# MUSTANG AERONAUTICS, INC.

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http://mustangaero.com/downloads/Mustang\_Revisions

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#### Mustang II & Midget Mustang Service Letter

<u>Date:</u> 7/30/2019

Subject: Inspection of the tailcone transverse bulkhead p/n 240.345 (M-II) or p/n 140.356 (M-I)

We have had another report of a failed Transverse Bulkhead (p/n 240.345) in an older Mustang II. No Mustangs with the design changes to the Transverse Bulkhead in May of 1993 have had cracking issues. The Midget Mustang has a similar design (p/n 140.356) and should follow the same inspection methods. A simple preflight check should reveal a crack in the transverse bulkhead before the aircraft is flown and should be done before every flight of all Mustangs. See page 4 for the preflight inspection procedure.

The small Transverse Bulkhead is a critical attach point for the vertical fin as it has 2 of the 3 lower fin rear spar attach points. Refer to construction drawing #29 for the Midget Mustang and drawings 240.021 and 240.023 for the Mustang II.



The affected aircraft suffered a fatigue crack in the transverse bulkhead emanating from the aft two corners whose flange is attached to the sta 209.5 bulkhead in the Mustang II. In the Midget Mustang the affected Transverse Bulkhead flange attaches to the sta. 182 bulkhead. Previously issued updates and repeated inspection recommendations have not always been adhered to. Improper manual ground handling has been the primary cause of the failures that we have seen. The original design is sound if the aircraft is not subjected to unapproved/nonstandard loads.

Repeatedly moving the aircraft on the ground by lifting the tail of the airplane by the horizontal stabilizer or applying a side load to the vertical fin can put excessive torsional loads on the Transverse Bulkhead. Mustangs should never be lifted or moved by applying force to the empennage. Instead steer the airplane manually on the ground by pushing on the side of the tailcone at a bulkhead, by lifting the tailwheel and pulling the airplane around by it, or by a tow bar connected to the tailwheel or nose wheel. Snap rolls can also put excessive loads on the transverse bulkhead. If aerobatics are performed in aircraft without the updates the aft tailcone inspection cover should be removed and the transverse bulkhead inspected more than once per year. Snap rolls are not approved in the Mustang II. Proper installation of the 3 AN3 bottom fin rear spar attach bolts is also critical. A transverse bulkhead failure typically leaves only the vertical fin leading edge attach bolt, the single bottom lower fin rear spar attach bolt, and the rudder cables to hold the vertical fin on the aircraft. While a loss of the vertical fin has not occurred, serious structural damage has resulted from the failure of this bulkhead. In June 1987 the light-ening hole was eliminated from the Transverse Bulkhead and inspections recommended. After another bulkhead failure this change was made mandatory and written up in the Mustang Newsletter Vol 9 No 3 (May 1993). The bulkhead was changed from .025" 2024-T3 to .032" in the Midget Mustang and changed from .032" to .040" in the Mustang II. In May 2006 a doubler was added to the bulkhead and the update was published in the Vol 16 No 5 issue of the Mustang Newsletter.



Aft Tailcone Inspection Cover

Transverse Bulkhead



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## Midget and Mustang II Revisions

[From Mustang News & Views Vol 16 No 5 - May 2006]

#### **Transverse Bulkhead Doubler**

We had a report that a Mustang II had a failure in the Transverse Bulkhead p/n 240.345 although this was probably the result of a missing bolt from the lower fin attach point. In a previous revision this bulkhead had been changed to thicker material and the lightening hole eliminated. This particular airplane has over 1200 hours and does not have this revision. For new airplanes we are adding an additional doubler just as an extra precaution. This is not a mandatory change. A good preflight should include checking the stiffness between the fin and horizontal stabilizer. Excessive movement is an indication that there is a problem.

For the Mustang II a lightening hole can be cut in the center of the new doubler to allow it to lay flat against the transverse bulkhead. The doubler is riveted to the bulkhead at the corners using 3/32" universal head rivets on 5/8" spacing, staggering rows 1/2" apart.

If you are building a Midget Mustang or do not have the stiffening bead in the bulkhead, the doubler can be attached to the bulkhead without the hole using 1/8" rivets on 7/8" spacing, staggering rows 5/8" apart.



### **Preflight Inspection Procedures**

As a part of **every** preflight inspection in a Midget Mustang or Mustang II the aft transverse bulkhead should be checked for cracks by preforming the following procedure:



Video published on YouTube: https://youtu.be/83DoBZV8WpQ

Holding onto the tip of the vertical fin rear spar (not the fiberglass tip) in one hand and tip of the horizontal stabilizer rear spar in the other (not the fiberglass tip) gently pull them towards each other with a small amount of force. The Midget Mustang will have a slight give as it does not have the front spar carry through in either the vertical fin or horizontal stabilizer. The Mustang II should not have any give between the tail surfaces. The important thing to notice is any change over time. If there is more give than normal remove the aft tailcone inspection cover and examine the aft transverse bulkhead and the fin attach points carefully for any cracks.

### **Annual Airworthiness Inspection Procedures**

During the annual airworthiness inspection and more often as needed, the aft transverse bulkhead should be visually inspected by removing both of the aft tailcone covers between the vertical fin and horizontal stabilizer. A close examination of the transverse bulkhead (p/n 240.345 / 140.356) for any cracks and the steel elevator control arms (p/n 250.210 / 150.210) for cracks around the welds is an important part of every airworthiness inspection.