pusher, Serial #23, which had been built from spare parts by Lt. Goodier. During testing on the day of the race, #22 was cracked up, eliminat



Signal Corps No. 22 with bogle type undercarriage and inset ailerons. The latter feature being a late development.



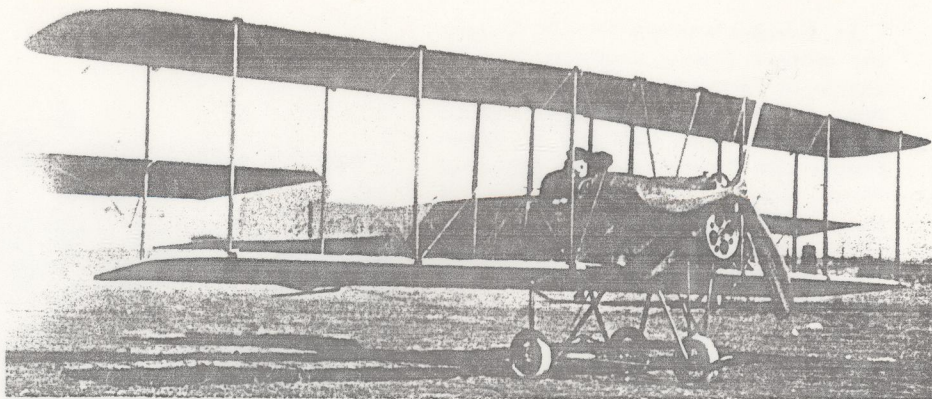
ing itself from competition.

With an acute shortage of Army aircraft, particularly dual control training types, Lt. Goodier could not afford to relegate #22 to scrap. Therefore, by April 1914, he had the tractor rebuilt in a somewhat modified form. The product of this handiwork now used an OXX direct drive engine turning a two bladed propeller, the same covered fuselage, empennage and 4-wheel soft-sprung gear, but a new wing cellule was fitted. Number 22 now had semi-inset ailerons on overhung sections being braced by struts slopping up and out from the lower wings.

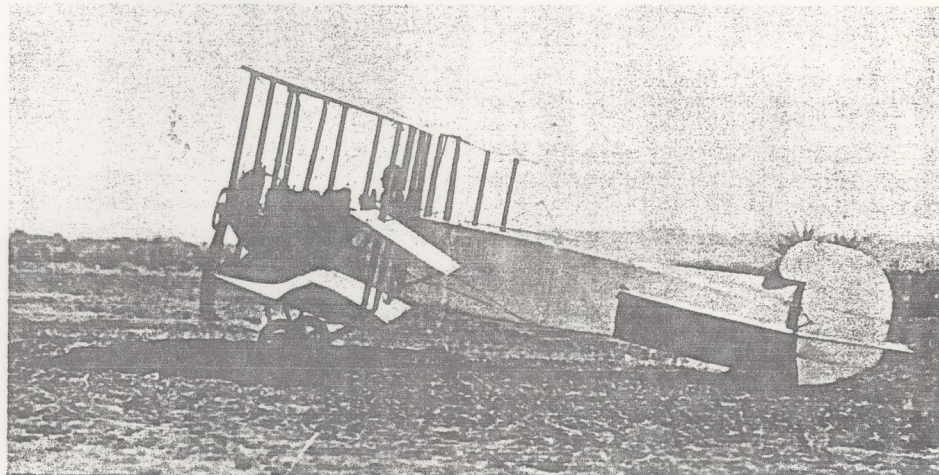
Years later, Goodier noted how he had loved this airplane. "Old 22 was a very remarkable machine—a big... beautiful old thing... When you landed... it was just like a rocking chair." Its flying qualities must have been quite good for that early period, for Goodier recalls with pride that he did a considerable amount of "slow speed flying" experimentation in this machine. With the low horsepower available, little of this type of flying was done then, but "old 22 sailed along in beautiful shape."

On January 7, 1914, the organization of the Army Signal Corps' First Aero Squadron was approved. Based at San Diego, the new squadron was divided into two companies. The first company, under Lt. Benjamin D. Foulois, was to use Burgess tractor airplanes. The second, under Lt. Taliaferro and including Lt. Goodier, was to operate Curtiss types—three pushers and the ever faithful #22. After Goodier's reconstruction of the tractor, it performed yeoman trainer service, being particularly useful when the Army stopped using the Wright control system. In particular, Goodier recalls how quickly Oscar Brindley, former civilian Wright instructor of Army Aviators and an expert flier, mastered the Curtiss-type controls of #22.

In its rebuilt configuration, the Curtiss served as a trainer for at least six other pioneering Army fliers. As in all training operations, things did not always go smoothly between man and machine. One such incident was recorded by Goodier: "I'll never forget the day that



Gloriously crude with modern tri-cycle landing gear and 3-bladed propeller. Enclosed tractor was very popular after open pusher type was basically all the Army previously had for training purposes.  
T. G. Foxworth



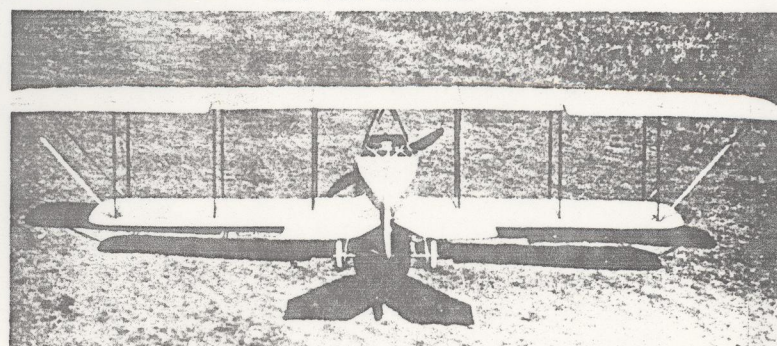
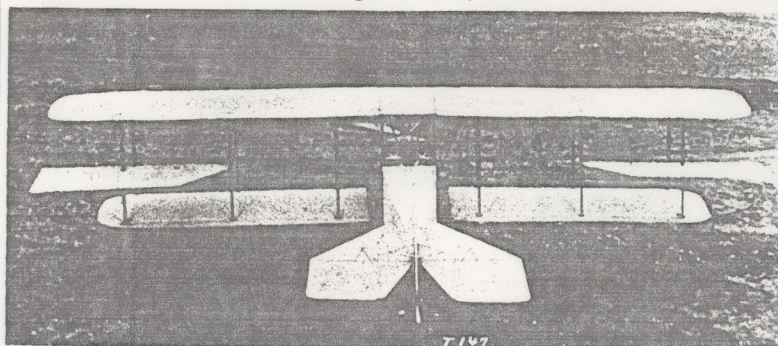
Ole' No. 21, with revised landing gear, taxis along North Island's boundless runway. Both planes were built as "Scouts" but the Army seemed to have lost the meaning of the word during use of the machines.  
T. G. Foxworth

I had taken Muller up. He already knew the Curtiss control and hadn't flown 22 much. I took him up and he was overcontrolling. We got down and he knew it. He got out of the machine and said, 'Ned, I hate to hurt your feelings, but that's the G.D.'est flying machine I was ever in.' Thus we have the views of two pioneer pilots concerning #22.

Late in 1914 new airplanes for the Signal Corps were coming into service, and #22 was getting weary. Army records indicate it was condemned on September 16, 1914. As with the first tractor, it has sometimes been referred

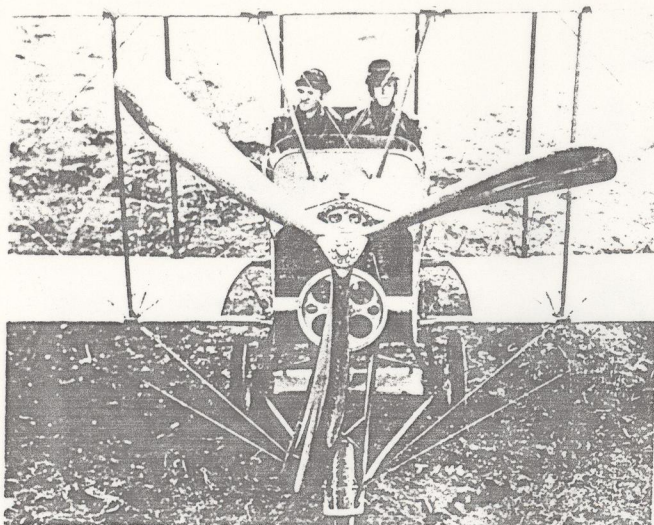
to by a letter designation, in this case the Curtiss Model H. However, this usage seems as unlikely as in the former case. Curtiss nomenclature is certainly uncertain during this era, but letter designations for either of the first Curtiss military tractors should be considered most improbable.

These two airplanes, as opposed to the *civil* tractor type built for Lincoln Beachey in 1913, were the first Curtiss *military* tractors, and thus they can lay a certain claim to fame as a turning point in Curtiss design and as ancestors of the long line of Curtiss military tractors that followed.

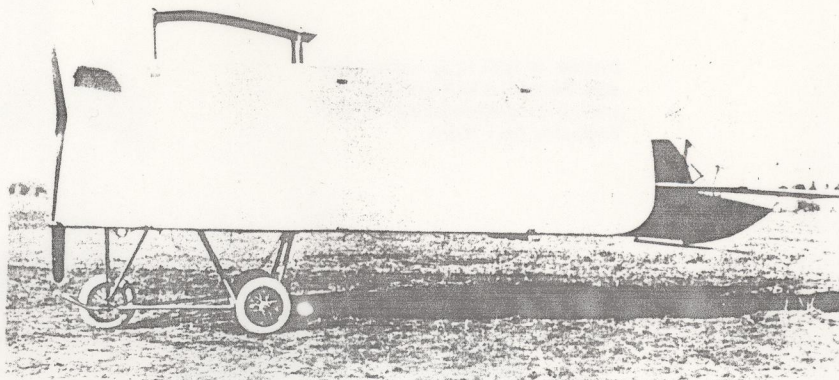


Rear view of S.C. 21 (left) at North Island and No. 22 (right) at Hammondsport show basic planview of machines, their similarities and changes incorporated.  
Bruce C. Reynolds



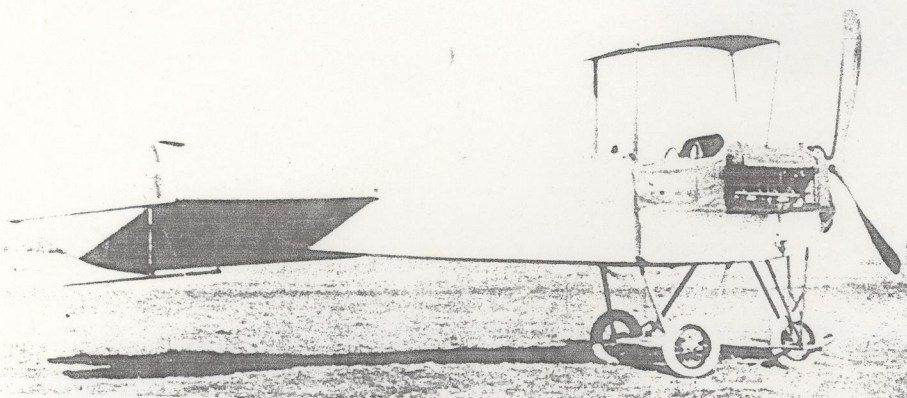


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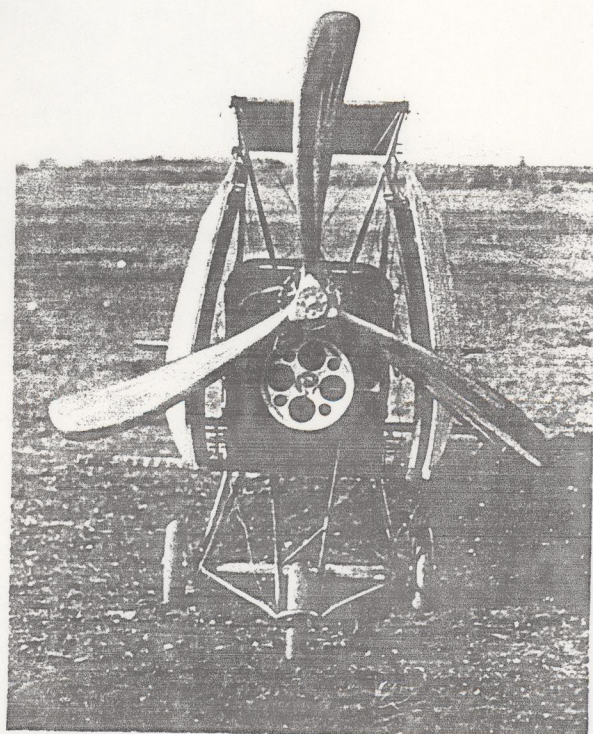


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Compact, portable shipment, 1914 style. Signal Corps required aircraft be dismantled, easily crated and shipped by railroad or Army wagon. (left) Close quartered cockpit, downward vision through wing cutouts and 2:1 engine-propeller reduction made S.C. 21 unique in early aeronautical history. "Aviators" are unknown.

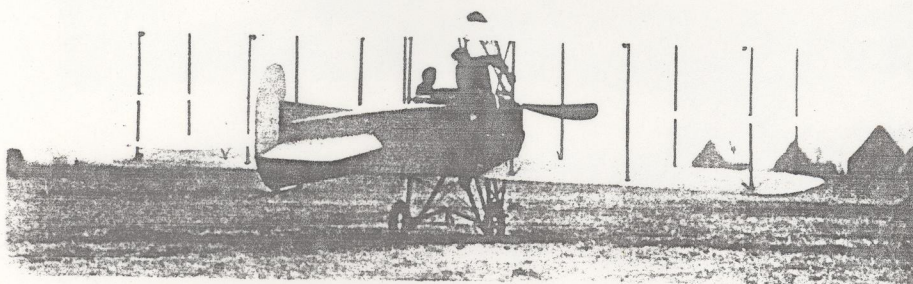


Curtiss tractor, minus wings, had overall width of 9 feet. Sides of cockpit were elastic lined canvas, which allowed pilots to lean side to side fully in Curtiss shoulder yoke control system. (below) Method of mounting the "new" tractor type of flying machine. North Island, 1913.



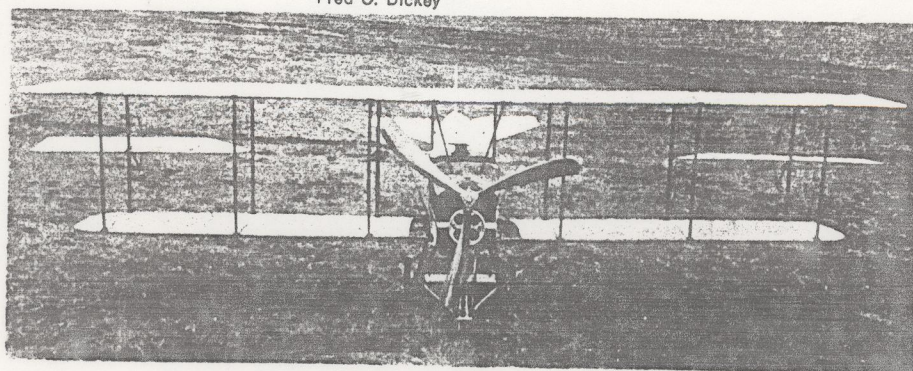
Thomas Foxworth

Lookout, hea' com da scout! A complete package, ready for delivery anywhere brush warfare may breakout.



Fred C. Dickey

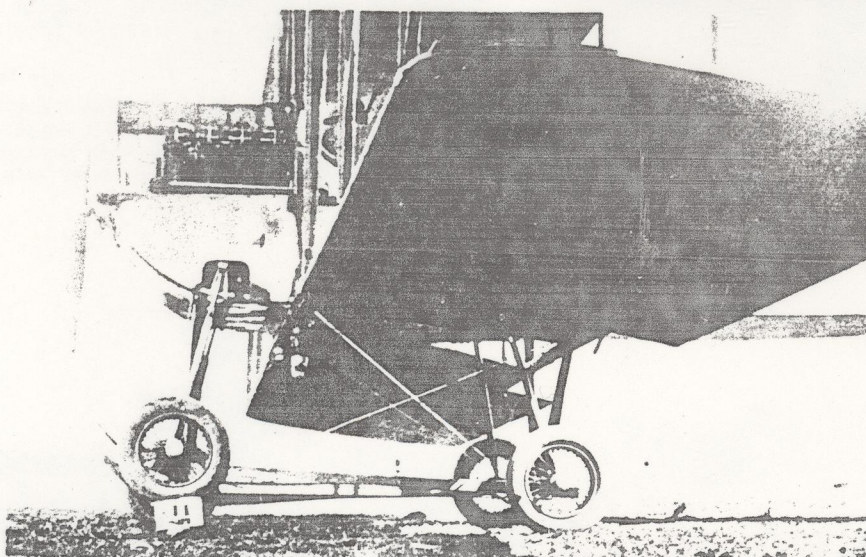
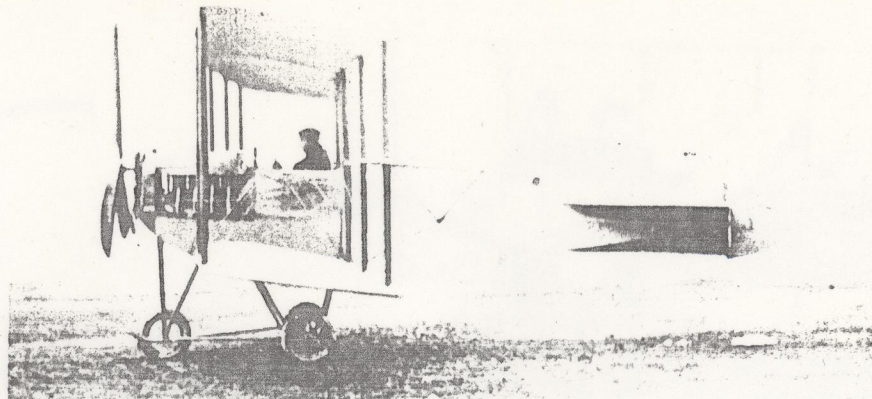
Fully rigged, which was one hellava job, Signal Corps 21 was a safe and reliable critter. Only the Martin TT of the same 1913/14 era surpassed it in performance and service utility.



B. C. Reynolds



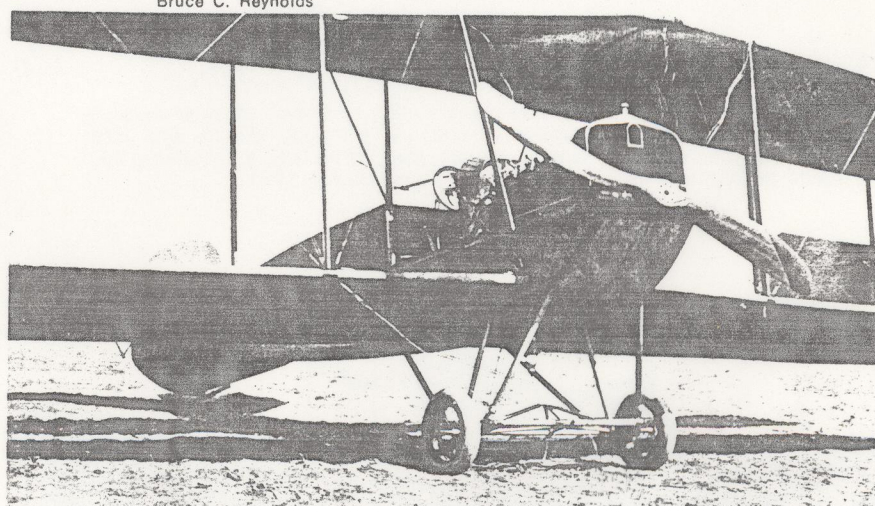
Profile of first fully completed and flown Curtiss military tractor at Hammondsport, N.Y. Probably late 1912.



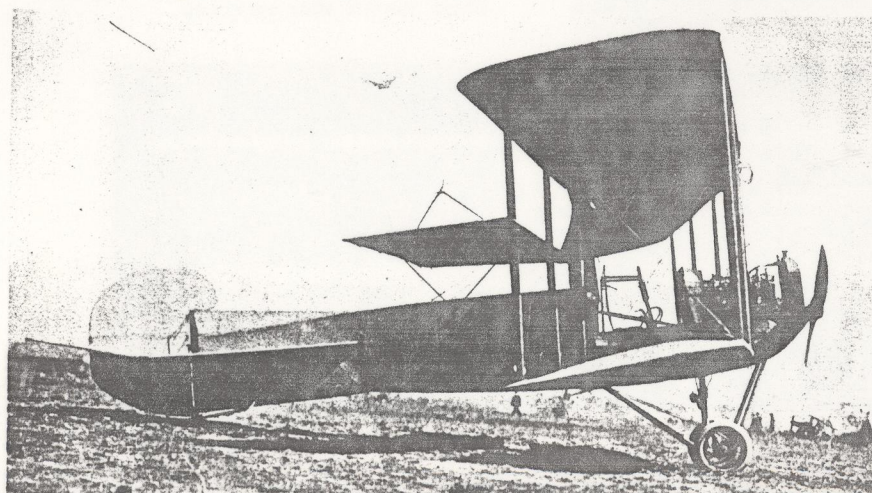
Original bogie landing gear configuration on S.C. No. 22. Trial and error, try again was the motto of the pioneer airplane designer.

Bruce C. Reynolds

Dec. 1913, the second Curtiss tractor was delivered to North Island. The revised and more conventional undercarriage, plus direct drive propeller made it far more practical than was the original No. 21 companion.



Thomas Foxworth



Big and boxy in construction, the second Curtiss Tractor was nevertheless the forerunner of all Curtiss machines of this type to follow. It taught Curtiss engineers a great deal.

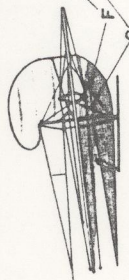
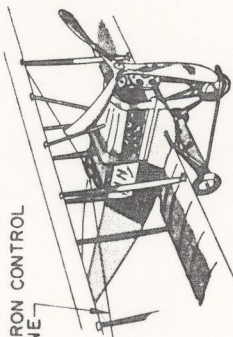
Thomas Foxworth



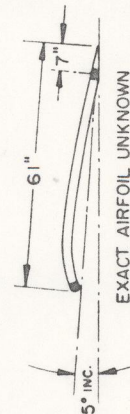
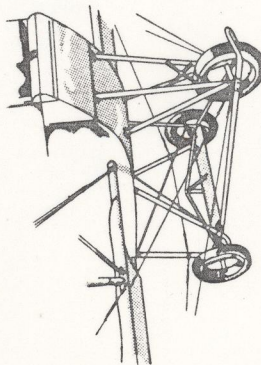
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GROSS WEIGHT 1290 lbs. Approx.  
 WEIGHT EMPTY 1050 lbs. Incl. water & fuel  
 TOP SPEED 75 m.p.h.  
 CRUISING OR "NORMAL" 60 m.p.h.  
 LANDING SPEED 45 m.p.h.  
 CLIMB, INITIAL, S. L. 200 ft./min.  
 RANGE, AT CRUISE 315 miles  
 POWER - 8 Cyl. W.C. CURTISS MODEL O ENGINE, 70 h.p.  
 PROPELLER GEARED DOWN, 2:1 RATIO,  
 6" GEAR AND 20" FLYWHEEL ON ENGINE SHAFT,  
 BICYCLE CHAIN POWER TRANSMISSION TO 12"  
 GEAR ON SUSPENDED PROPELLER SHAFT 18"  
 ABOVE POWER DRIVE. IT IS BELIEVED THE  
 ENGINE TURNED AT 1600 r.p.m., PROPELLER  
 AT 800 r.p.m. (MAX. RATING).

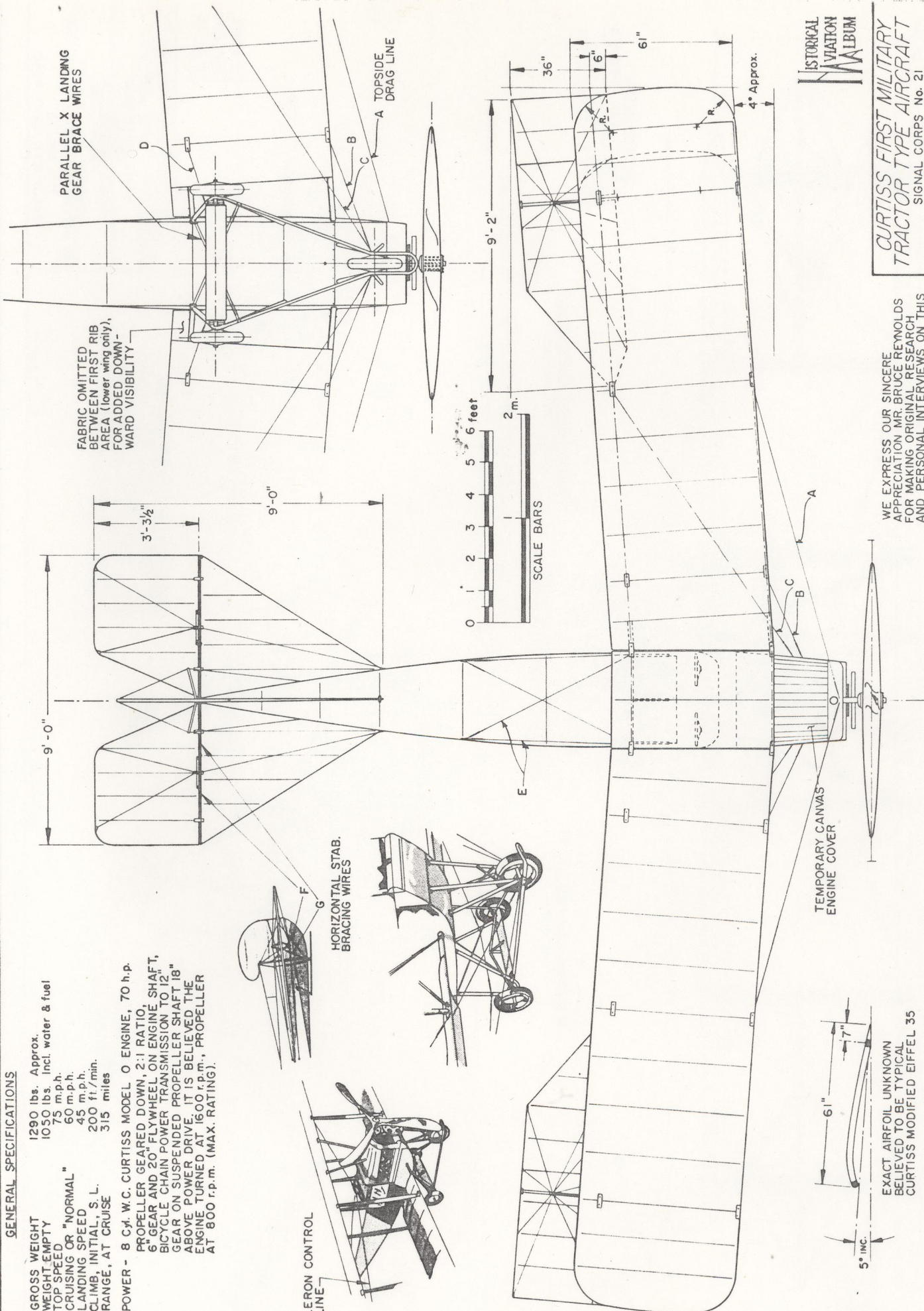
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HORIZONTAL STAB.  
BRACING WIRES



EXACT AIRFOIL UNKNOWN  
BELIEVED TO BE TYPICAL  
CURTISS MODIFIED EIFFEL 35



HISTORICAL AVIATION ALBUM

CURTISS FIRST MILITARY TRACTOR TYPE AIRCRAFT

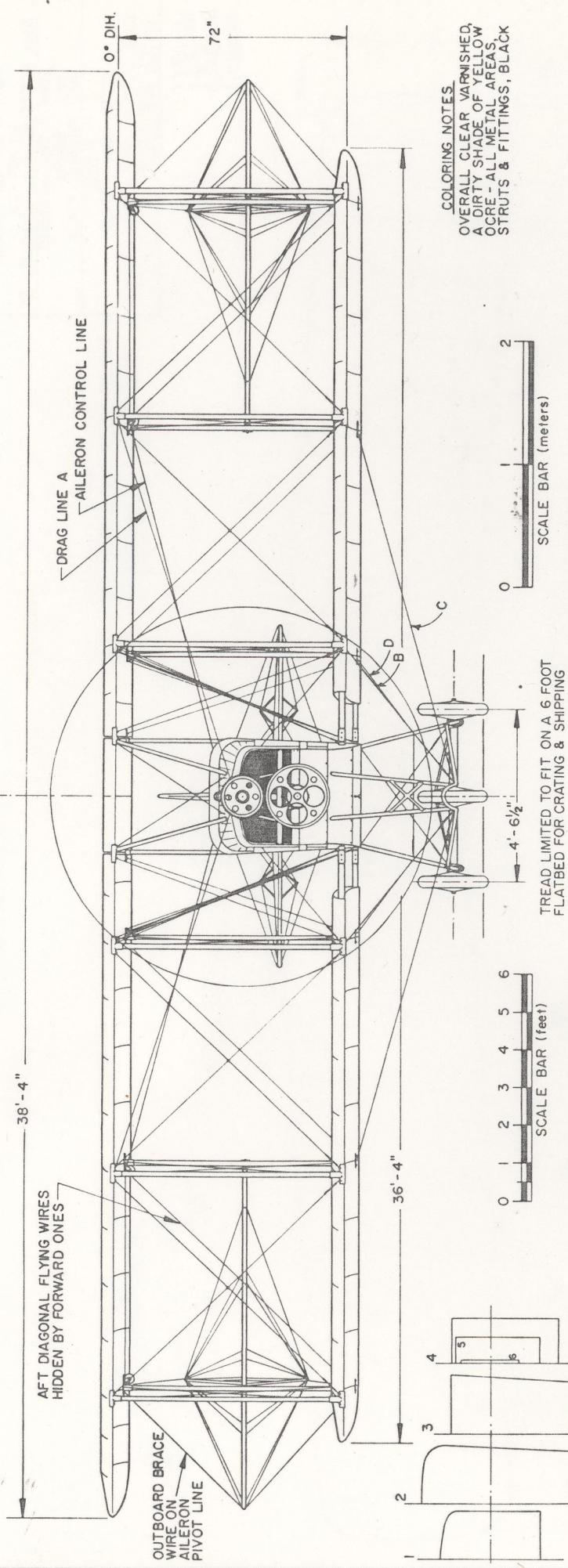
SIGNAL CORPS No. 21 1913-14

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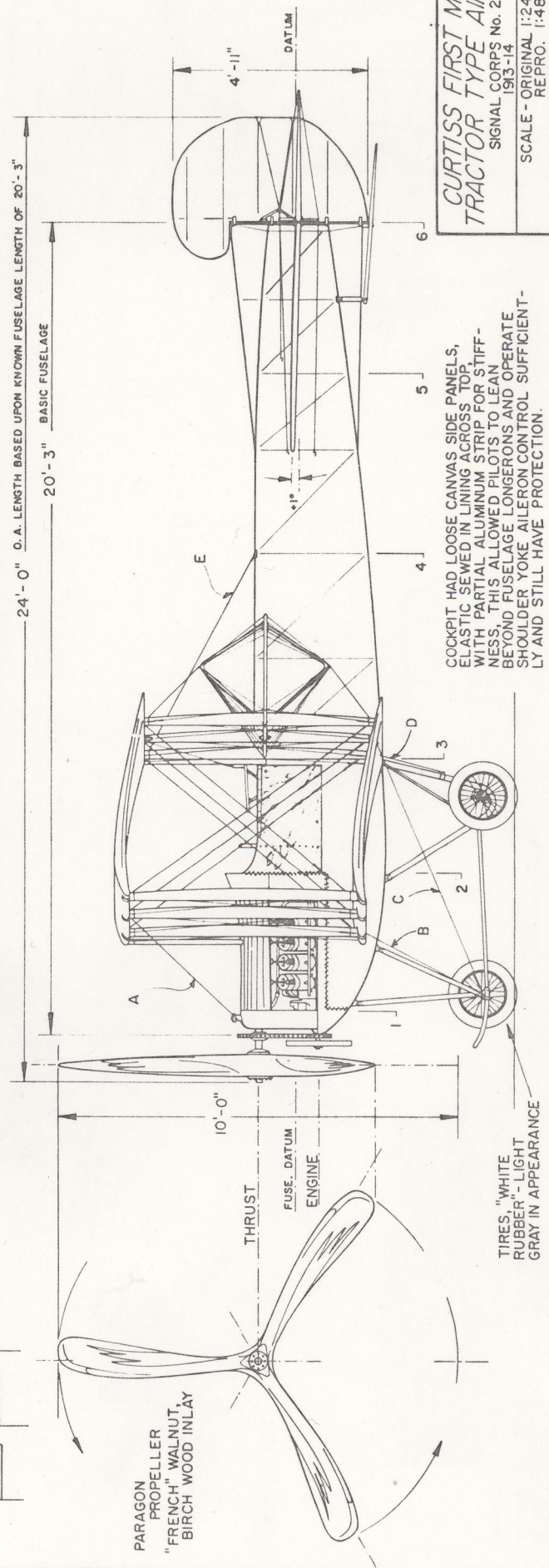
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 OVERALL CLEAR VARNISHED,  
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**CURTISS FIRST MILITARY  
 TRACTOR TYPE AIRCRAFT**  
 SIGNAL CORPS No. 21  
 1913-14

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 SCALE - REPRO. 1:48  
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