AIRWORTHINESS APPROVAL NOTE NO: 25599

APPLICANT:	Cyclone Airsports T/A Pegasus Aviation		
AIRCRAFT TYPE:	Cyclone AX3/503		
REGISTRATION NO:	G-MYER	CONSTRUCTOR'S NO:	CA001
INSTALLER:	Cyclone Airsports		
DESIGN ORGANISATION:	Cyclone Airsports		
CERTIFICATE CATEGORY:	Permit to Fly		
MODIFICATION NO:	AX-74		
MODIFICATION TITLE:	Redesign of Main Beam as a Cable-Braced Steel Truss		

1. Introduction

Service experience of the original design of fuselage main beam has shown it to be prone to cracking at bolt holes, resulting in the issuing of Pegasus Aviation Service Bulletin No 7 Issue 3. This failure may be as a result of overload or fatigue or a combination of both. This Airworthiness Approval Note approves a replacement main beam, in the form of a braced steel truss, which is a fit, form and function replacement for the original, but which offers increased strength and is less prone to fatigue failure.

2. Modification Description

2.1 General

The original design of fuselage main beam was a solid 1 inch diameter 2017-T6 aluminium bar with 6061-T6 aluminium oversleeve and a central steel oversleeve. Holes were drilled in the beam to take the control stick and aileron pulley mounts. In-service experience has shown this component to be prone to fatigue cracking. Pegasus Aviation have issued Service Bulletin No 7 Issue 3 to address this situation. This Service Bulletin refers to a replacement item, which is the subject of this AAN.

2.2 Description of Redesigned Main Beam

The redesigned main beam has a cable-braced steel tube structure. The control stick and aileron pulley mounts are integral, TIG welded to the structure. The undercarriage pick-up and cable king post are similarly of welded construction. The redesigned main beam is defined by drawing 10163N Issue A. The main beam is BK107 steel tube, of 1.125 inches diameter, 17 g wall thickness. At the ends of the beam, holes are drilled on the flexural axis to receive the lift strut and fuselage pickups. An insert is provided in each beam-end to act as a fail-safe load path and to reduce the bolt bearing stresses, and to prevent tube crushing.

The redesigned fuselage main beam is a fit, form and function replacement for the original main beam. It weighs 0.9 kg less than the original, and has no significant impact on the aircraft centre of gravity.

The stress analysis, dated 24 May 96, and part of Modification Leaflet AX-74, shows structural reserve factors in excess of 1.0 for all BCAR Section S load cases at a maximum take-off weight of 390 kg.

2.3 Structural Test

The redesigned main beam has been subject to structural testing as reported in AX3 Load Test Report dated 3 June 96, part of Modification Leaflet AX-74. The load tests assumed a maximum take-off weight of 390 kg and were:

1. A vertical three point loading, simulating the landing case

2. Tensile loading, simulating flight loads

3. Tensile loading as in (2), but with the third bolt from the end removed to test the fail-safe nature of the design

The beam withstood the limit loads and ultimate loads without permanent deformation. Failure in buckling occurred at 107% of ultimate loads, although it is noted that this failure mode is largely academic because of the constraint offered by the seat structure in the buckling plane. In the tensile load tests, there was no deformation in bearing at limit loads, and small permanent deformation in bearing at ultimate loads.

This structural test is acceptable to CAA.

3. Approval Basis

The basis of approval is BCAR Section S.

4. Compliance with Requirements

This modification has been assessed against the requirements of BCAR Section S, and found to be compliant.

5. Flight Test

A handling assessment of this modification has been carried out by the applicant under his 'B' conditions. Although not formally reported, the modification leaflet AX-74 records that the new beam had no discernible effect apart from a more rigid feel to the structure when taxiing, take-off and landing. A separate CAA handling assessment is not required.

6. Pilot's Handbook

There are no changes introduced to the Pilot's Handbook by this modification.

7. Noise

This modification is assessed as having no significant effect on the aircraft noise. The existing noise certificate remains valid.

8. Limitations

There are no additional limitations introduced by this modification.

9. Continued Airworthiness

The influence of the modification on Mandatory Permit Directive, Service Bulletin etc eligibility must be considered and the publications monitored accordingly. The maintenance schedule for the aircraft should include reference to this material.

10. Approval

This aircraft and any other of the same type so modified is approved for the issue of a Permit to Fly, provided that it conforms to the contents of this AAN, is operated in accordance with the Pilot's Handbook, and is maintained in accordance with manufacturer's requirements, or any other maintenance schedule approved by the CAA.

R J Hardy
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For the Civil Aviation Authority

Date 10 July 1996