FLIGHT CERTIFICATION OF A CHEROKEE II SAILPLANE
and
THE CONSTRUCTION OF AN ENCLOSED TRAILER

By

Ronald D. Kriz

AERO 400 LAB

California Polytechnic State University
San Luis Obispo

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Project Advisor: Dr. Hendel

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SUMMARY

The Cherokee II was built and covered by Leroy E. McChesney who did an excellent job in the construction of this home-built sailplane.

The objective of this project was to complete an operational enclosed trailer and sailplane combination.

This report will show the work done up to the test flight including a brief description of the test flight.

INTRODUCTION

On October 16, 1973 a Cherokee II sailplane was bought in a joint partnership by Richard Hanna, William Hodgess, and the author. Mr. Hanna and the author reworked the sailplane for FAA inspections leading to flight certification. As part of the project an enclosed trailer was built to protect the wood and fabric sailplane from the harsh desert enviroment.

On February 9, 1974 the Cherokee II was given the final flight certification and on February 21 the trailer was completed, registered, and licensed. On February 23, 1974 the Cherokee II was transported to El Mirage Dry Lake and test flown by Mr. John Gravance.

REWORK AND INSPECTIONS ON THE CHEROKEE II SAILPLANE

When first purchased the Cherokee II was registered N3773G and ready to be flight certified. Unfortunately during the first inspection the FAA inspector pointed out that if no record had been kept on previous inspections, i.e. before covering, then the aircraft would have to be reinspected and recovered. Fortunately this only involved removing small portions of the covering for inspection of the airframe. Patches on the rudder, vertical stabilizer, elevator, horizontal stabilizer, fuselage, and both wings were removed. On January 1974 the airframe was inspected and permission to recover was logged in the new aircraft log book. The open areas were patched over according to repair manuals sold by the FAA, see Figure 1.

Since this sailplane was an amateur homebuilt the FAA requires that the sailplane should be flight certified in an EXPERIMENTAL classification. The proper markings were then painted on the aircraft according to FAR part 45(Identification and Registration Marking).

The wing Fairings were constructed from 0.030 in. white enameled aluminum sheet and springs.

The Cherokee II was next weighed and balance. The C.G. with a 190 lb. payload was located 77.3 inches from datum (The nose of the Aircraft) which was will within the range of the C.G. limits (Forward 77.1 In.; Aft 80.0 in. from datum), see Figure 2.

With the completion of the weight and balance the sailplane was ready for the final FAA flight certification inspection. Final certification was granted on February 9. 1974. All that remained before the test Flight was to complete the enclosed trailer.

CONSTRUCTION OF AN ENCLOSED STRESSED SKIN TRAILER

Because the Cherokee II has an unusual shape(when compared with most sailplanes), the enclosed trailer had to be custom built. Most home built trailers are in general bulky, cumbersome, and very heavy. Unfortunately the lighter weight custom built trailers are expensive (1800^{00} to 2200^{00}). After talking with many experienced sailplane owners the author was convinced that a stressed skin trailer (S.S.T.) was the best design because of the trailers light weight, low cost, and easy construction. A majority of the materials used to build the enclosed trailer were purchased from Herman Stiglmeier who is responsible for the design of the S.S.T.. The total cost of raw materials was 700^{00} which included a rusted wheel axial assembly including tires and rims for 30^{00} which was salvaged from a junkyard. The objective was to construct a low cost trailer. A list of items used to build the trailer is shown in Table. I. The basic dimensions and type of construction is shown in Figure 3. Figure 1 shows the trailer under construction.

The trailer was designed so that the thin aluminum skin covering would take the tensile bending stresses while the thick plywood floor resists the compressive bending stresses. Therefore no large heavy undercarriage is needed to stiffen the trailer bed instead all loads are taken by the skin and floor. This type of construction makes the most efficient use of materials which results

in a low cost light weight enclosed trailer.

Special fixtures where fabricated for holding the fuselage, wings, and horizontal stabilizer inside the trailer. The idea was to prevent damage to the sailplane if the trailer rolled over. Therefore all fixtures were positive acting. The trailer was balanced so that a tonque weight of 100 lbs. (All up Weight) and 60 lbs. (empty weight) resulted. This was done by positioning the wheel axial assembly and internal arrangement of wings and fuselage until the desired tonque weight was acheived. The internal fixtures and wheel axial assembly were then bolted to the trailer floor.

TEST FLIGHT

Since the author was only a student pilot and close to maximum payload of the Cherokee II, it was dicided that a more experienced lighter weight sailplane pilot should test fly the Cherokee II. Mr. Gravance a fellow Aeronautical Engineering student was asked to test fly the Cherokee II. Mr. Gravance holds a Certified Flight Instructors rating for sailplanes and has been flying sailplanes for six years. For saftey sake Mr. Gravance did a second weight and balance before the test flight to check that the C.G. was within the C.G. limits with a payload of 135 lbs. plus a 20 lb parachute. The Cherokee II was first given two low altitude auto tows to check for stability and general functional integrity of the aircraft. After two succesful auto tows the Cherokee II was aerotowed to 2000 ft. A.G.L. and checked for stall and general flying characteristics. It was discovered as expected that the Cherokee II flys similiar to the Schweizer 1-26 and that in a full stall the left wing falls first initiating a spin entry. It was also noted by Mr. Gravance that there is no buffeting or warning of any kind before stall except that an unuaually high angle of attack is needed to stall the aircraft. Mr. Gravance also expliained that the spin entry resulting from stall was not uncontrolable and that recovery was easy. Several photographs of the test flight are shown in Figure 4. A list of general flight characteristics is tabulated in Table II. As can be seen the Cherokee II is a relatively high

perfomance home-built sailplane.

CONCLUSIONS

A Cherokee II home-built by Leroy McChesney was reworked, FAA inspected, flight certified, and test flown. An enclosed stressed skin trailer was custom built for the Cherokee II sailplane.

During it's maiden test flight the Cherokee II was found in general to have flight characteristics similiar to the Schweizer 1-26, and that the left wing drops when the aircraft is stalled.

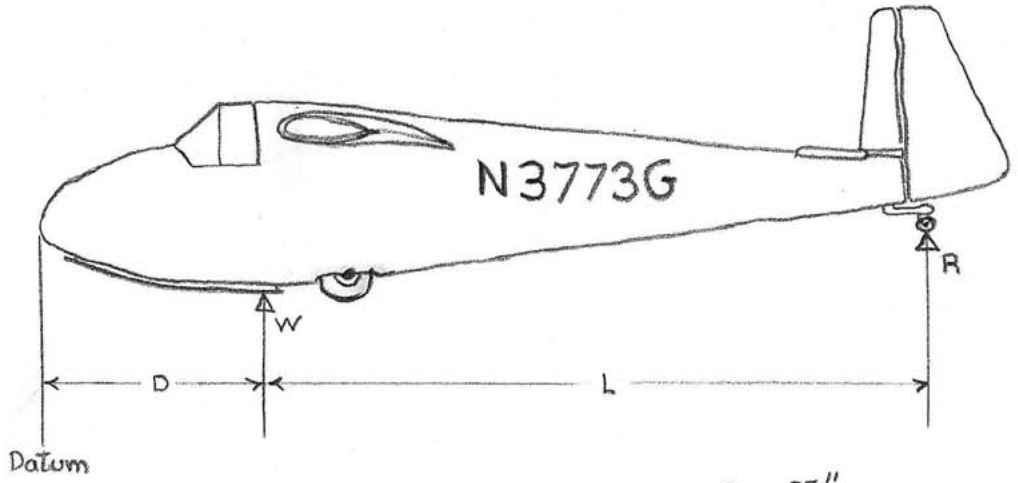
VII. Figures And Tables

Figure 1.

Recovering The Cherokee II and Fabricating
The Stressed Skin Enclosed Trailer

Figure 2.

Weight And Balance Of The Cherokee II



$$C.G. = D + \frac{R \times L}{W}$$

C.G. = 77.3 in.

D = 55"
L = 178"
R = 70 lbs.
W = 535 lbs

Figure 3.

Construction Of The Stressed Skin Enclosed Sailplane Trailer

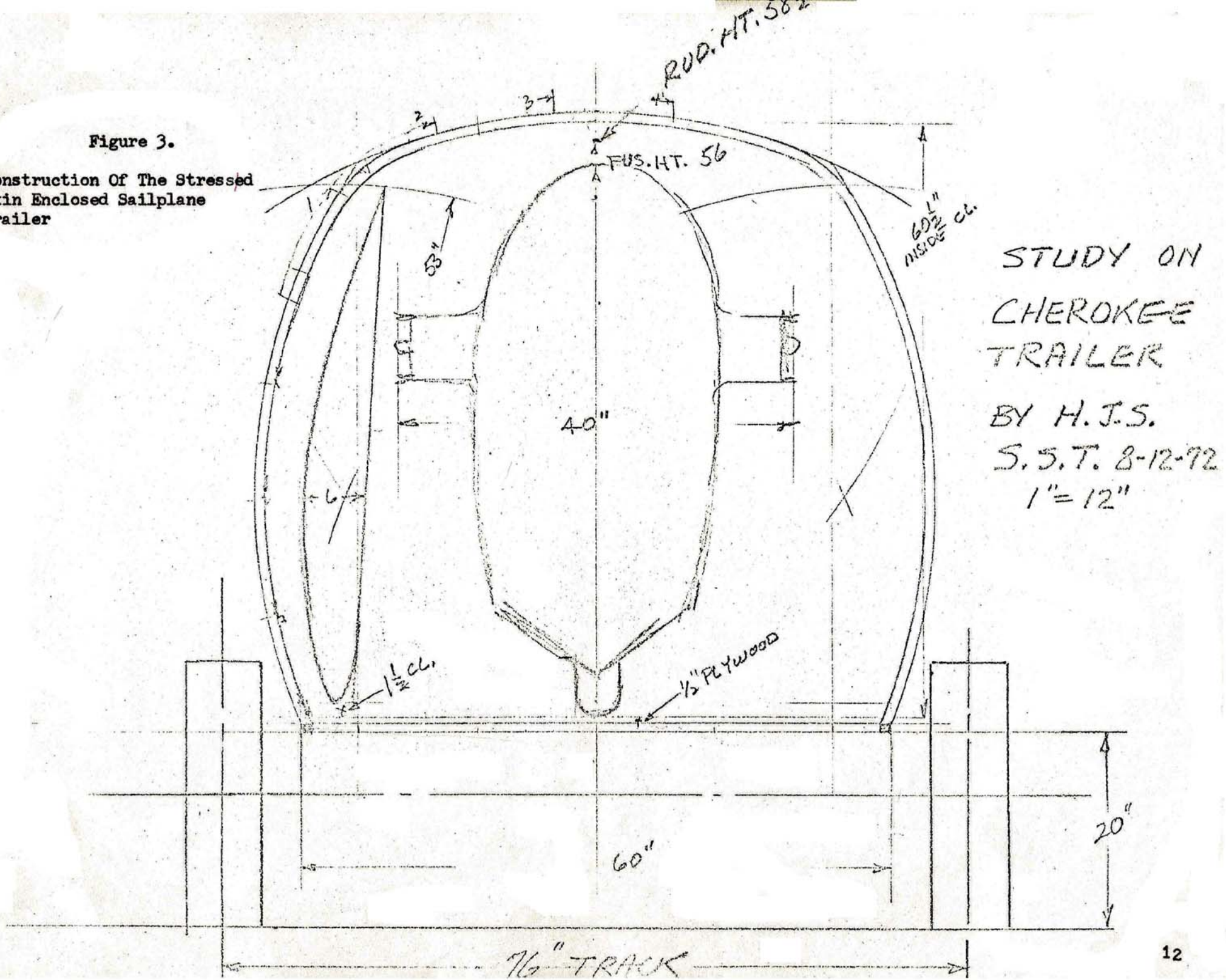


Figure 3. (continued)

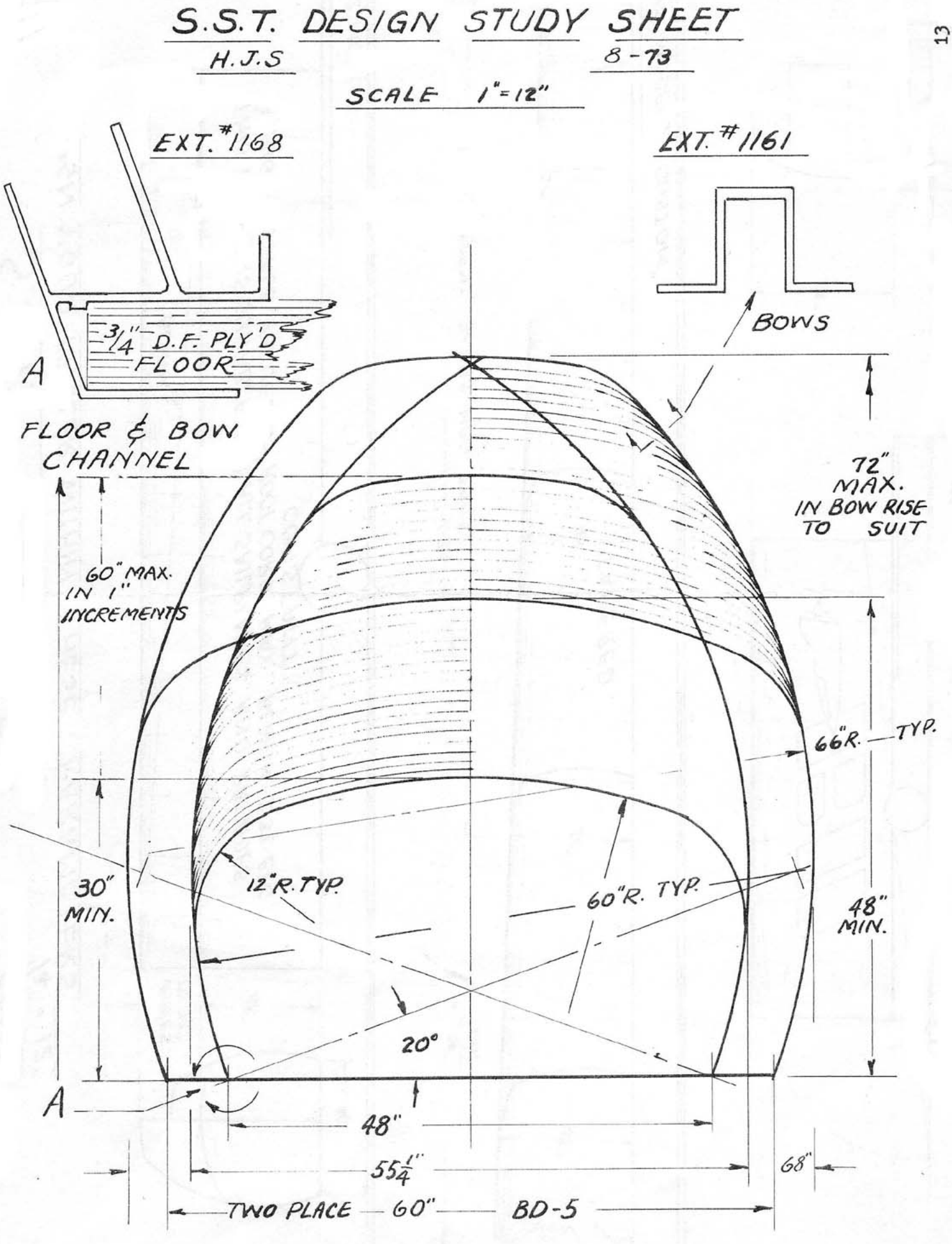


Figure 3. (continued)

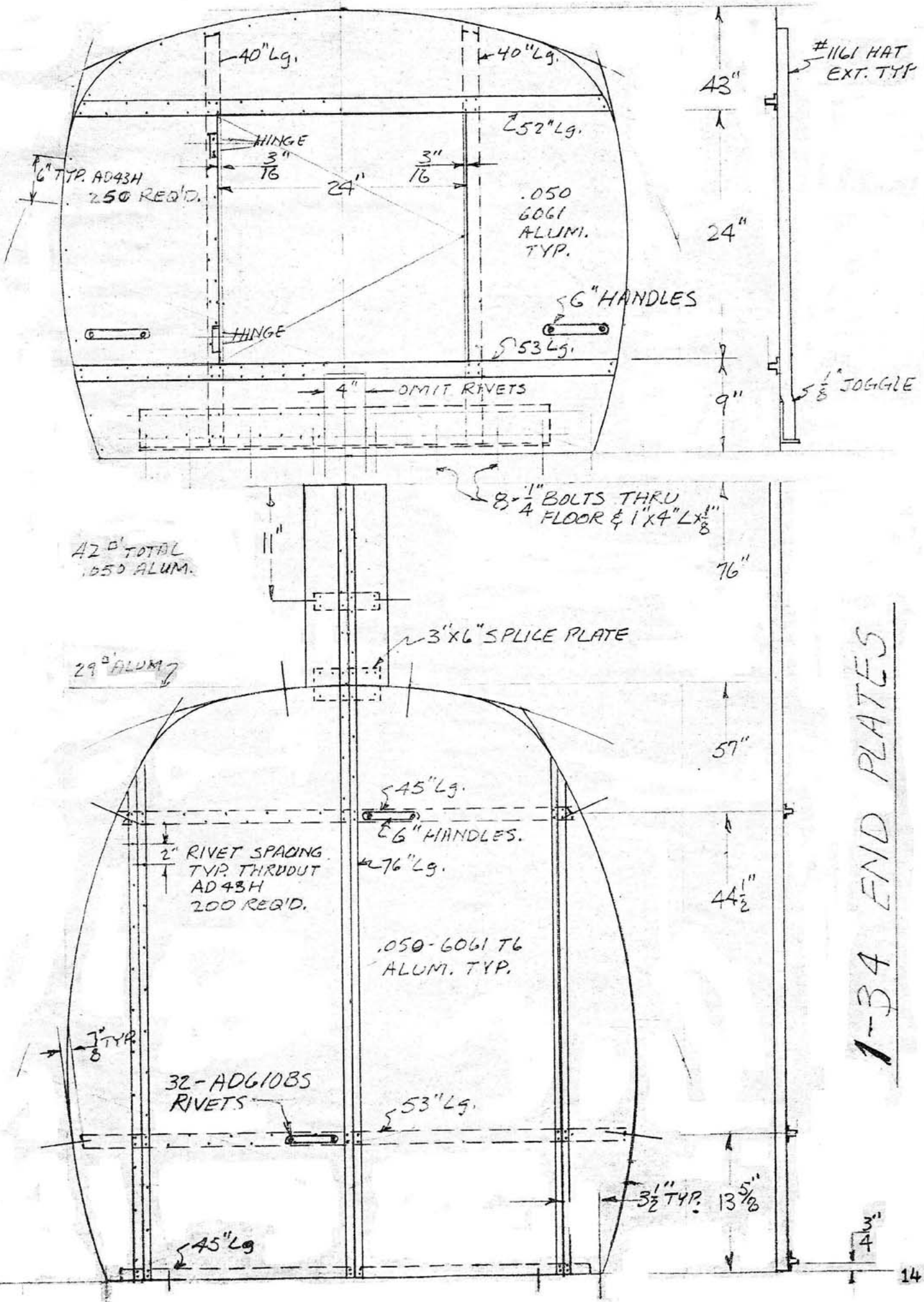


Figure 4.

First Test Flight

Table II.

General Flight Characteristics of the Cherokee II Sailplane

Span	40 ft
Wing Area	125 ft^2
Aspect Ratio	12.8
Length	21.75 ft
Height	48 in.
Weight Empty	312 lbs.
Aerofoil (constant)	Gottengen 549
Wing twist	0 degrees
Angle of Incidence	3½ degrees
Taper Ratio	25:1
Max L/D	23.5
Min. sink	2.6 ft/sec
Stall Speed	34 mph
Horizontal tail area	14.4 ft^2

Appendix A

Operating Limitations Experimental Amateur Built Aircraft

Appendix B

Aircraft Bill Of Sale