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I. REPORT ON THE TEST SET-UP FOR THE STRUCTURAL TESTING OF THE AIRMASS SUNBURST ULTRALIGHT AIRCRAFT

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ABSTRACT

This report reviews the test set-up and procedure for the structural testing of the Airmass Sunburst Ultralight Aircraft.

INTRODUCTION

In general aviation today, there is a growing need for more stringent design criteria for ultralight aircraft. Unlike most general aviation aircraft, the ultralight lacks sufficient design criteria and more importantly it lacks sufficient certification enforcement. The Airmass Sunburst ultralight that is currently being tested at the University of Kansas, by William Zimmerman, Suman Sappali, and Dan Kurg, is responsible for over a dozen deaths. It is believed that had there been a more stringent criteria and certification process, this might have been prevented. Our attempt is to show that the failing loads of the aircraft in question are so far below that of the current design criteria, that the laws need to be changed.

PROGRESS (WORK DONE)

After an initial survey of the ultralight aircraft, located at the Lawrence Municipal Airport, the following jobs were outlined and performed.

1.) Since the aircraft had been sitting in the hanger for many years, it was decided that the whole aircraft should be cleaned. This was done by first using a power blower to whisk away most of the dirt, and then it was dusted by hand.

2.) In order to work on the ultralight, a scafolding was needed. This was obtained through Dr. Smith and delivered to the airport by the Facilities and Operations personnel. It was then set up.

3.) After the ultralight was hoisted using the hand hoist, the scaffolding was moved under the ultralight. The next step was to assemble the whiffle trees. The whiffle trees are what the aircraft is to be supported with along its span, and when the aircraft is pulled from below, it simulates a lift load. The whiffle trees were first dusted and then they were assembled. There were twelve whiffle trees. Six for each wing. It was determined during this process, that additional turnbuckles were needed. They were obtained and all twelve whiffle trees positioned.

4.) Upon review of the above work, it was noted that the aircraft needed to be leveled both lateraly and longitudinaly. The longitudinal balancing was obtained by placing billets on the forward section of the whiffle trees near the front spar. These billets, weighing 25 pounds each, were drilled by Andy Pritchard to obtain a 0.5 inch hole through them. This allowed the billets to be attached quite easily. They were bolted firmly to prevent any accident, and helmets were worn at all times. The lateral leveling was obtained through a lengthy process of adjusting the turnbuckles, and wedging the outboard whiffle trees. In some cases, the turnbuckles had to be sawed down to a smaller length. The main problem was that the load on the wings due to the ultralights weight, was not semmetric. This process took three weeks.

5.) The next step was to set up the actuator and load cell that would be used to apply a load to fail the aircraft structure. 175 pounds of sand was installed in the cockpit to simulate the weight of the pilot. Then the actuator and load cell were installed. To do this, the attachement bars that attach between the floor and the load cell were trimmed and drilled. Andy prichard provided the tooling and expertise required to machine the attachment bars.

6.) The next two weeks involved the testing and repair of the strain guages. During the process of attaching the whiffle trees, several of the strain guages were damaged. The wires were resoldered. The guages were then tested with a digital multimeter and the process of resoldering the guages continued untill all but three were fixed. These three were so badly damaged, that we were unable to fix them. Two of them are on the far inboard station and after discussion with Dr. Smith, it was agreed they were not critical to the test. The third was located at the rear spar, directly over the mounting point of one of the whiffle trees.

7.) The next step was to attach the guages to the recording equipment. Jerry Hanson was informed of our progress, and met with us out at the airport. After obtaining the equipment, it was determined that to hook up the guages, each guage would require a full wheat stone bridge. After describing the theory of the bridge and how it allows the measurement of the strain in the guages, a sample bridge was mapped out and constucted. In attempting to zero out the equipment a show stopper had arisen. The resisters used to balance the bridge were not precise enought to allow a proper balance. In order to procede, preccision resistors will be needed. Currently they have been ordered by Jerry Hansen from a company in Kansas City and are expected soon.

CONCLUSION

The ultralight test set-up is nearly complete. All that is left is to balance the wheatstone bridges for each guage. When this is complete, and the tests are run, it is believed that the failing load of the ultralight will be far below that of the certifiable failing load. With our results, we will show the need for new design criteria and more importantly the need for stricter enforcement of the design criteria. The designer of this ultralight has fled the country. He obviously only cared about making a fast buck. In the future, we as an industry must work to prevent accidents like those attributed to the Airmass Sunburst. In all acutuality, they weren't accidents. They were negligent actions that could have been spotted had there been a stricter process of certification and enforcement been achieved.