Mustang II Revisions

The following pages contain major design changes to the Mustang II.

Minor changes and clarifications are not included in this document.

Mustang II Revision Changes

- 7/17/2013 M-II Aileron Controls - corrected jam nut to AN316-6R
- 7/17/2013 M-II Elevator Control picture - revised rod end bearings to MD36-14

Mustang Aeronautics Inc.

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Date: March 10, 1999

Subject: Main Wing Spar Riveting Procedure Addendum

The easiest way of setting the proper wing dihedral is to finish the main wing spars before the center section main spar is riveted into the center section. In the standard kits supplied by Mustang Aeronautics, the wing spars are pilot drilled to set the dihedral but the spars still need to be clamped in place while reaming. There is enough movement during the riveting process that the wing tip position could change. This is one reason for drilling the wing attach holes undersize and reaming to fit later. Before riveting the main wing spars together the builder should be proficient at riveting since the spars are a major structural item. We do provide a generous safety margin by using a larger quantity of smaller rivets. They are easier to drive and a few scattered bad ones should not cause any problems. Use the drop included with the kits to practice riveting. Assembling the center section rear spar first will provide additional practice.

The following procedures are to be used in riveting the main wing spars:

- Put the necessary bevel on the longest capstrips to ensure that they will lay flat on the wing spars and not ride up on the bend radius. Do not worry about taking off to much material on this one capstrip. It is more **important** that they lay flat. The only concern is that no material be removed around the wing attach hole. (this step is completed in the kits)

- Cleco all of the capstrips into place on the pilot drilled wing spar. Pin the wing spar to the center section main spar using the 35/64" pins. Clamp the root end of the capstrips to the spar with a small C clamp reaching in from between the capstrips on the spar root. Do this for the top and bottom. Now remove the pin and wing spar

- With the wing spar free reinsert the pins leaving the clamps in place.

- Drill the rest of the holes laid out on the capstrips. Remember that the first 20" of the wing spars use 5/32" rivets.

- Debur all holes. File, and pollish the capstrip edges and wing spars smooth. Prime or alodine the capstrips and wing spars. If a wet wing is being used do not apply a primer to the forward side of the wing spar or the capstrips located on the forward side of the spar.

- Reassemble the wing spars using rivets and clecos to hold the parts together. We use riveter's tape to hold all of the rivets in place. It is very **important** that the supplied steel pins be inserted into the capstrip wing attach holes before riveting. This is necessary to keep the capstrips from shifting. Rivet the wing spars together and then attach the butt angles per the drawings.

- The flanges on the wing spars need to be straightened and checked for the proper angle. The riveting process may cause them to open up.

- Lay the center section main spar flat with the aft side up. Clamp a straight edge to the bottom long enough to reach the tip of the wing spar. A chalk line can be used but is less desirable.

- Pin the bottom capstrips to the center section with the steel pin. Level the wing spar with spacers. Per the write up in the construction manual, elevate the tip of the wing spar 9.75" and clamp in place. The reason we pin the bottom capstrips is that these are in tension under a positive "g" loading and the top ones are in compression. It is therefore more important that the bottom wing attach bolts have a good, full bearing surface.

- It is important that both spars have the same dihedral angle. If the spar tips are not exactly 9.75" above the bottom of the center section spar it is okay. Just make sure that they are both the same. They should be within 1/8” of each other and within 1/2” of 9.75”.

- We use NAS close tolerance bolts for the wing attachment but they may still have a few thousandths variance if they are not from the same batch. They are also slightly smaller than 9/16”. It is therefore recommended that each bolt be miked and an adjustable hand reamer be used to achieve a close tolerance fit. A "light" drive is the goal. Start reaming undersize and work up to the desired fit. Care must be taken using the adjustable reamers. The blades can bow if tightened too much and will make for an inaccurate hole. When sizing the reamer up be sure to apply the same amount of torque to the nut with each adjustment. Adjustable hand reamers are available through Mustang Aeronautics if unavailable locally.

- Mark the wing bolt for the hole just reamed and insert. Color coding the bolts and holes works well for keeping them matched if necessary.

- Remove the steel pin from the bottom wing attach hole and ream with the wing spar still clamped in position, repeating the above procedure.

- There should not be any slop in the wing spar attachment with the bolts in place. Maximum service limits are 1/8" movement at the wing tip. Note this is movement due to loose attach bolts, not twisting of the spar when a load is applied.

- Oversize bolts are available if the wing attach holes become too big. These bolts currently cost about $28 each so be careful when reaming!

Areas to inspect closely for cracks would be:

-the landing gear mount tubes between the gear leg and the main/front spar. Looking for cracks near welds at main spar bracket or bent tube.

-the small square horizontal bulkhead under the elevator control horn at the aft end of the tailcone. This has cracked on some airplanes leading to a failure in the major fin attach point here, it has never been catastrophic but every preflight should include checking for movement here by pulling the tip of the fin rear spar towards the tip of the horiz stab rear spar, one hand on each.

-the horiz stab and vert fin spar around the outboard hinge brackets for the rudder and elevators. Airplanes with some bad hinge alignment developed cracks here.

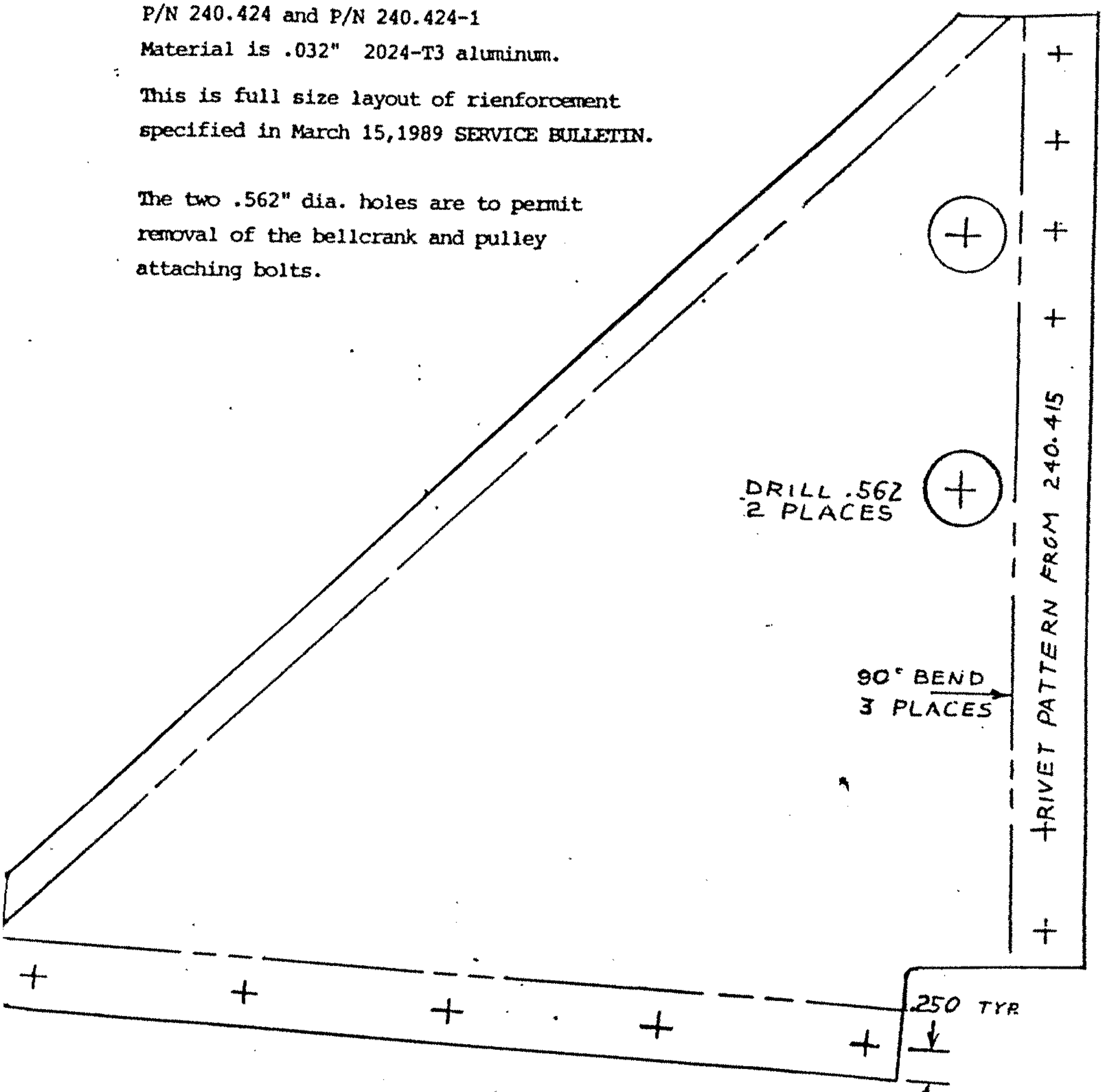
-the elevator control arms between the elevators and the control horn. Looking for cracks around the welds.

P/N 240.424 and P/N 240.424-1

Material is .032" 2024-T3 aluminum.

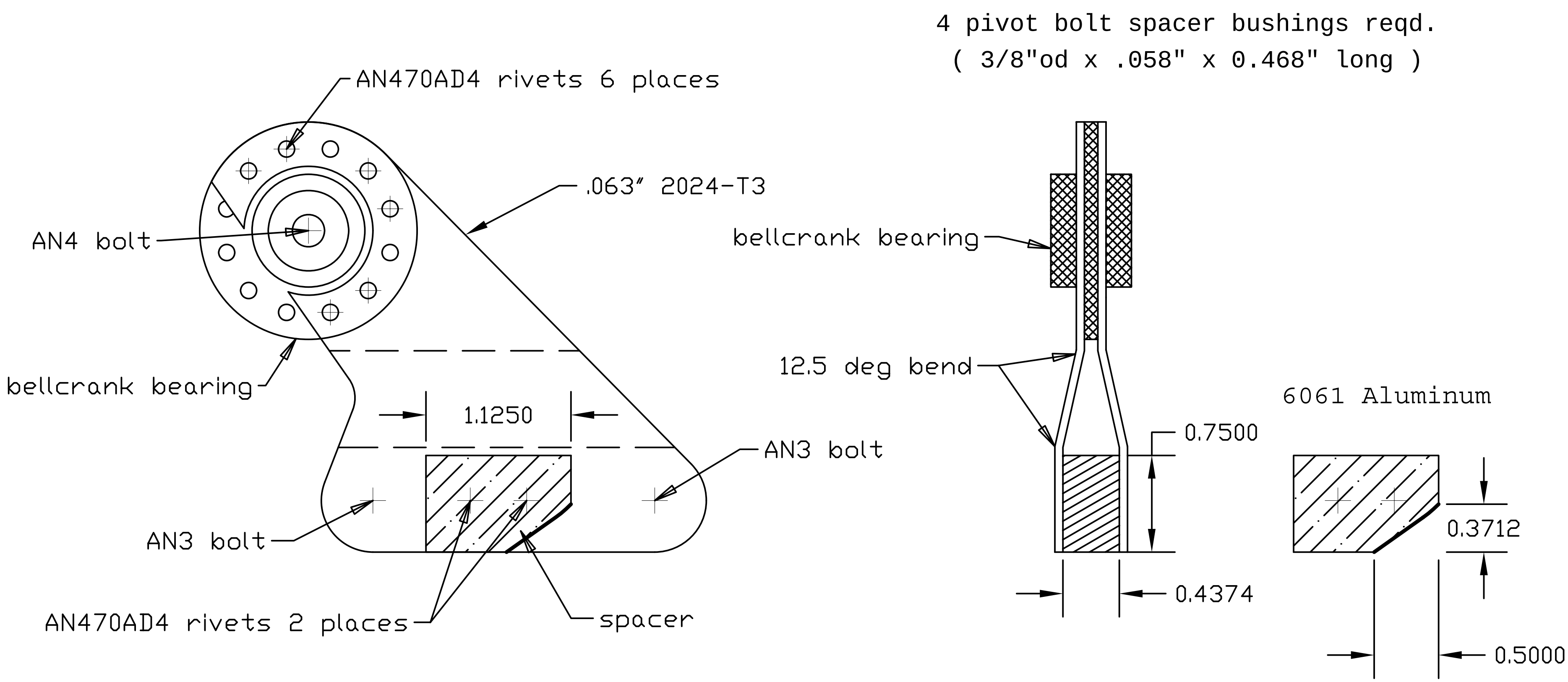
This is full size layout of rienforcement specified in March 15,1989 SERVICE BULLETIN.

The two .562" dia. holes are to permit removal of the bellcrank and pulley attaching bolts.

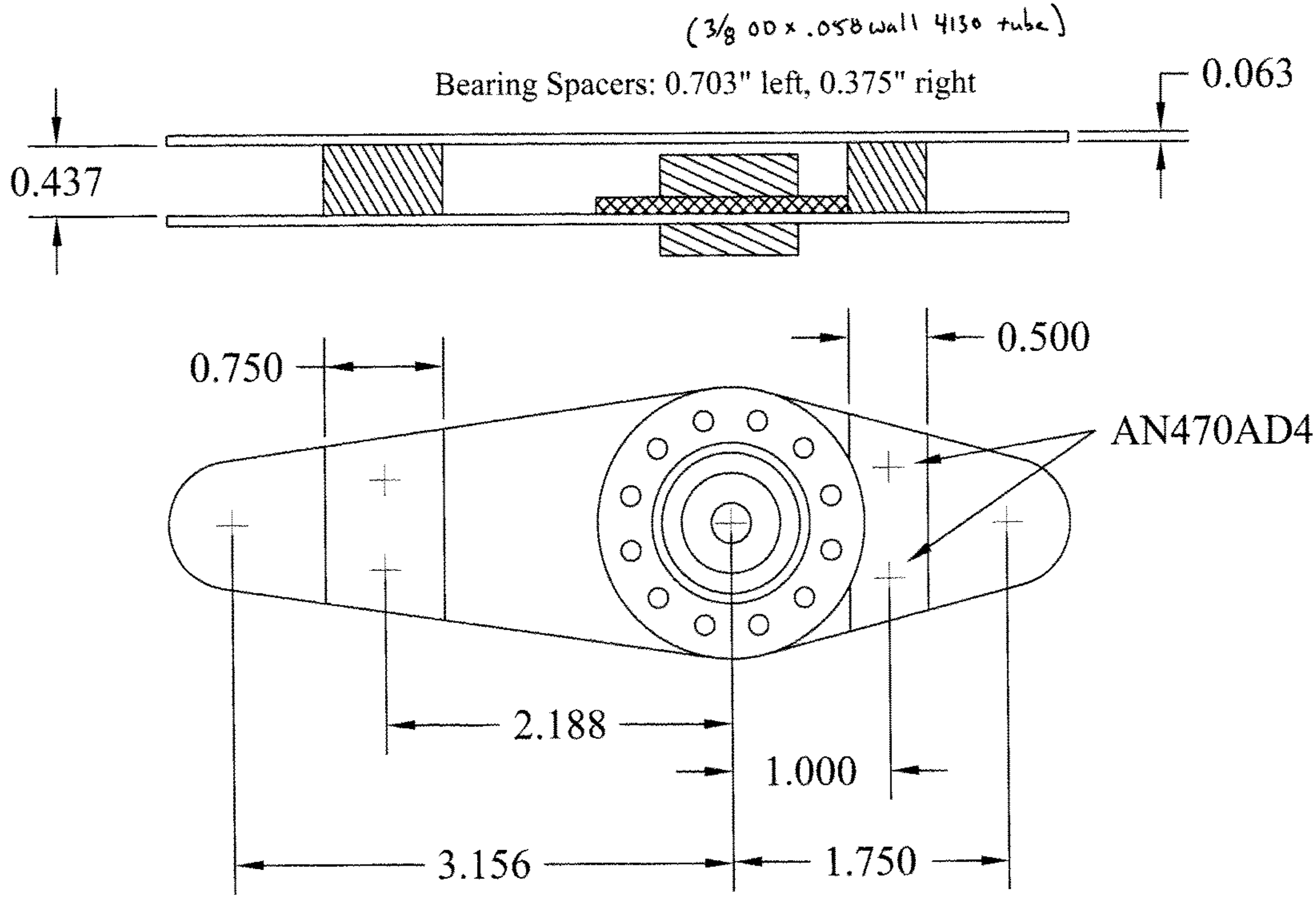


These rienforcements are located aft of station 114.75 with flanges facing away from aircraft center line. Attach rienforcements to P/N 240.415 & 240.415-1 at existing rivet locations using AN470AD4 rivets. Attach rienforcements to fuselage belly skin using AN426AD4 rivets spaced as shown.

MAR. 31, 1989



Assembly 260.120
aileron bellcrank



260.121 Elevator Bellcrank

rev. 8/22/01

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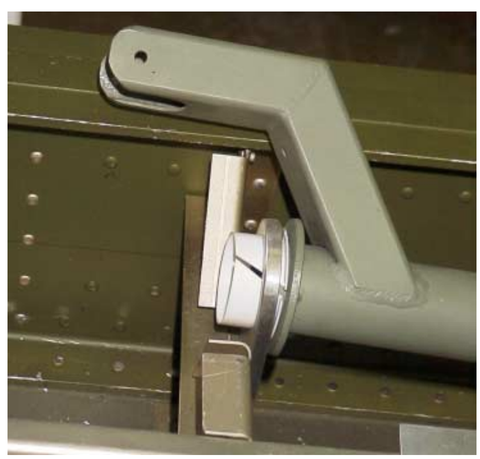
Mustang II Service Bulletin

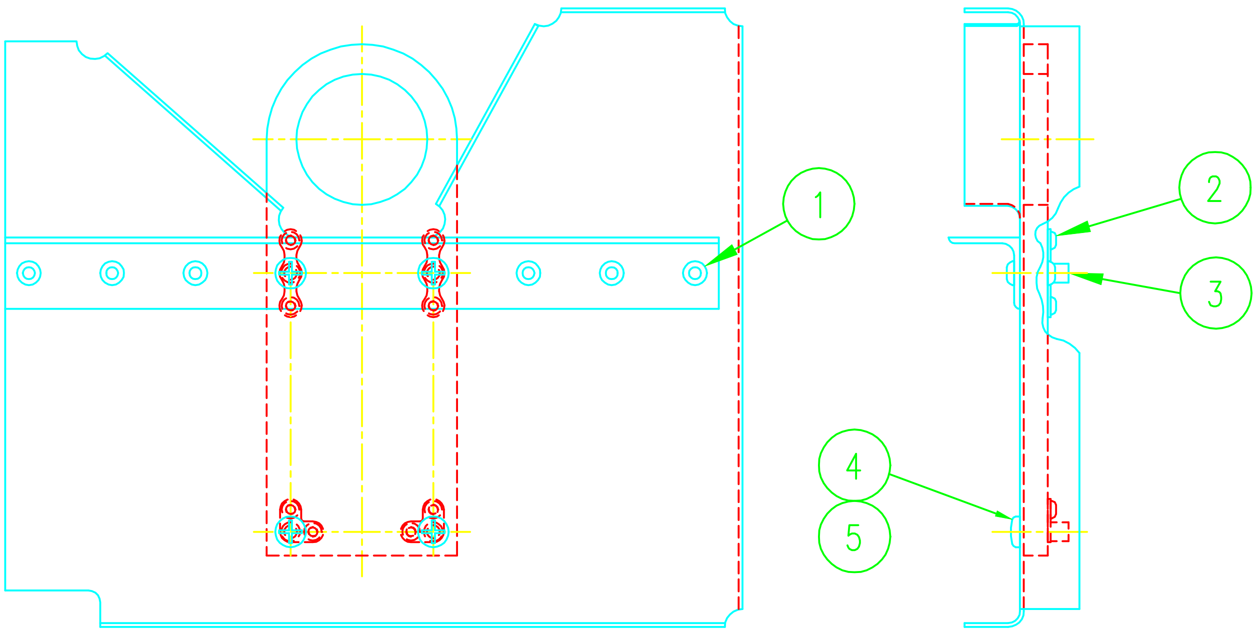
DATE: **6/19/2000**

SUBJECT: Control Stick Bearing Support Modification
(p/n 220.330 & 220.331)

For easier control stick assembly removal, the aluminum bearing (220.331) may be mounted with machine screws instead of rivets to the control stick support bulkhead (220.330). See drawing 220-005-1. This is not a mandatory change.

The control stick bearing has been modified to use a nyliner insert. This bushing eliminates the need of lubricant for the bearing and reduces friction in the control stick assembly. The aluminum bearing (220.331) must have an oversized hole to accommodate the thickness of the nyliner bushing. The new hole is 1.445" diameter vs. 1.375". This is not a mandatory change.





NOTE: 2 REQ'D
LH ASS'Y SHOWN

ITEM	PART No.	DESCRIPTION	No.	MAT'L
1		AN470-4-9 RIVET	12	
2		AN426-3-6 RIVET	16	
3		NAS680-A08 ANCHOR NUT	4	
4		NAS698-A08 ANCHOR NUT	4	
5		MS35026-246 PAN HEAD SCREW	8	

Mustang II
Mustang Aeronautics

Title: CONTROL STICK BEARING SUPPORT ASS'Y

Scale: 1:2	Approved By:	Drawn By: TRM	Date: 05/30/00
Mat'l:	Revised:	Drawing Number.: 220-005	

DRAWING CORRECTIONS:

Mustang II

Dwg. 240.012 – p/n 240.383 is a floorboard support clip that can be seen on dwg 240.002 sheet 1 between p/n 240.375 and p/n 240.380

Dwg. 240.011 – We are replacing the Cesna engine mount brackets with our own extrusion, which is slightly different. P/N 240.375 will be slightly wider to accommodate the new bracket (1.4825" inside dim. vs. old 1.391") and p/n 240.380 will be $^3/_{32}$" shorter overall as a result. (dwg. 240.012)

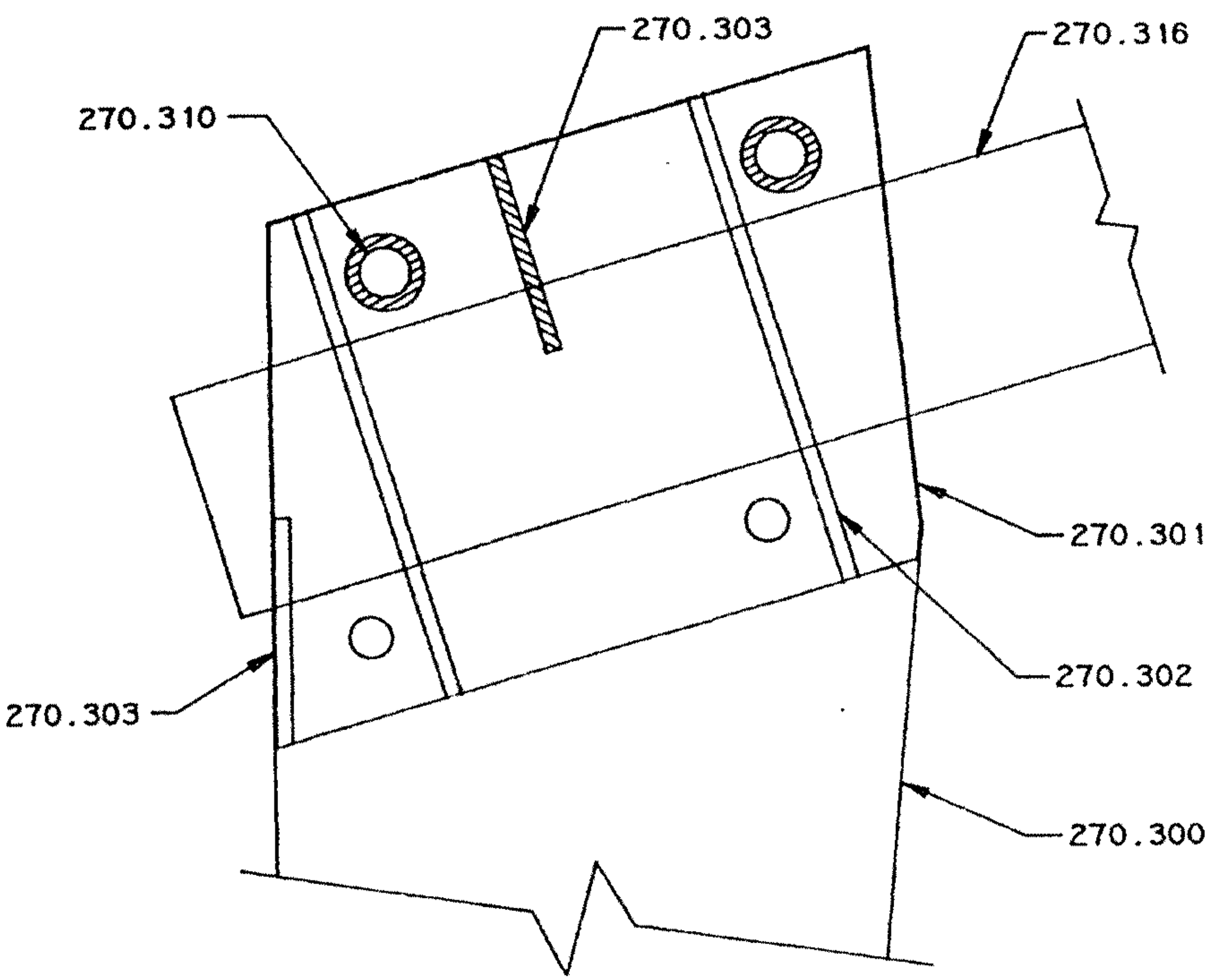
Dwg. 270.001 – p/n 270.305 The middle torque tube has been shortened to 13" in length from 28.375".

Updating the drawings and construction manuals is a continuing process. Any comments or suggestions from builders are appreciated. We are now working on a new Midget Mustang manual – – so send those comments!

GEAR ATTACH PLATE CHANGE:

(see illustration below)

For clearance, the bushings are no longer welded to the brackets (270.302) and the 1/2" bushings have been eliminated entirely. Shorter bolts are used. The larger bushings can also be eliminated if the appropriate length bolts are used. An additional gusset has been added to provide more contact area between the plate and torque tube.



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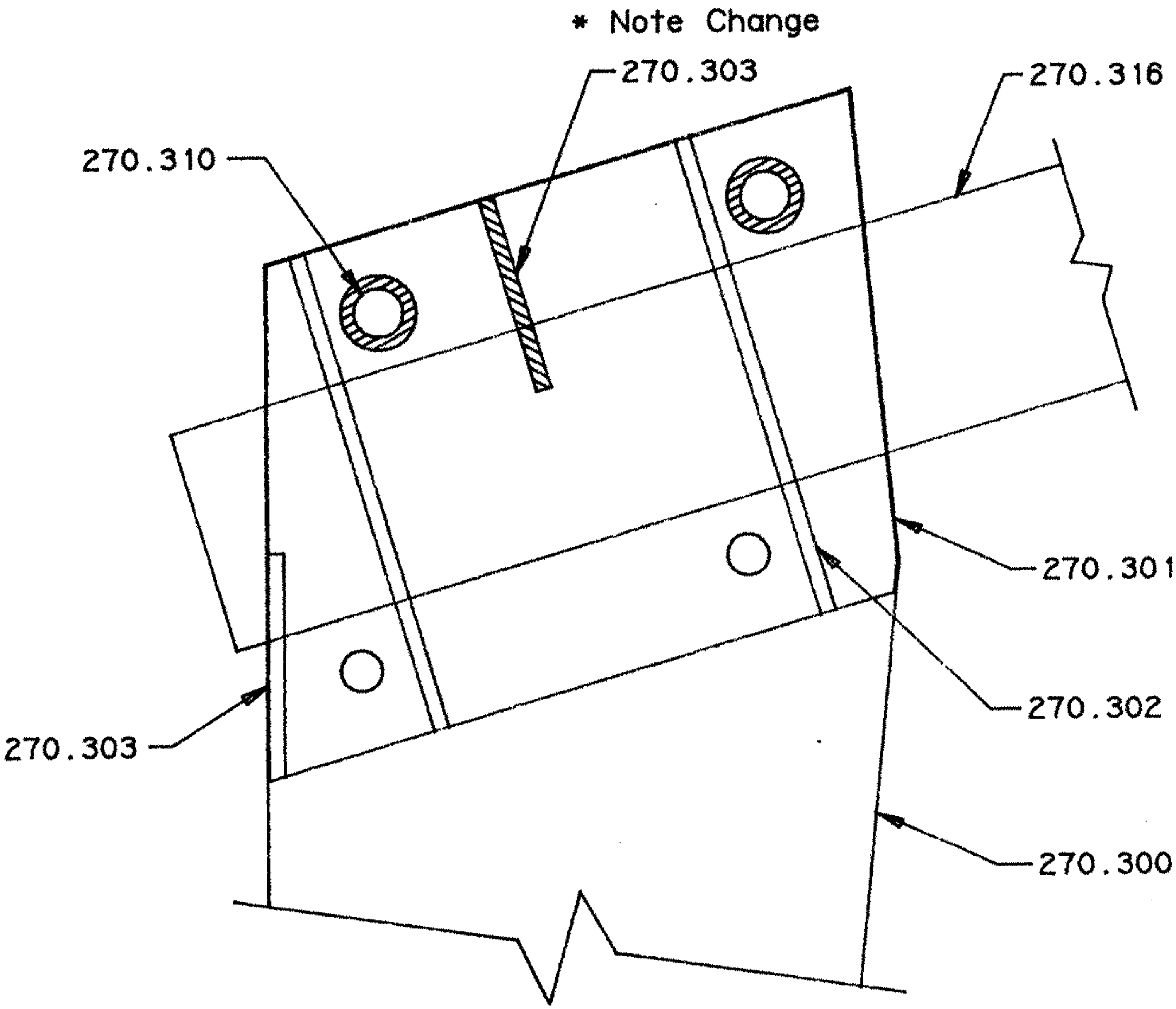
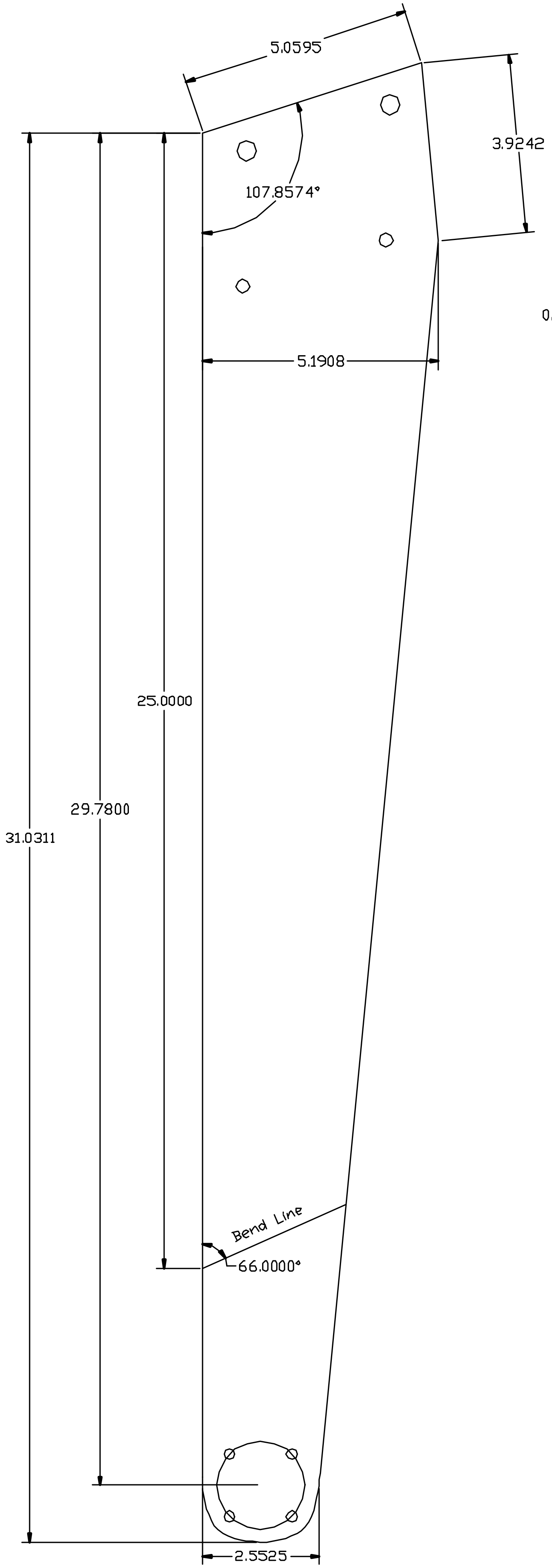
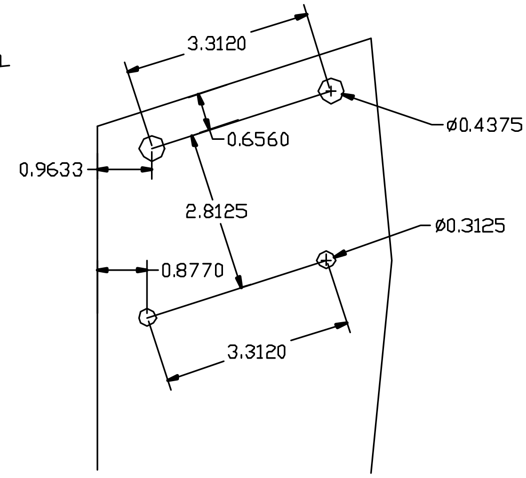
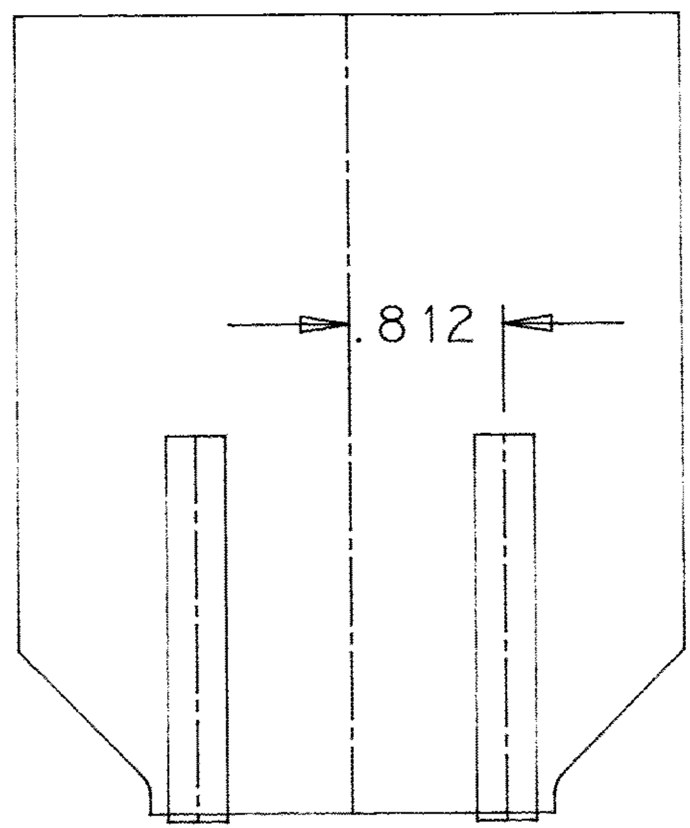


9/23/93 CKT


5.0595
3.9242
107.8574°
5.1908
25.0000
29.7800
31.0311
Bend Line
66.0000°
2.5525

3.3120
ø0.4375
0.6560
0.9633
2.8125
ø0.3125
0.8770
3.3120



p/n 240.351

.812 vs. .843 8/13/94

Volume 10, No. 2 March/April 1994

Mustang News & Views

Inspect Your Aircraft !

by Chris Tieman, Mustang Aeronautics

Last December Kevin Cammack was killed in his Mustang II while on a local flight near Oklahoma City. The cause of the accident is still under investigation. Our deepest sympathies go out to his wife and family.

The accident is very significant in that it is the first time a Mustang II has had an in-flight catastrophic failure. While the exact cause of the accident is still unknown and may never be determined (there are no witnesses,) there are some important factors raised here that every homebuilder should be aware of.

Kevin's airplane, N4YP, was built in 1977 and had gone through several owners. The airplane had over 1000 hours on it with no accident history. This is typical of many of the Mustangs flying. As any airplane ages, proper maintenance becomes more of an important factor. N4YP's left elevator and left aileron were found a significant distance away from the rest of the aircraft indicating that they had separated from the airframe first. A **pre-existing** crack 50% of the way through the elevator control tube fitting (p/n 250.312) and immediately adjacent to the weld for the control arm (p/n 250.325) was the failure point of the elevator. While this may not have been the cause of the accident it was certainly a major contributing factor. The crack has been there for quite a period of time and **should have been discovered at the previous airworthiness inspection**. All too often it seems we do not do as thorough a job as we should when it comes time for the annual inspection or even the preflight walk-around. Homebuilts require a more extensive inspection than factory builts because of their nature. Airplanes exposed to severe operating conditions should be thoroughly inspected more than once a year. This especially applies to airplanes doing rigorous aerobatics.

Very rarely does a part have a sudden catastrophic failure. Cracks develop first, and take time to progress to the point where the structure will fail. We need to be observant enough to see the warning signs. For example, a change in tire wear or change in how the airplane sits on the ground is a good indication that the torque tubes have cracked. Tip movement in the fin indicates a cracked transverse bulkhead in the tail. Be aware of anything out of the ordinary which may indicate a problem.

During the annual inspection it is very important that all control surfaces and their linkages be thoroughly examined. In the Mustang II, pay particular attention to the aileron counterweight brackets, gear torque tubes, and the elevator arm assembly. In the Midget Mustang, the steel aileron hinges also need to be checked closely for wear. The problem areas are usually the steel parts. The reason the parts are steel is because they are

(continued on page 3)

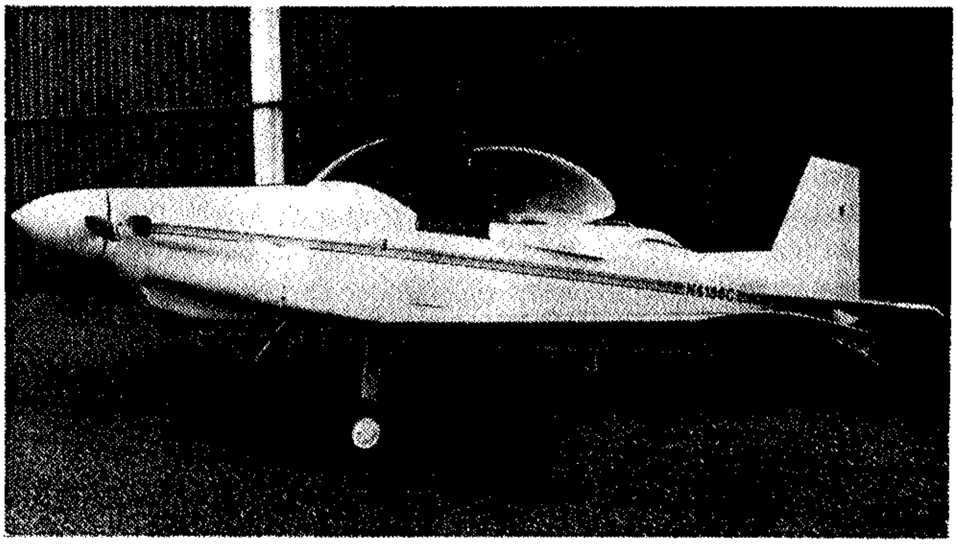
4th Annual Mustang/RV Fly-In – will be held on September 17th and 18th at the Wadsworth Airport, OH (3G3.) Pancake breakfast each day as well as FAA seminar on licensing homebuilts. Look for direct mailers from EAA Chapter 846 in the near future.

Billy Thompson EAA Memorial – We are still accepting donations for a plaque on the EAA Memorial Wall in honor of the late Billy Thompson. Please send donations to:

Robert Bushby
674 Rt. 52
Minooka, IL 60447

INSIDE:

WARREN SARGENT'S MUSTANG II



My Mustang II was started November 1, 1989 and after 3300 man hours flew its first flight July 24, 1993. It is powered with a Lycoming 160 HP and propelled by a Sensenich special 70x77 metal prop on a 4" extension (the new home-builders special.)

Empty weight is 930 lbs. and with the above power combination, I can report the airplane has enviable flying qualities. Stall (airborne slow flight) 50 indicated with 1500 RPM and full flap. Stall (landing) 60, cruise at 3000 feet, 2500 RPM is 190 indicated. The rate of climb at 90 indicated is 1250 FPM.

This is strictly "Bushby" with no modifications and has received rave reviews from those who leave flown it, including my CFI and an RV3 builder friend.

Inspect Your Aircraft!

(continued from page 1)

taking a concentrated load, but poor welding techniques cause most of the cracks. Poor penetration or high internal stresses where parts have not been properly stress relieved are common causes for failures. We are now offering all of the welded steel parts on the airframe as an option to builders.

While we do not know what maneuvers Kevin was doing at the time of the accident, it was a turbulent day and it appears that the airplane was moving at a very high airspeed. The ailerons had fluttered and both counterweights are missing. The center section main spar failed in a **very** high **negative "G"** condition. The wing spars and their attach fittings only sustained impact damage.

Aerobatics are fun in the Mustangs, but pilots need to have some aerobatic training before flying loops and even rolls. A botched aileron roll could result in something similar to a split S, with the airplane going straight down. Speeds will approach redline very quickly if the power is not reduced. "G" loads can build up dramatically during a pull up from a high speed dive, and an excited pilot with the ground coming up very fast will pull hard on the stick. These fast homebuilts are designed for speed and are very different than a Pitts or Citabria. A Pitts could be going straight down with power, but will have enough drag to prevent overspeeding. A Mustang can exceed the redline without power. At any airspeed above maneuvering speed, a pilot can overload an airplane by severe control inputs. When the nose comes down throughout the horizon, the power needs to come back.

The Mustangs are very strong airplanes and are great for sport aerobatics, but proper maintenance and proper pilot training are a key part in safe operation. Both Mustangs have exceptional safety records, yet there are limits and we all need to be aware of them.

Midget and Mustang II Revisions

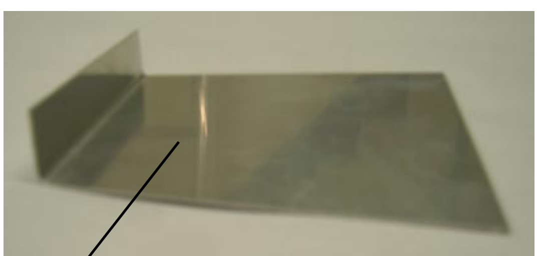
Transverse Bulkhead Doubler

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.

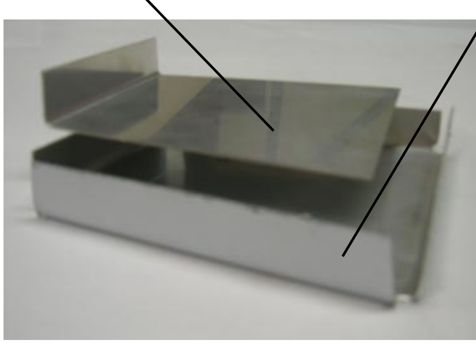
If you are building a Midget Mustang or do not have the stiffening bead in the bulkhead, the doubler can be attached to the bulkhead without the hole using 1/8" rivets on 7/8" spacing, staggering rows 5/8" apart. CAD drawings of this revision will be made available.

Aft Side



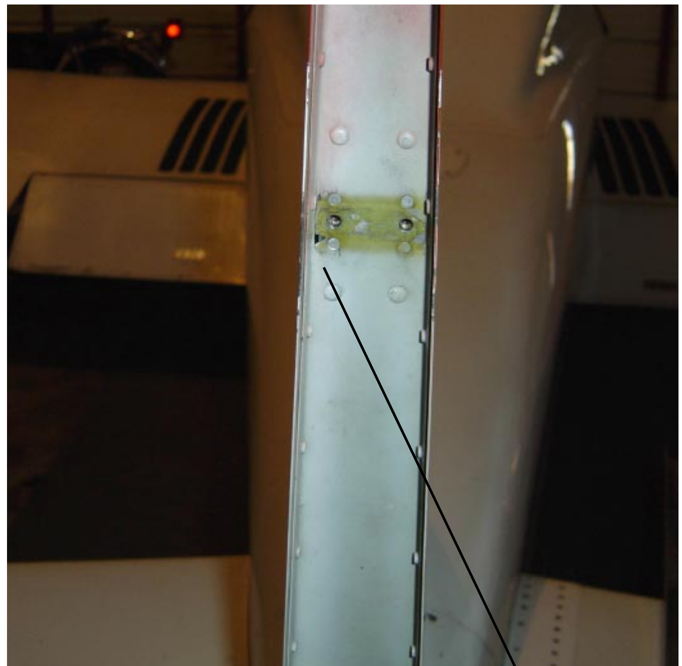
.032 Doubler

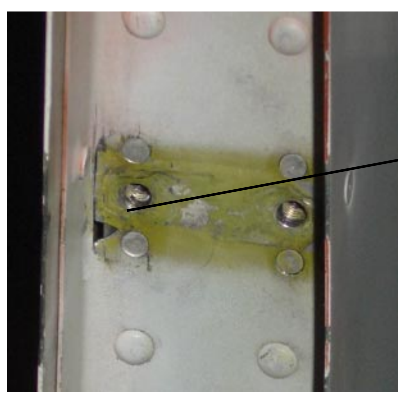
Transverse Bulkhead



Stabilizer Hinge Bracket Advisory

Recently two Mustang II's have reported cracks around the upper fin hinge brackets. This has been covered in past newsletters. Slight binding in the hinges cause the spar to flex. Kits from Mustang Aeronautics use a different hinge design to eliminate this problem (revision is on our website). A good preflight check of the stiffness between the elevators/rudder to the fin/stab will detect any problems. The annual inspection should include a close inspection of the hinge bracket area.





Crack

*** Elevator Bellcrank Advisory ***

A builder has contacted us that his elevator bellcrank sides were made from .040" material. The minimum thickness is .063". If anyone has the thinner parts, please contact us and we will replace them. This was from an older kit shipped in 1994.

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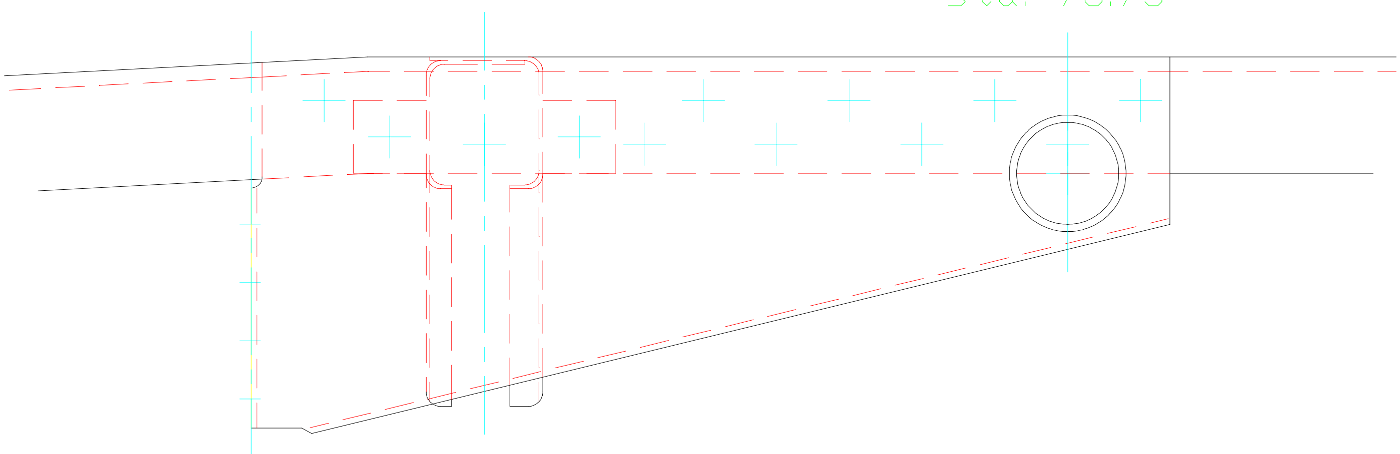
Mustang II Service Bulletin

DATE: **7/06/2000**

SUBJECT: T-18 Canopy Installation

When using the T-18 style canopy on the Mustang II, the roll bar assembly needs to be moved aft for a proper fit of the windscreen. The T-18 roll bar is moved 6 inches aft as shown below. The roll bar attach bracket (240-203) is stretched and a reinforcing gusset (240-368) installed between it and the sta. 73.75 vertical bulkheads. The roll bar brace (240-210) is also lengthened from 17 inches to 22.125 inches.



Top View T-18 Roll Bar Attachment

M U S T A N G   A E R O N A U T I C S ,   I N C .

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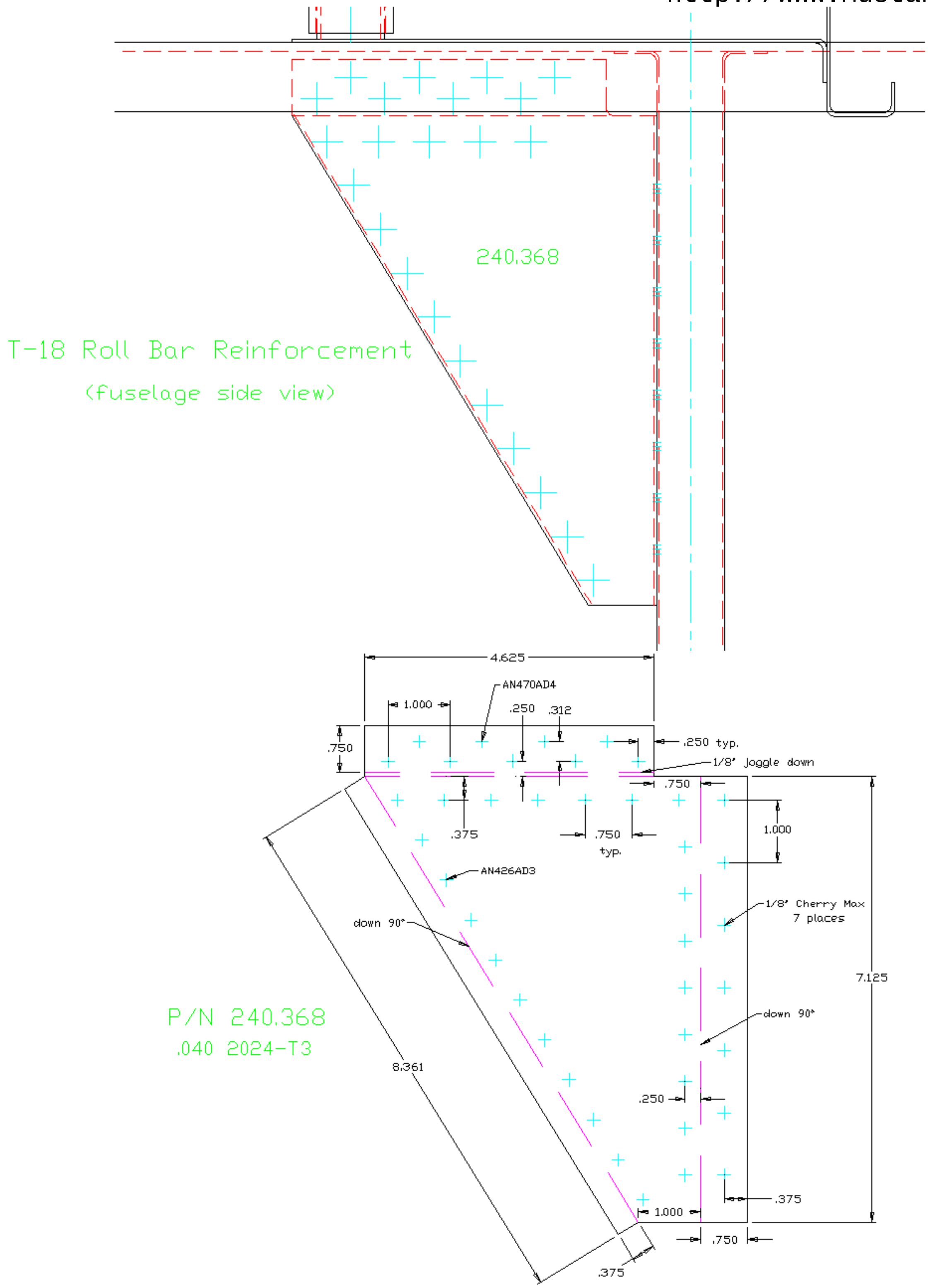

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http://mustangaero.com/downloads/Mustang_Revisions

Mustang II Service Letter

Date: Feb 19, 2020

Subject: Canopy Frame Inspections

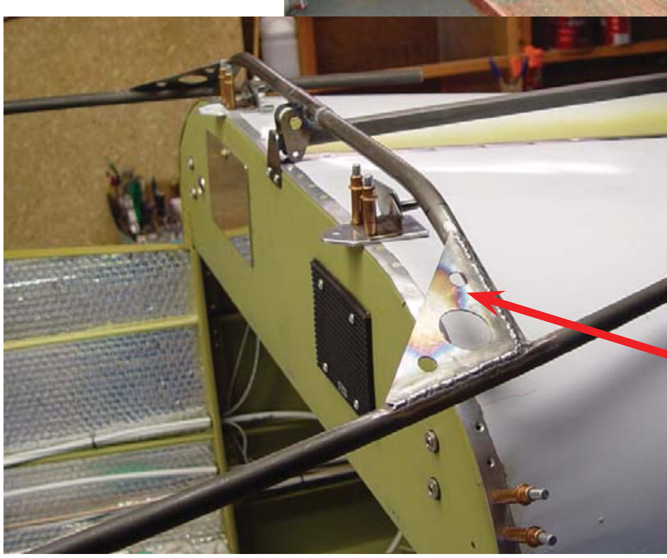
A recent Mustang II canopy failure that resulted in the loss of the aircraft and 2 occupants is a tragic reminder that the canopy is an important part of the annual inspection. Owners should verify that the Canopy Frame Revision from 1984 has been installed and that the rear canopy frame is structually sound. The canopy latch should also be inspected for function and integrity. The canopy does experience lifting loads that can be fairly substantial.

The rear cross brace p/n 280.350 should be formed in 1 piece per the plans and not made with a miter cut and butt welded as this would greatly weaken the part. Any such cut of the tube would need to be properly reinforced.

A Cut and Butt Welded Cross Brace is NOT Acceptable

(possible examples)

Aft Side Retaining Pins
(p/n 280.386 & 387)



Canopy Frame Gussets
(p/n 280.388)

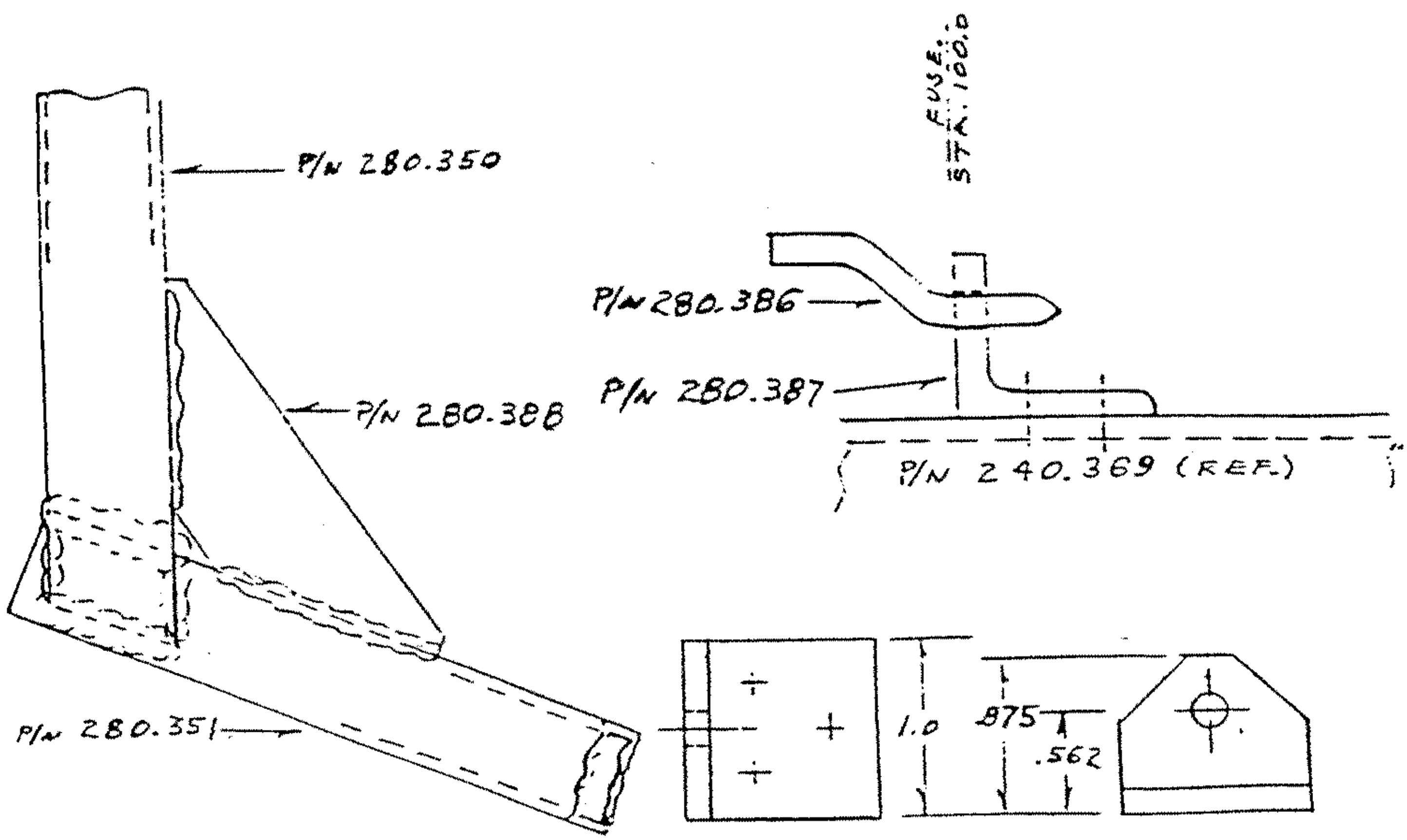
{ This page was omitted from some drawing sets shipped before fall '95}

Mustang II Canopy Frame Revision - 11/1/84

Service experience has indicated a need to strengthen the canopy framework at the aft corner junction of p/n 280.350 with p/n 280.351 & 351-1. This is to be accomplished by installation of gusset p/n 280.388 (2 required). The gusset is fabricated of .050 4130 steel per the following sketch.

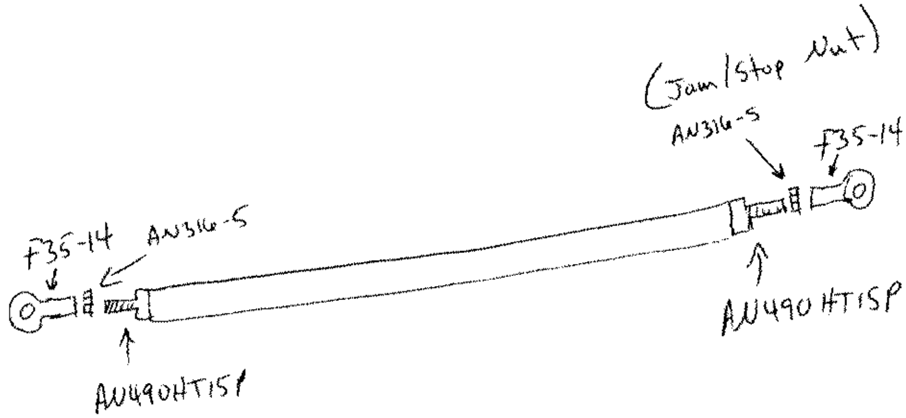
Position the gusset to be on the center of p/n 280.350 tube and top inboard corner radius of p/n 280.351 & 351-1 tubes. Note the "fishmouth" shaped ends of p/n 280.350 are important to obtain maximum weld strength. Refer to asy. dwg. 280.003 detail in the lower right section of the page. Weld all edges of 280.350.

Aft retaining pins and brackets are also to be incorporated. This will prevent bulging in flight and also support the canopy aft section. They consist of p/n 280.387 fabricated of 1" x 7/8" x 1/8" 6061-T6 aluminum angle that is 1" long. It is to be riveted to the fuselage to stringers p/n 240.369 by use of three 470AD4 rivets. Locate p/n 280.387 with aft surface at sta 100.0. Fabricate p/n 280.386 retaining pin from 3/16" rod or bolt. Shape per dwg. and weld to canopy frame p/n 280.351 & -1. Position for maximum engagement in retaining bracket. See part details below.



P/N 280.387 DETAILS

SCALE = FULL SIZE

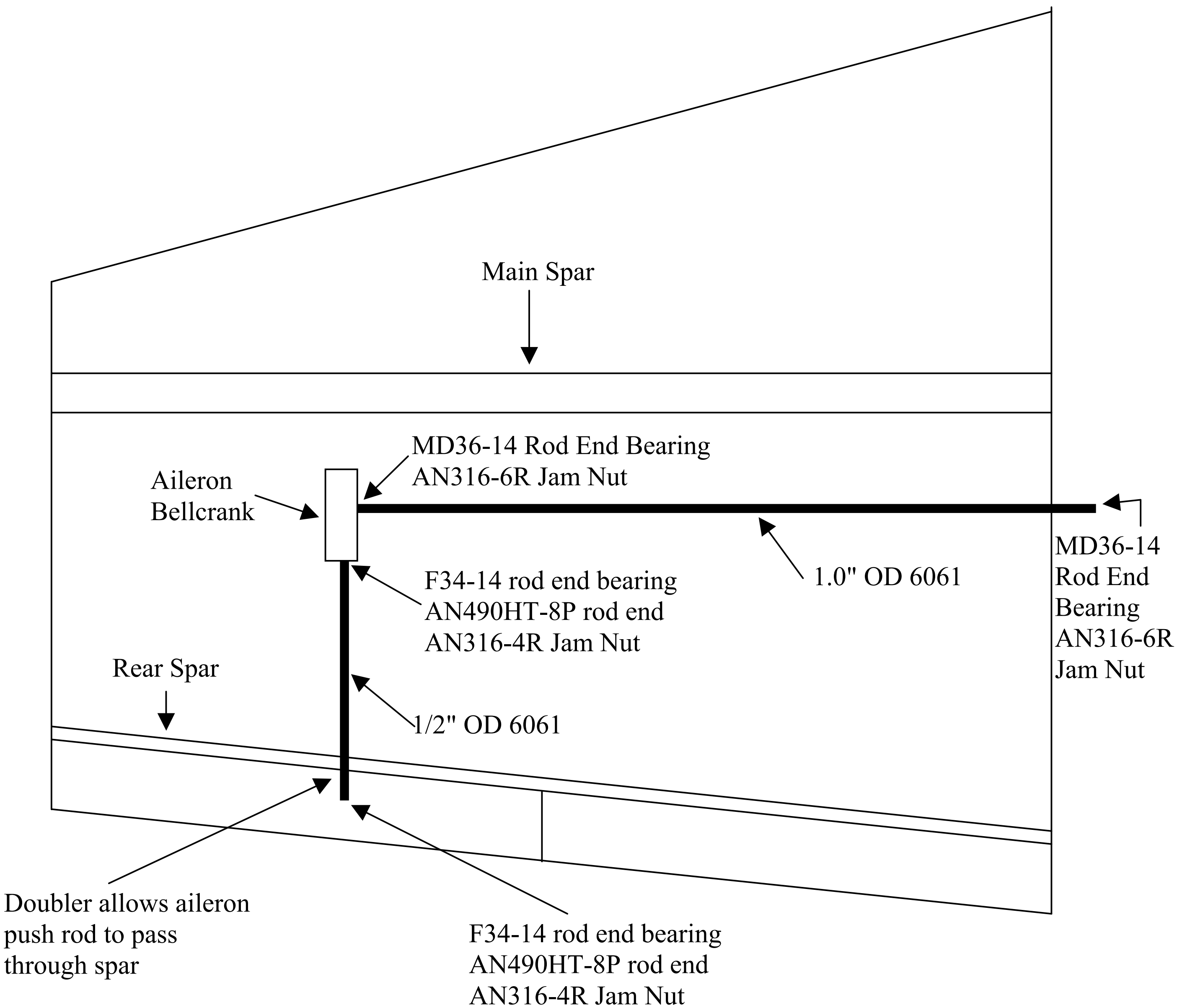


Flap Pushrod

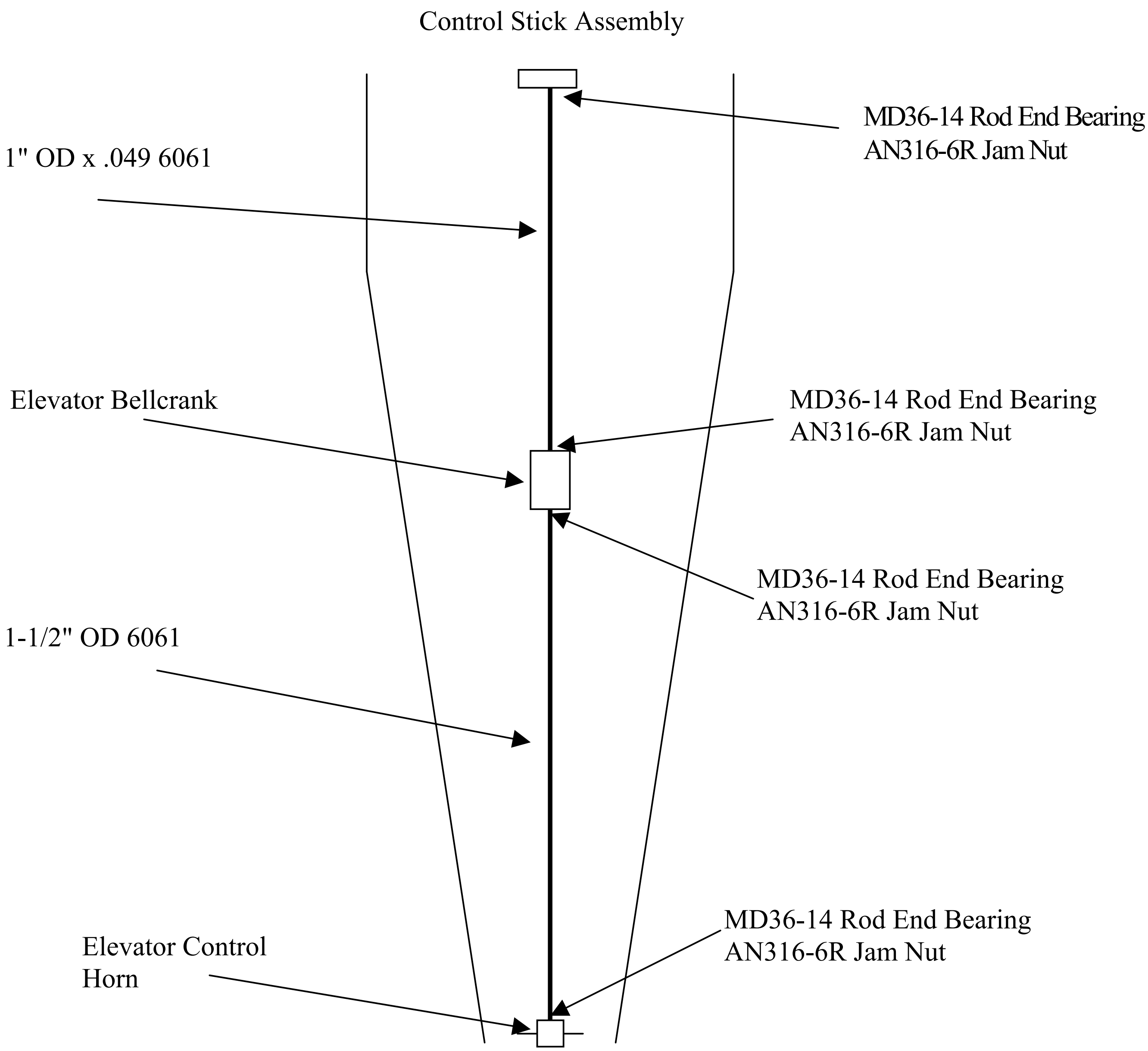
Weld AN490 fittings into pushrod
(can rivet as alternative)

Cut tube to appropriate length for
flap operation.

Mustang II Aileron Controls



Mustang II Elevator Controls



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Mustang II & Midget Mustang Service Bulletin

Date: 5/22/00

Subject: Change to outboard horizontal stabilizer and elevator hinge brackets (p/n 250.308 & 250.321)

This change applies to both the Mustang II and Midget Mustang. The parts are interchangeable.

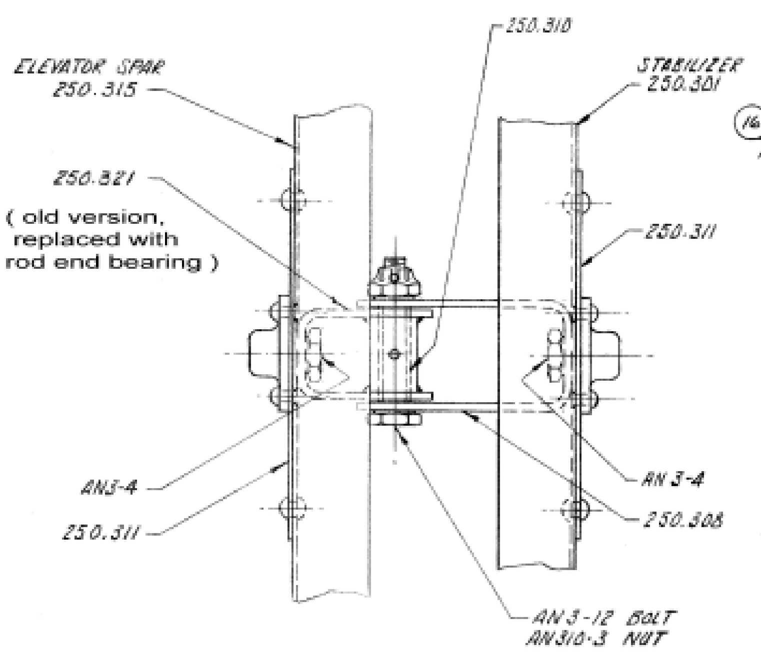
This change is not required for existing aircraft that do not have hinge alignment issues (binding) of the elevators. It was primarily made to simplify construction and manufacturing. It will also help to eliminate the possibility of cracks in the horizontal stabilizer spar around the doublers at the outer elevator hinge points due to misalignment of the hinge points.

The larger spar doublers, additional attach bolts for p/n 250.308, and the adjustment capability of the elevator attach points using rod end bearings make the new configuration superior in many ways.

It is possible to use the older steel elevator hinge bracket (p/n 250.321) with the new multiple bracket version of the stabilizer hinge brackets (p/n 250.308). The spacing between the 250.308 brackets just needs to be changed accordingly.

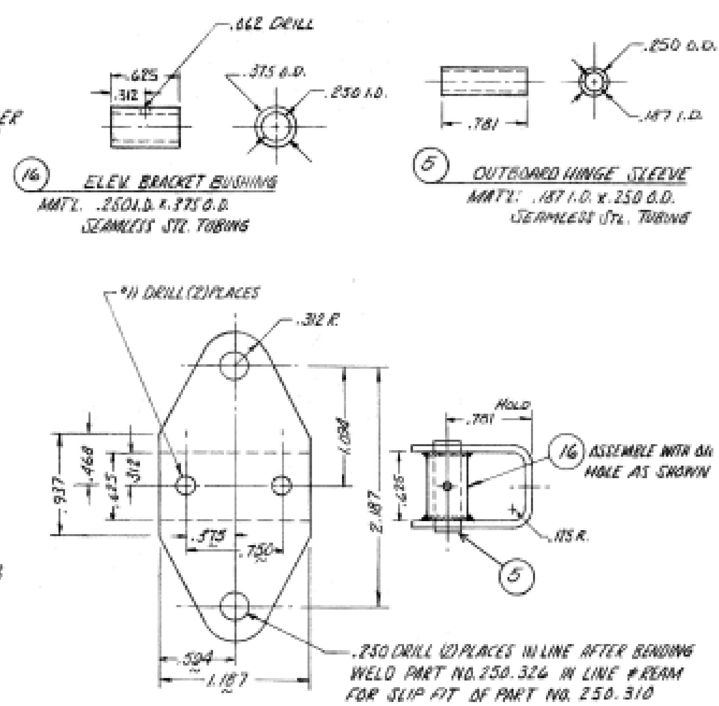
Original Configuration

from dwg 250.003

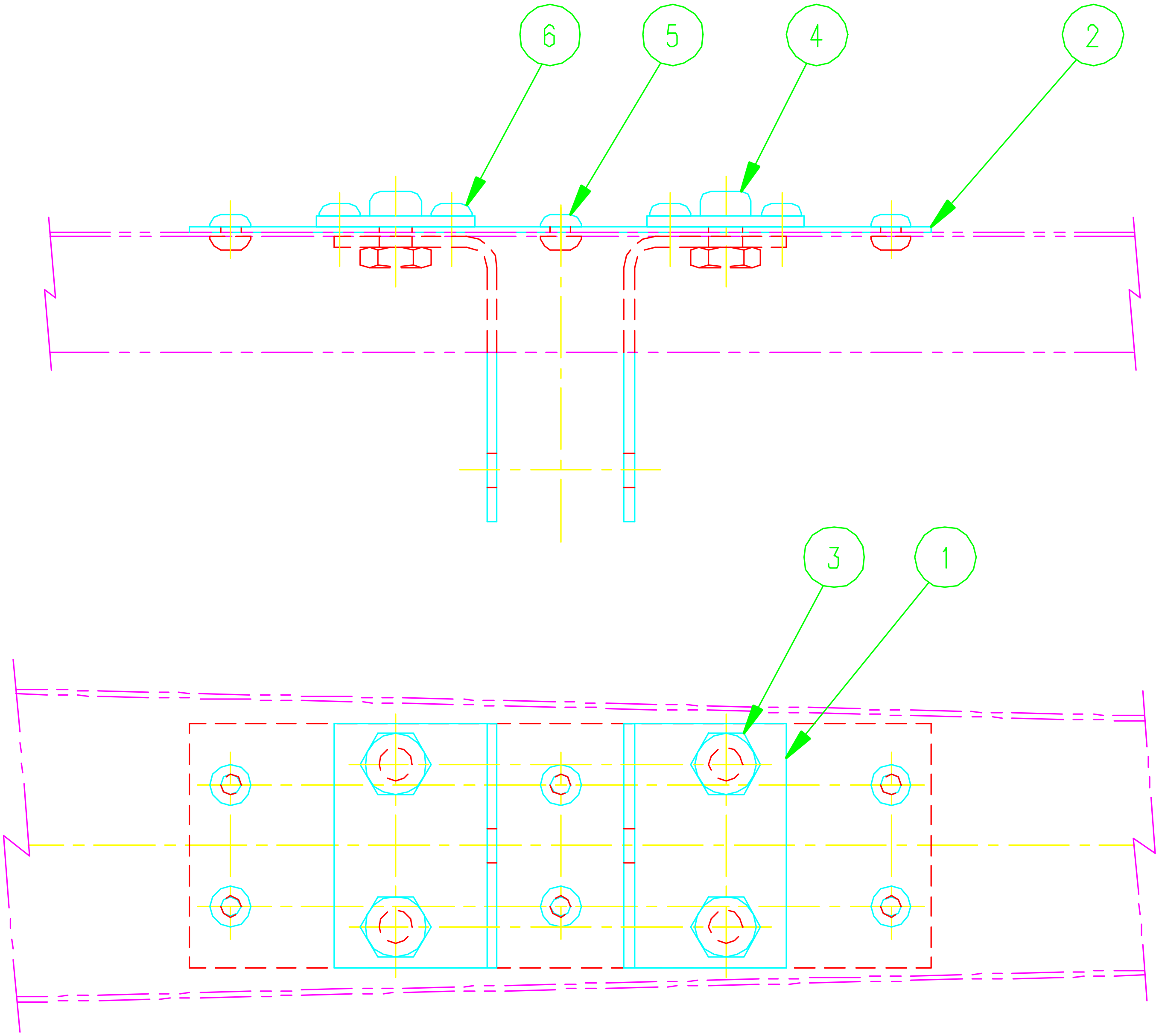


Old Style OUTBOARD HINGE ASSEMBLY

from dwg 250.002



(10) OUTBOARD ELEVATOR BRACKET & UPPER RUDDER HINGE
MAT'L. .063 4130



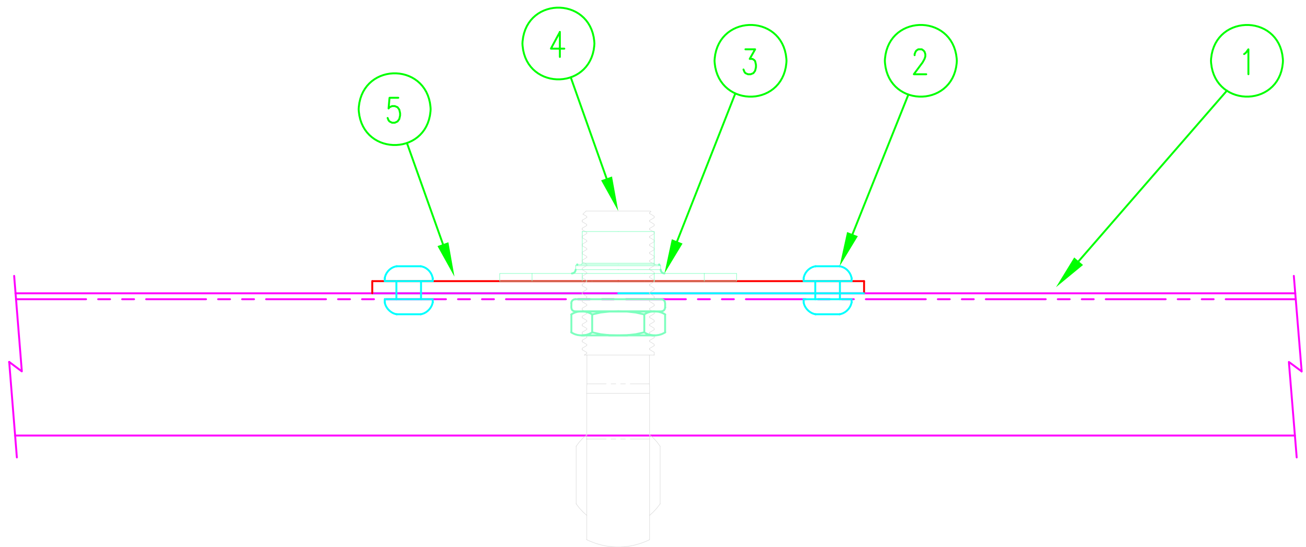
ITEM	PART No.	DESCRIPTION	No.	MAT'L
1	250-308	OUTBOARD STABILIZER HINGE .063 THK.	6	4130 STL.
2	250-386	HINGE BRACKET DOUBLER .032 THK.	5	2024 T3 AL.
3		AN3-3A BOLT	12	
4		AN366-F1032 NUT PLATE, SELF LOCK	12	
5		AN470-4-4 UNIVERSAL HEAD RIVET	18	
6		AN426-4-6 C'SUNK RIVET	24	

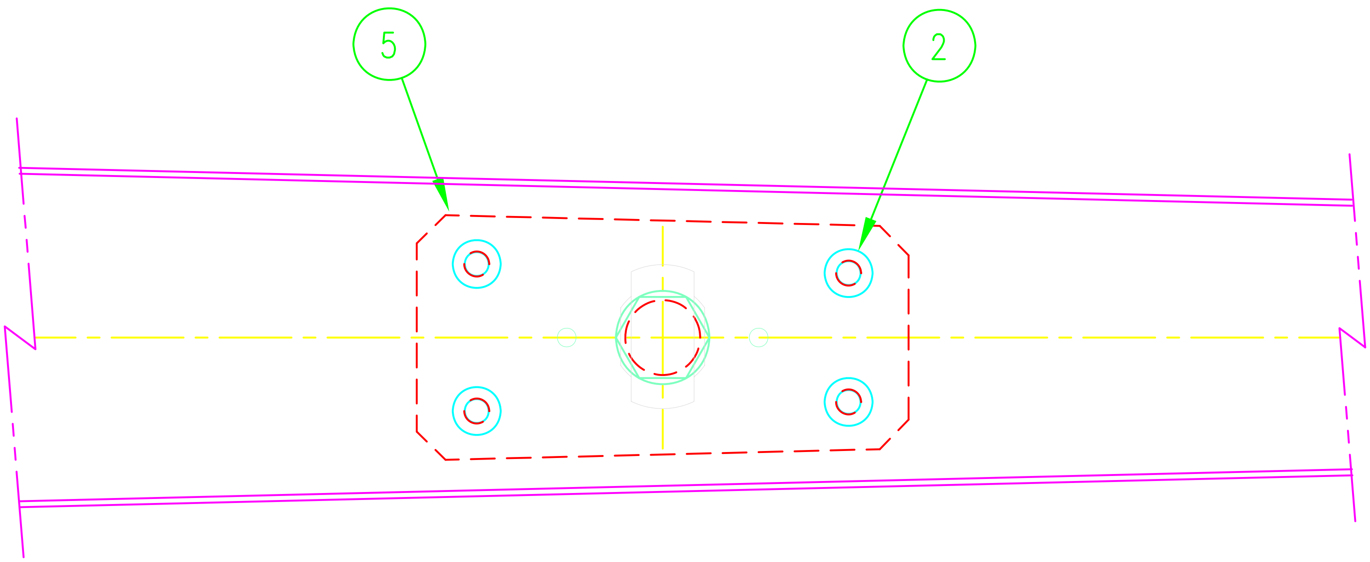
Mustang II

Mustang Aeronautics

Title: REVISED HINGE BRACKET AND DOUBLER

Scale: 1:1	Approved By:	Drawn By: TRM	Date: 05/22/00
Mat'l:	Revised:	Drawing Number.: XXX.XXX	





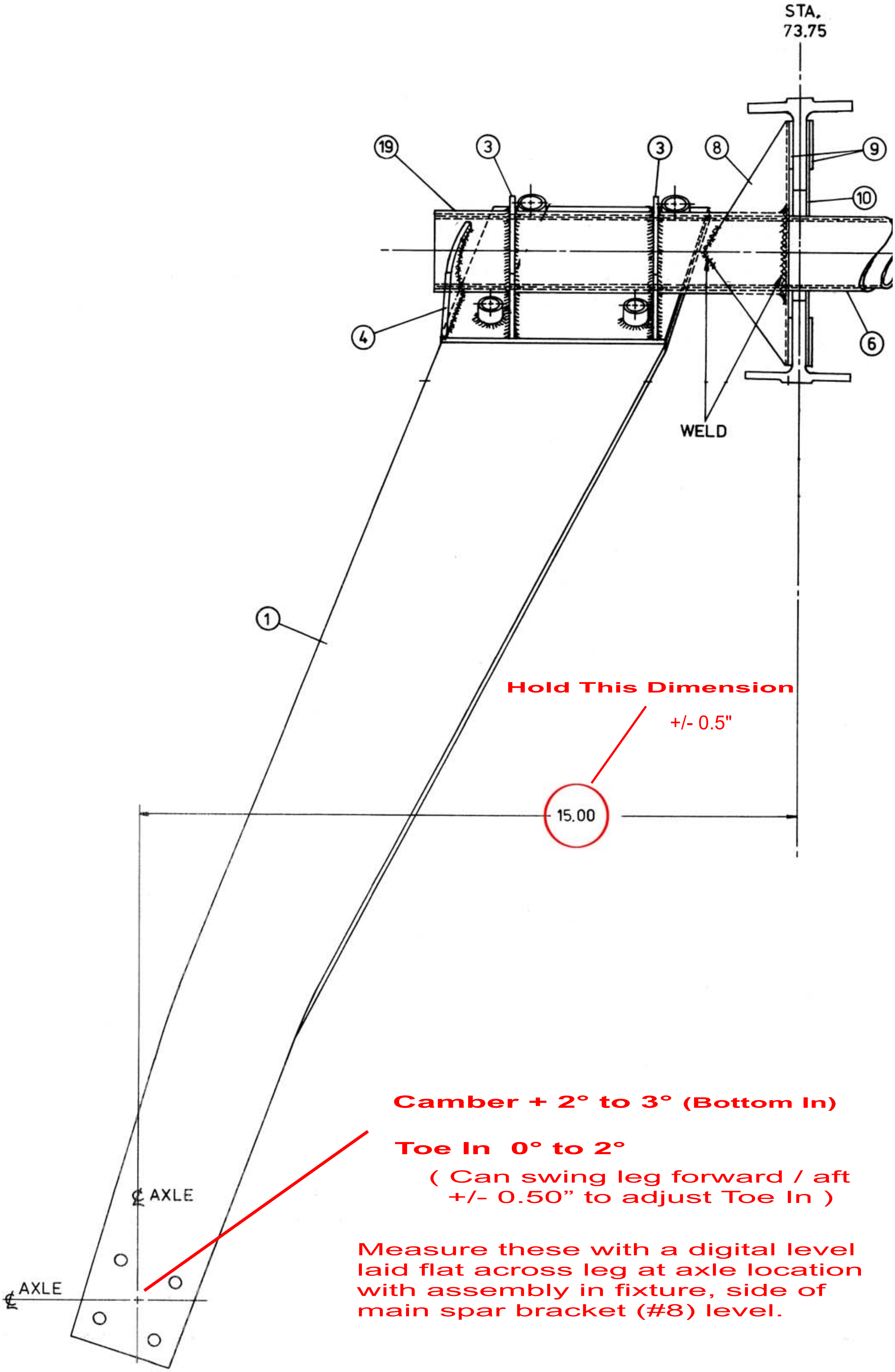
ITEM	PART No.	DESCRIPTION	Qty.	MAT'L
1	250.315	Elevator Spar	2	0.032 2024 AL
2		AN470AD4-5 Universal Head Rivet		
3		MS21047-L6 3/8" nutplate	3	
4		GMM-3M-670 RodEnd Bearing (MD36-14)	3	
5	250.329	Outboard Elev/Rudder Hinge Brkt Dblr	3	0.063 2024 AL

Mustang II

Mustang Aeronautics

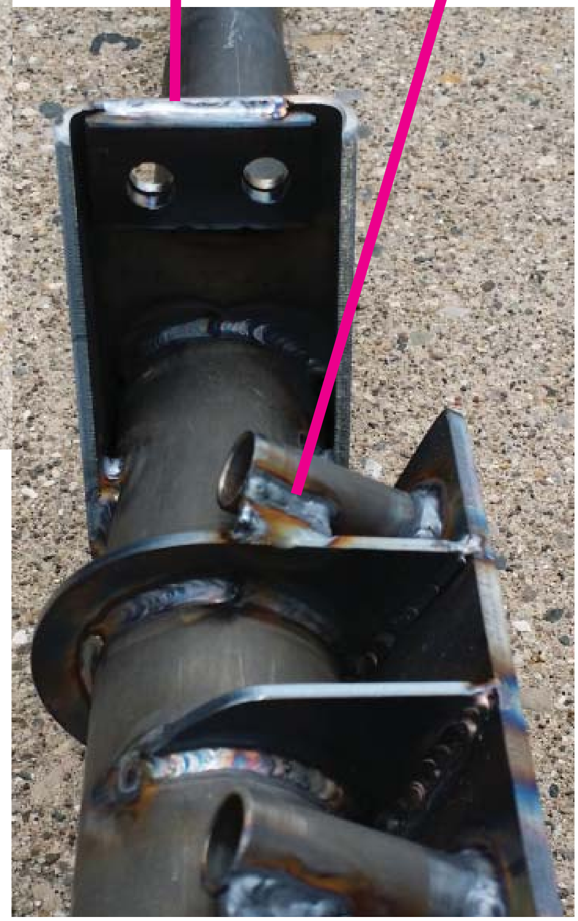
Title: Revised Outboard Elevator Hinge

Scale: 1:1	Approved By:	Drawn By: CKT	Date: 08/20/11
Mat'l: ASSEMBLY	Revised:	Drawing Number.:	


STA.
73.75
19
3
3
8
9
10
4
6
WELD
1
Hold This Dimension
+/- 0.5"
15.00
Camber + 2° to 3° (Bottom In)
Toe In 0° to 2°
(Can swing leg forward / aft
+/- 0.50” to adjust Toe In)
Measure these with a digital level
laid flat across leg at axle location
with assembly in fixture, side of
main spar bracket (#8) level.
℄ AXLE
℄ AXLE

Weld Spacer to Spar Bracket

Weld Bushing to Gusset
with Scrap Spacer



Landing Gear Mount Tube to be TIG Welded and then Stress Relieved to a Maximum of 1100 degrees F

Spacer Predrilled with 25/64”
(Oversize) Holes and Edges
Ground to Fit Radius

Weld Down Tube Inside Bracket 0.625”
This is the CRITICAL Weld

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Mustang II & Midget Mustang Service Bulletin

Date: 1/26/2019

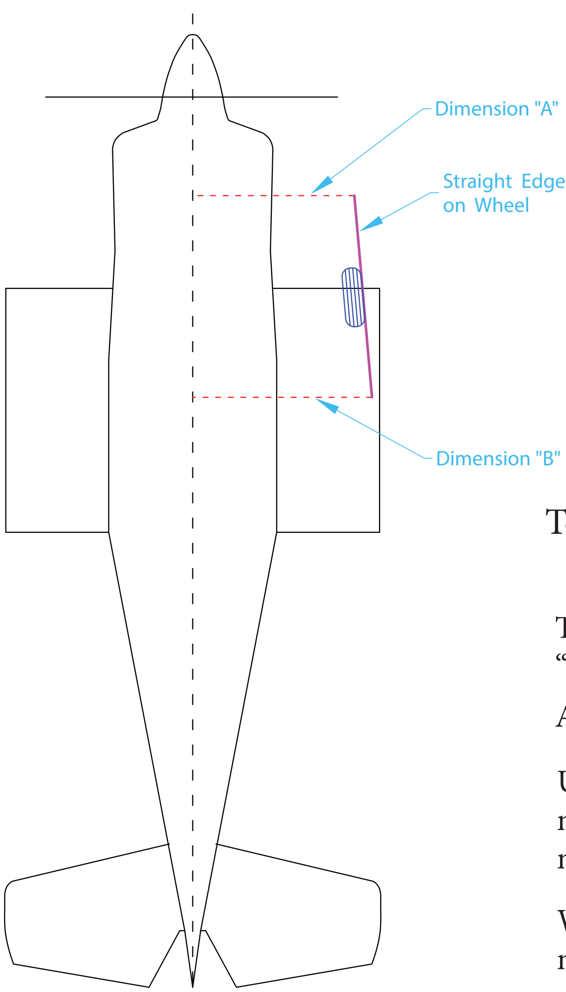
Subject: Checking for Correct Wheel Alignment

Good ground handling of the conventional landing gear (tail dragger) version of the Mustangs is dependent upon proper wheel alignment. There should absolutely be no wheel "toe out" with a desired angle of 0 to 2 degrees "toe in".

To check the wheel alignment the following procedure can be used:

On the bottom of the aircraft, drop a plumb bob from the center (widthwise) of the firewall tunnel to the ground and make a mark on the pavement.

Drop a plumb bob from the center of the forward tailwheel attach bolt after verifying it is close to being on the centerline (widthwise) of the airplane. Put a mark on the pavement.



Using a chalk line, snap an aircraft centerline on the pavement between the two marks.

Using a long straight edge (4 feet or so, longer is better) hold it against the wheel close to its center on the outboard side as shown in the sketch.

Measure perpendicularly from the aircraft centerline to the end of the straight edge on both ends to get Dimensions "A" and "B" as shown in the sketch.

$$\text{Toe In} = \sin^{-1}\left(\frac{\text{Dimension “B”} - \text{Dimension “A”}}{\text{Length of Straight Edge}}\right)$$

This is also called the "ArcSin". A Google search such as: "***ArcSin .05 in degrees***" will give an answer.

A negative "Toe In" value will mean it is actually Toe Out

Up to 2 degrees of axle shims can be used. If there needs to be more than 2 degrees of correction, the gear leg will need to be modified.

Wheel Camber (vertical tilt) misalignment does not have much effect on ground handling, just tire wear.

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http://mustangaero.com/downloads/Mustang_Revisions

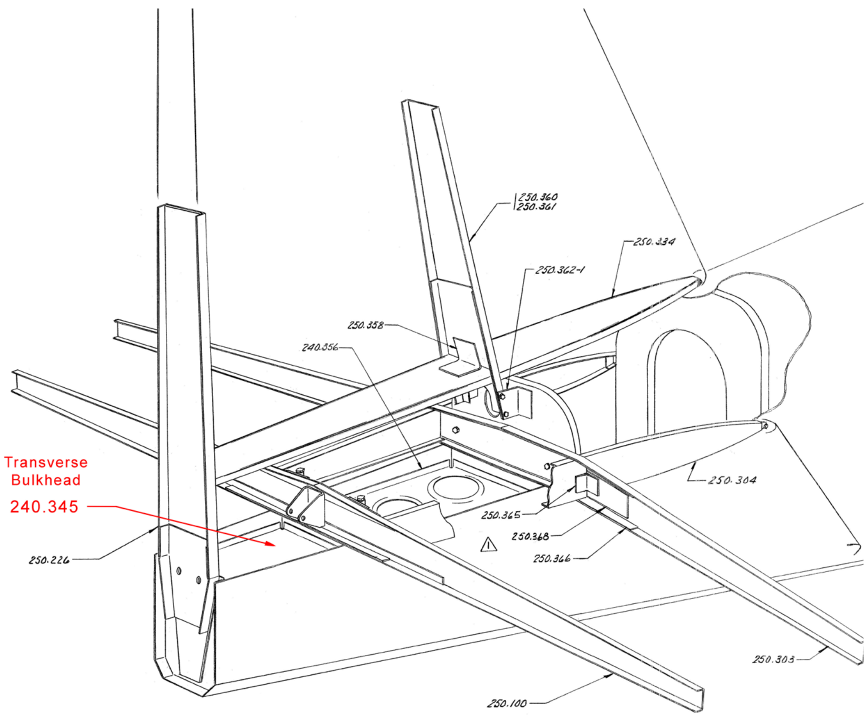
Mustang II & Midget Mustang Service Letter

Date: 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.

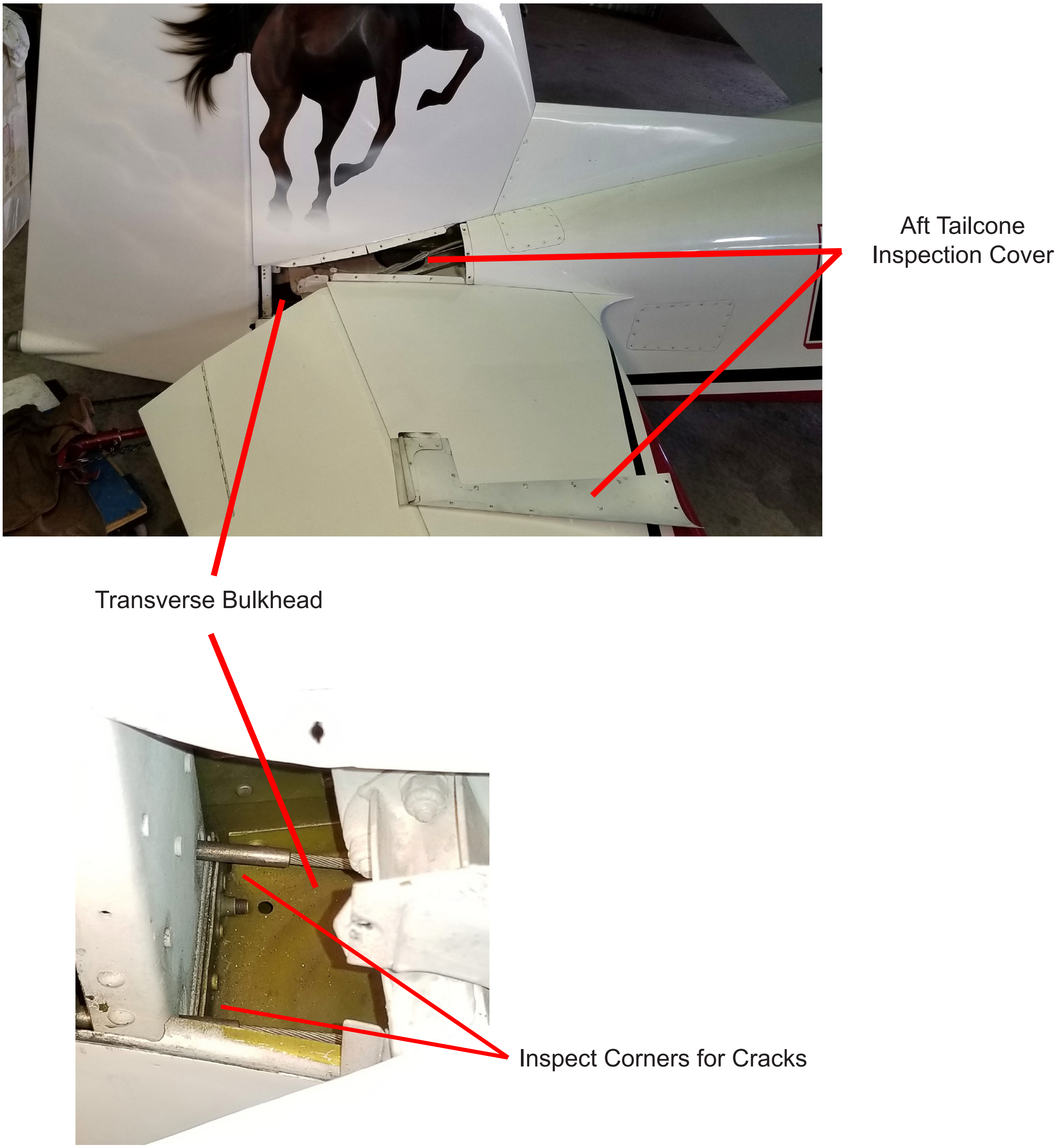
The small Transverse Bulkhead is a critical attach point for the vertical fin as it has 2 of the 3 lower fin rear spar attach points. Refer to construction drawing #29 for the Midget Mustang and drawings 240.021 and 240.023 for the Mustang II.



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 lightening 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.



Midget and Mustang II Revisions

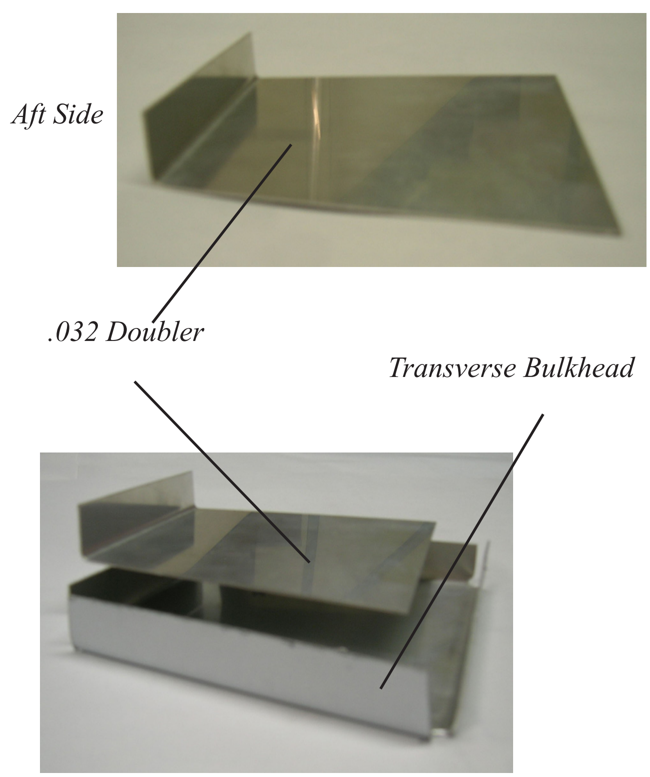
[From Mustang News & Views Vol 16 No 5 - May 2006]

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.

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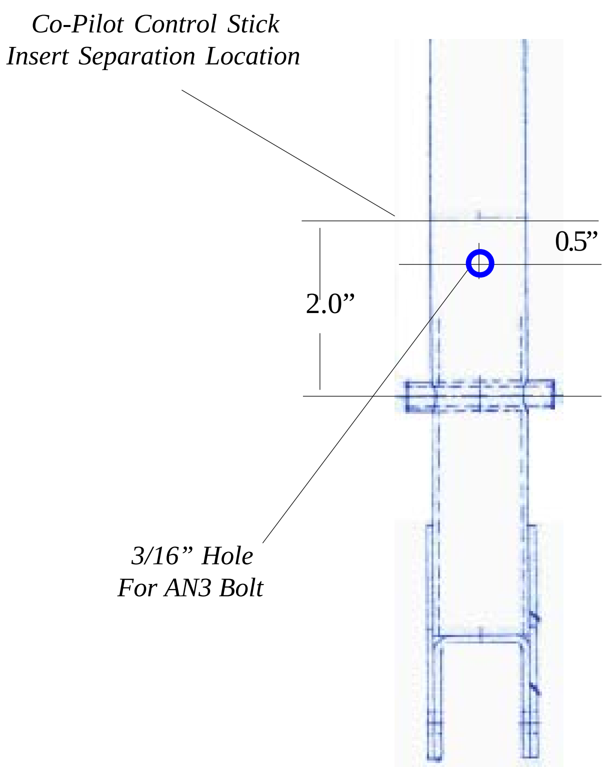
Mustang II Service Bulletin

Date: 3/29/2007

Subject: Co-Pilot Control Stick Advisory
(p/n 260.102)

It has been reported that a similar homebuilt design aircraft made a hard landing when the co-pilot accidentally pulled the passenger side control stick from the assembly while landing the airplane. The co-pilot control sticks provided in the Mustang II kits have removable top sections. Removable control sticks are to be pinned or bolted while the aircraft is in use.

The co-pilot control stick in the kit is cut 2" above the control stick bushing with a tube insert welded inside the top portion of the stick so it can be slipped in place and pinned. It is up to the builder to drill the pin or bolt hole approximately 1/2" below the point of separation. Some builders have also modified the pilot stick this way to make working under the instrument panel much easier. The removable portion of the stick has to be bolted in place if this is done.



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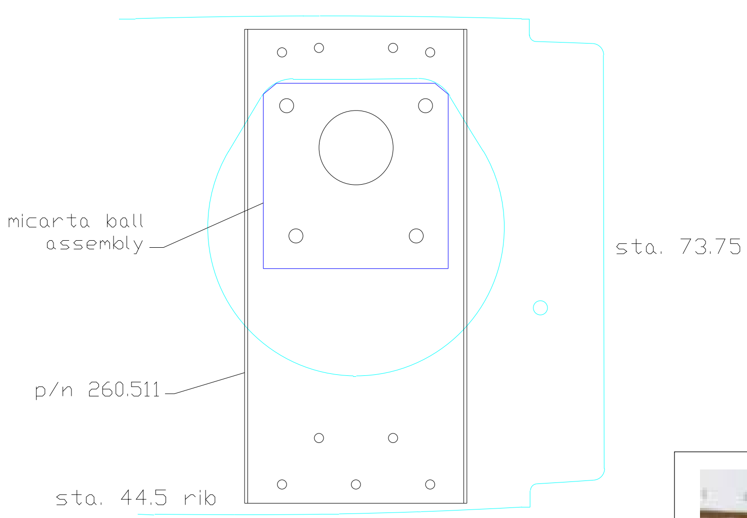
Mustang II Service Bulletin

Date: 5/7/2007

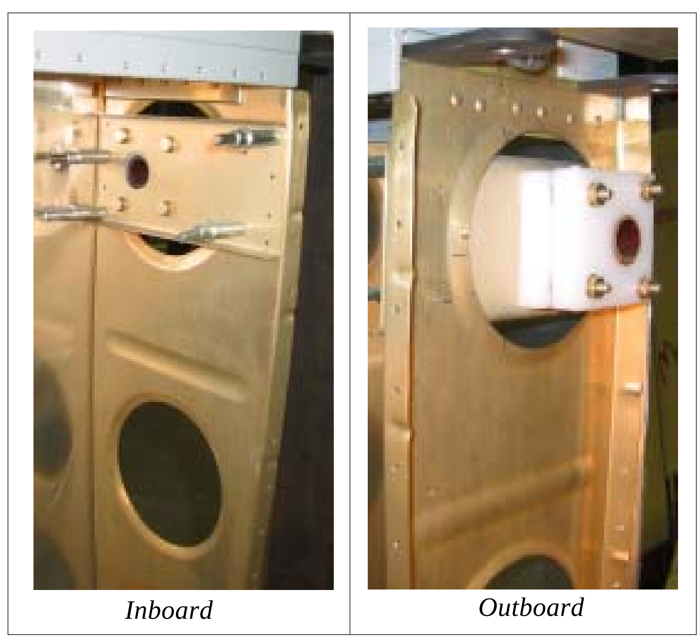
Subject: Aileron Pushrod Support Bracket Installation (p/n 260.511)

The forward edge of the aileron inboard control tube mounting bracket will interfere with the main spar rib attach angle when mounted to the station 44.5 rib as shown in drawing 260.006. The interference can be eliminated by rotating the mounting bracket 90 degrees on the station 44.5 rib as shown below. Detailed drawings are available on the Mustang website for p/n 260.511. This part is now included in the center section kits.



Station 44.5 Rib and Micarta Ball Assy.

Forward



Aft

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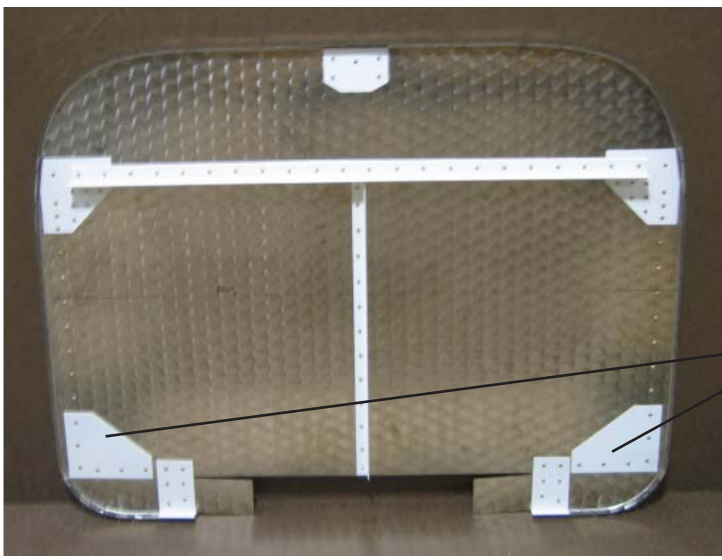
<u>Mustang II Service Letter</u>

<u>Date:</u> 10/16/2019

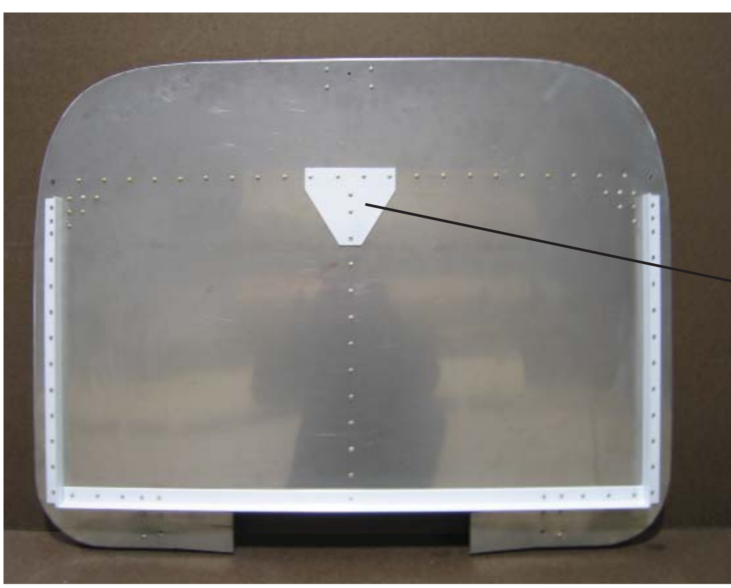
<u>Subject:</u> Firewall Doublers for Tricycle Landing Gear Version
(p/n 240.311 & 240.312)

This is a clarification on the addition of firewall doublers installed with the Tricycle Landing Gear version of the Mustang II.



Forward Side

240.311



Aft Side

240.312

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Mustang II Service Bulletin

Date: 1/12/2016

Subject: Hardware Substitution

For availability and cost considerations the following equivalent hardware items have been substituted for the corresponding items originally called for in the Mustang drawings and manuals:

Original Manufacturer	Original Part #	Replacement Manufacturer	Replacement Part #
Heim	MD36-14M	Aurora	GMM-3M-670
Heim	F35-14M	Aurora	GMW-3M-570
Heim	F34-14M	Aurora	GMW-3M-470
nutplates	AN365-xxx		MS20365-xxx
nutplates	NAS680-xxx		MS21047-xxx

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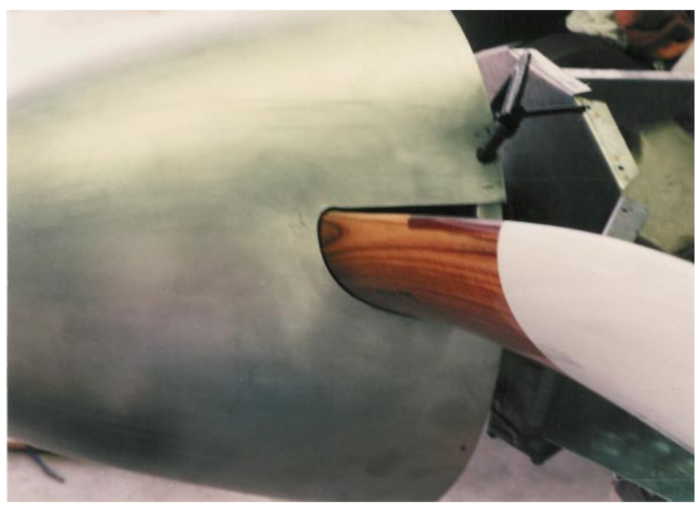
Mustang II Service Bulletin - MSB Spinner 1-24-96

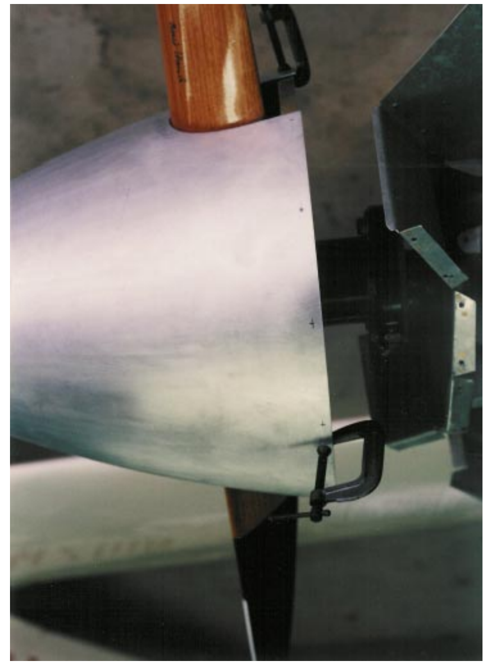
Date: 1/24/96

Subject: 16" Spinner Installation, fixed pitch propeller
(p/n 010.010)

The first step for installing the spinner is to make the propeller cut outs. A tight fit to the propeller blade contour is desired. A gap of 3/16" should be used between the prop and spinner. Make a paper or cardboard template of the prop blade 8" out from the center. The template should fit over the propeller sitting in place on the spinner backplate flat on a table. The bottom edge of the template should be against the table to give the proper reference for the blade angle in relation to the back of the spinner. This template is then used to mark the spinner for removing the prop cut outs. Reference marks should be placed on the aft edge of the dome equal distances apart measured around in both directions. Using the template, align the trailing edge of the prop cut outs with the marks on the dome. In order to get the spinner dome in place the areas aft of the prop blades will need to be removed as well. Cut along the marks from the template and later file in the 3/16" clearance gap fitting the prop in place occasionally for comparison. Using another template make a filler piece to cover the gap aft of the prop. If care is taken the filler pieces can be made from material removed from the spinner for the cut out. The filler pieces are attached to the backplate in the same way as the dome using 2, #8 screws. Backup plates should be riveted to the sides of the filler pieces to fit under the dome. They need to be shimmed accordingly for a doubler around the prop cut out (see below). The filler pieces can now be attached to the dome and backplate in 4 spots.

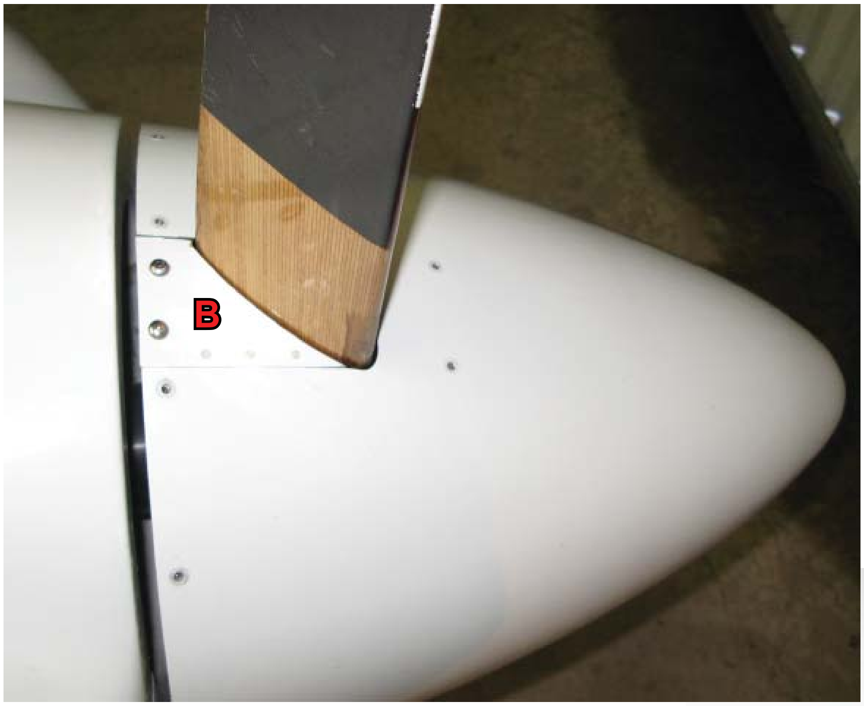


The prop cut outs in the spinner are where most cracking problems occur. This is why it should be reinforced with a doubler riveted to the inside. These spinners are much heavier than those supplied in the past and are therefore much less susceptible to cracking. However, we do still recommend installing an .040 doubler around the cut out. The doublers need to stop short of where the backplate fits on the inside edge of the dome. It is very important that the edges around the cut outs be polished to remove all nicks and other possible stress risers. We recommend using emery paper followed by Scotch Brite for a final finish.



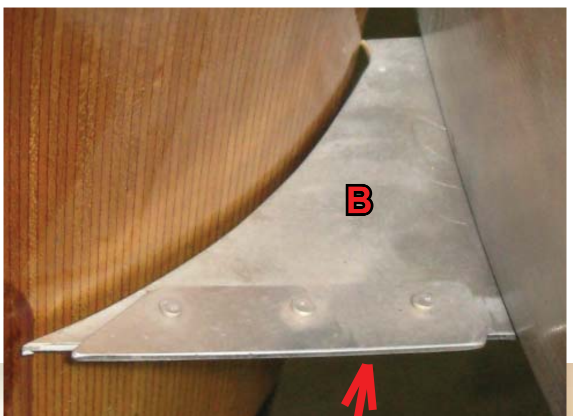
Our 16" diameter Mustang spinners are designed for installation with fixed pitch propellers. The front bulkheads will fit prop hubs of 2-3/4", 3-3/4", or 4-3/8" thickness. Shims are to be used to accommodate propellers with a different prop hub thickness. These are available from Mustang Aeronautics. The front bulkhead is a precision fit, so when installed properly it does not need to be attached to the dome with fasteners. The front bulkhead flange has a 3M Teflon fluorocarbon tape applied to it to prevent chaffing with the dome. It is **very important** that the dome fits tightly over the front bulkhead and spinner backplate. This requires proper spacing between the front bulkhead and backplate (2-3/4", 3-3/4", or 4-3/8"). Install the prop extension, then the backplate, and then the prop. To ensure that the front bulkhead rides on the dome properly, use washers as spacers between the front bulkhead and the prop when you install the front bulkhead. Now press the spinner dome in place. On the first trial fit of the dome it should not go all the way onto the aft edge backplate because of the spacers. At this point you know that the front bulkhead is hitting the dome. Now you can remove washers until the dome stops just short of flush with the aft flange on the backplate. At this point, you can remove the washers and make a permanent spacer based on the thickness of the remaining washers. After 10-15 hours of operation the spinner should be removed and inspected for excessive chaffing between the front bulkhead and the spinner dome. When the propeller cut outs are made the spinner will deform to a slightly oval shape due to the internal stresses. A little extra Teflon tape in the areas above the cut outs may be necessary to achieve a good fit. If the chaffing persists attach the front bulkhead to the spinner dome using 5 #8-32 screws into nutplates. The spinner backplate should be attached to the dome using #8-32 screws into nutplates on the backplate with 3 to 3.5” spacing.

It is also very important that the spinner be adjusted to run true so that there is no wobble. This procedure should be followed when drilling the holes for the backplate as well as every time the spinner is put on the airplane. We use a dial indicator on a horse close to the nose of the spinner. A dry marker could also be used. After removing a spark plug from each cylinder the prop is pulled through. The indicator near the spinner nose will show where the spinner is out of round to allow for adjustment before final tightening of the spinner screws. The marker placed very close to the spinner will also show where it is out of round by where it hits and where it does not. Use small c-clamps to hold the dome in place when drilling the backplate attach holes. This all needs to be done while the dome is pushed back into its proper position on the front and rear bulkheads. For a proper fit the dome should have to be pushed on and held in place to get the screws in. If the dome is not held tight to the front bulkhead, screws will need to be used to hold it in place.

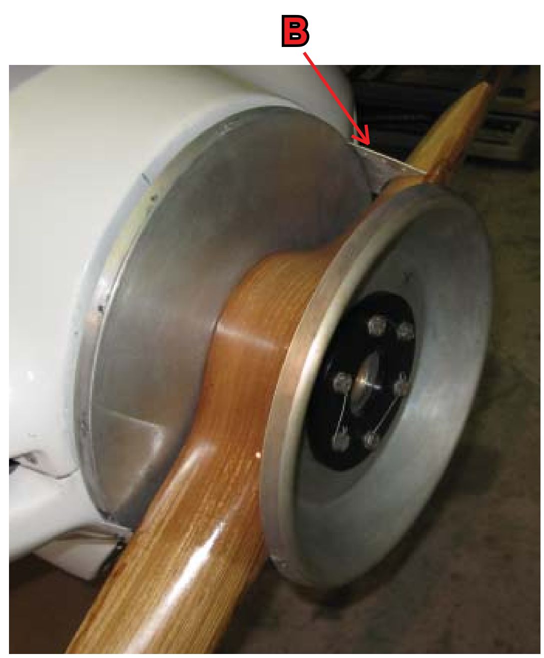

B

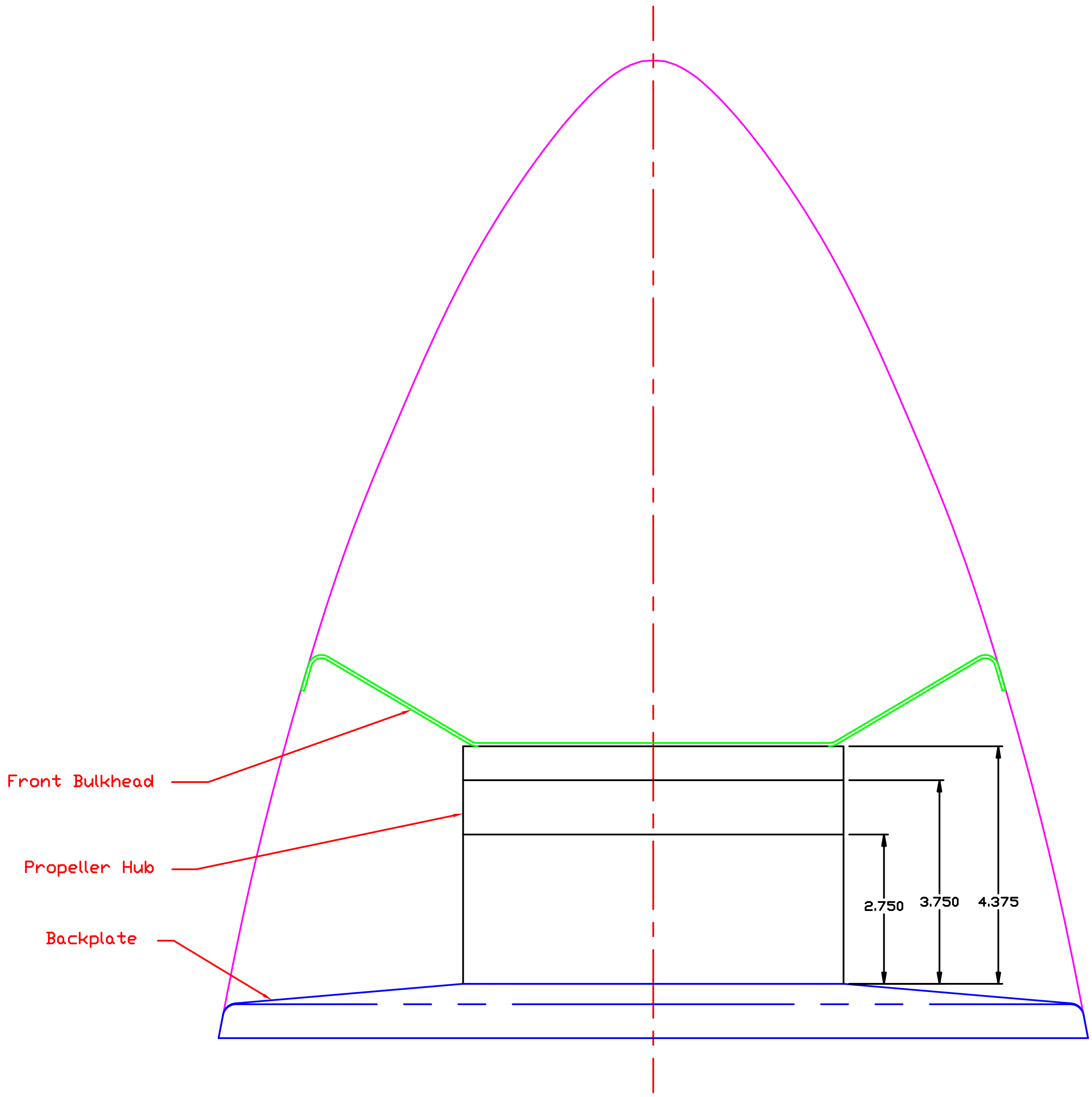

B

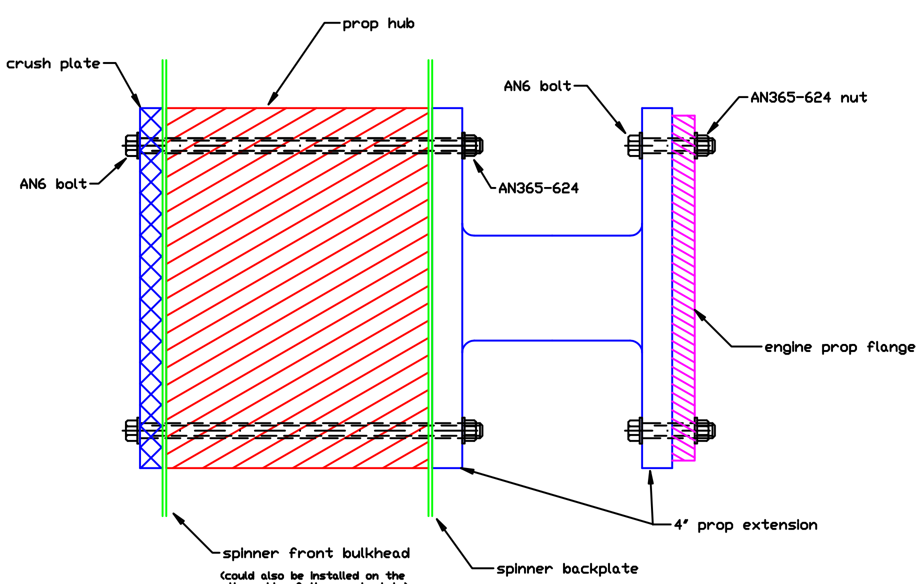

B


B


B


B


Front Bulkhead
Propeller Hub
Backplate
2.750
3.750
4.375


prop hub
crush plate
AN6 bolt
AN6 bolt
AN365-624 nut
AN365-624
engine prop flange
4" prop extension
spinner front bulkhead
(could also be installed on the other side of the crush plate)
spinner backplate

YOUR SPINNER AND YOUR ANNUAL INSPECTION

by George Linkis

When you do your annual inspection, you probably remove your spinner to inspect your propeller. Even a fixed-pitch prop should be inspected for safety, time security and no "slip" between bolts and prop (wood prop). With a constant speed prop, removing the spinner is a necessity to grease the hub (Shell Oil Co. #5 grease).

Now you folks in the warm climes like Florida and California may do your inspection at any time, but us folks that live in the climes that blows snow between November and April -- well, this subject is written because the snow is here now and this subject comes to mind -- our annual inspection.

The point of this article is to cover the importance of getting the spinner on -- centered! And secondly, torqueing the screws.

After you have finished your airplane including getting the spinner in place, removing the spinner requires that centering is done each time it is removed. Just because you have located the spinner "true" when you completed the airplane does not mean it goes on "true" each time you put the screw back in place. Each screw hole has a few thousandths clearance. If not deliberate during construction, then with "time". (i.e., wear by removal and re-insertion of the screws of slippage due to inadequate torquing of the screws.)

You might think this is not possible with just a few thousandths in the holes and that tight-fitting front hub bulkhead. Wrong! It is a fact. Aluminum as you know by now has "give" and "spring back", so you can push the spinner on tight and off center. Figure 1 illustrates how a few thousandths can give an off center line condition. Mustangs have large spinners so the multiplication factor is also large.

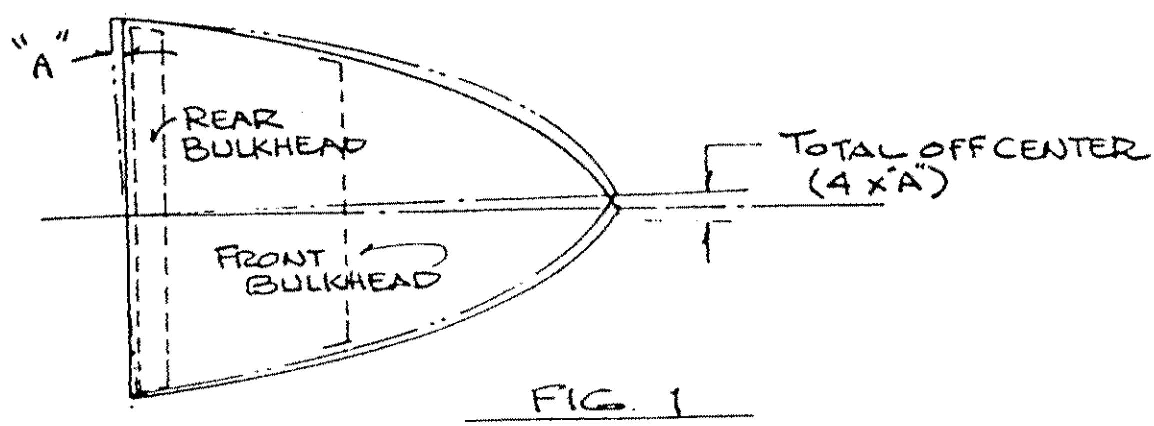


FIG. 1

Here is a tip on how to get the spinner on center:

1. Get the aircraft horizontal. Put the tail on a box . . . or a chair and box.
2. Get a broom, a tripod or some vertical device to which you can tape a felt tip marker horizontally.
3. Remove one plug from each cylinder. (After the compression test for your annual is the time to do a spinner alignment.) Refer to Figure 2.

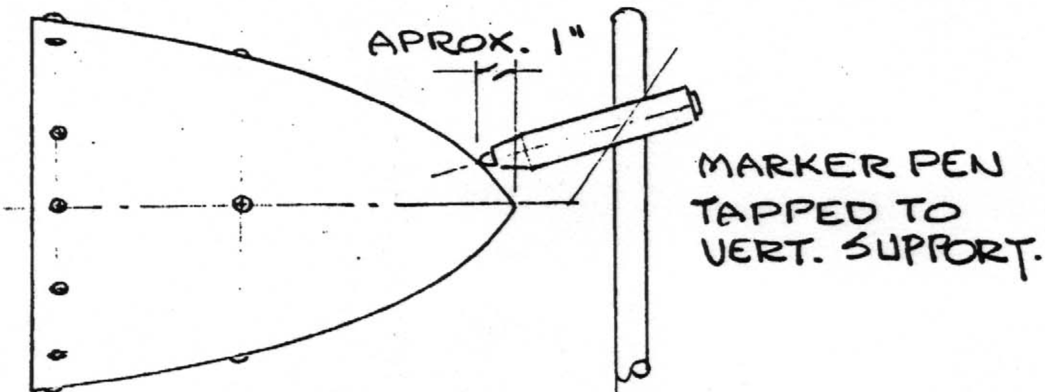


FIG. 2

Slowly, so that you do not apply incorrect pressures that permit the engine to move on the motor mounts, turn the prop. At least four of the screws at 90 degree intervals should be "slightly" snug. The marker will trace a path on the spinner. If you get an arc of 180 degrees or less, adjust the spinner by a slight "rap" of your palm in the appropriate direction. Do not wipe away the trace, but move the marker to say, 7/8" or 1-1/8" from the tip. Rotate the spinner again and note the trace. If unchanged, your screws are snugged too tight or your "rap" was too light.

Several tries will be required. When you get an arc of 270 degrees or more, your spinner is within a few thousandths of center. Refer to Figure 3.

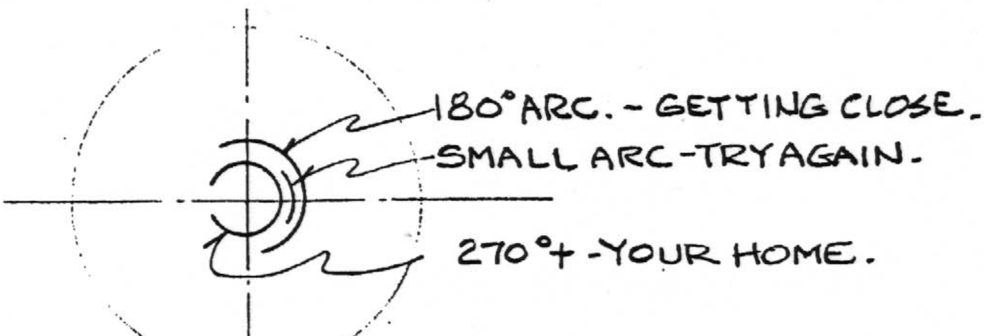


FIG. 3.

CAUTION! A trace of 360 degrees is no proof of being on center. The spinner may be pushing the felt tip pen away. A trace of 355 degrees is proof that the "pen" is free!

Satisfied you're centered? One more repeat wouldn't hurt. When completed, tighten the four screws, then insert and tighten the remaining screws.

To avoid cracks and "countersinking wear" be sure you use a nylon washer under each screw head. The nylon washer acts as a cushion against vibration wear and pressure compensator during temperature changes. If you have not been using these washers and find a black residue under the heads when your remove the screws -- your spinner is wearing away under the heads. Refer to Figure 4.

Your best insurance against wear is the nylon washer. Don't go flying without them. This works for new installations too. For you machinists out there, you can use a dial indicator in lieu of the felt pen (take care not to scratch the spinner).

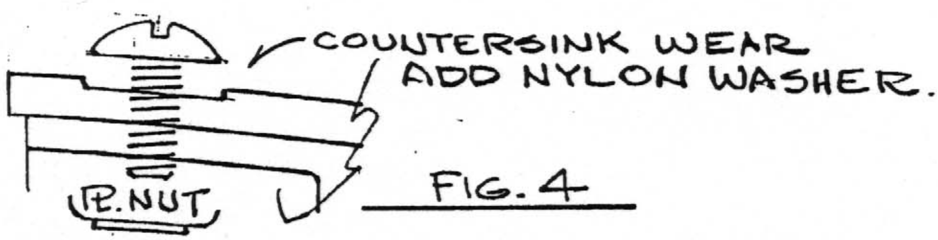


FIG. 4

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Mustang II & Midget Mustang Service Letter

Date: Jan 3, 2020

Subject: Torque Value for Main Wing Spar Attach Bolts

The Main Wing Spar Attach Bolts (p/n 220.0020 or 120.0002) are typically secured with either AN365-918 (MS20365-918) standard elastic stop nuts or AN364-918 (MS20364-918) thin or low profile elastic stop nuts. There has been repeated questions about the torque value for these bolts.

The Main Wing Spar Attach Bolts should only have the nuts tightened to a snug fit and NOT torqued.
This is indicated on drawing 230.001 for the Mustang II and drawing #24 for the Midget Mustang.

These bolts are strictly transferring a shear load from the main wing spar capstrips to the fuselage steel wing attach fittings. As such a snug fit of the nut to simply hold the bolt in place is good. Because of the 0.040” gap between the center capstrips created by the main wing spar web (p/n 230.301 or 130.301) the capstrips can potentially be damaged if the Main Wing Spar Attach Bolts are tightened too much. Excessive tightening without a filler piece (p/n 230.311 & 230.312) will squeeze and bend the capstrips together damaging them.

If there is slop in the wing attach bolt holes, tightening the nuts will not correct the situation and only potentially mask the problem during a preflight inspection. The tip of the main wing spar is allowed 0.25” of movement due to slop in the attach bolt holes. If the holes are oversized enough to allow more movement than this than oversize bolts will need to be installed. These bolts are available in .015” and .030” oversize from Mustang Aeronautics along with the appropriate hand reamers.

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Mustang II & Midget Mustang Service Letter

Date: June 8, 2020   rev March 24,2021

Subject: Stall Speed and Wing Leading Edge Shape

The airfoil used on both the Midget Mustang and Mustang II is a fairly thin laminar flow airfoil. It is optimized to reduce drag. The maximum thickness at the root is about 6 inches and the maximum thickness at the tip is 3 inches. Fabricating the leading edge skins by hand can take some work to get the proper airfoil shape at the leading edge. This is critical for proper stall speeds and characteristics. In the kits now supplied by Mustang Aeronautics leading edge skins are supplied which have the proper leading edge radius formed into them. Many older Mustangs have wings that were fabricated entirely by the builder. On these scratch built Mustangs the leading edge skins were made by hand and the leading edge radius is sometimes too small (or sharp). This is because when the skins were folded over and flattened to get the desired airfoil thickness most of the bending occurs in a very small section at the leading edge. Some follow up work is required to achieve the proper airfoil shape and thus the proper flight characteristics. Robert Bushby published an article in the January 1991 issue of the Mustang Newsletter detailing the procedures to fine tune the wing leading edge shape to get the best stall characteristics. We have heard from builders in the field that they have reduced their stall speeds by 15 mph using this technique. A Mustang with a stall speed over 65mph at our recommended gross weights almost certainly has the wrong leading edge shape.

Wing leading edge radius templates can be made from the wing rib drawing or purchased from Mustang Aeronautics (p/n 230.0009). These can be used to check the wing at each rib location for the proper leading edge radius and to verify that both wings are the same. Keep in mind that the intermediate wing ribs do not have a full nose section and stop about 7/16" short of the leading edge so it is fairly easy to reshape the leading edge. The procedures detailed in the following article by Robert Bushby can be used to correct the wing leading edge shape and improve the stall characteristics.

Wing Leading Edge Radius Template Set
p/n 230.0009

MUSTANG NEWS & VIEWS

Volume 7, No. 1 January, 1991

IMPROVING STALL CHARACTERISTICS

by Bob Bushby

Although the majority of Mustang aircraft have a straight forward stall at modest airspeeds, there are still some that will stall one wing first, and sometimes at a higher than desired air speed. In most cases this undesirable stall is brought about because of a wing leading edge radius that is too sharp, or is caused by one wing leading edge having a radius different than the other. There have also been reports of poor stall characteristics because one wing had a different wash-out than the other. If your aircraft has a characteristic similar to the above, then this article will help to correct it. The procedure is based on the fact that a sharp leading edge radius will cause a higher stall speed.

The wing leading edge modification was prompted by a phone call from a Midget Mustang flyer in Michigan. He reported that the right wing was stalling at an unreasonably high speed of approximately 80 M.P.H. His correction was to reshape the wing leading edge radius to obtain a larger radius, and therefore, a lower stall speed. The leading edge modification was relatively simple, using a mallet to push the nose of the wing back thereby producing a larger radius.

The plastic mallet used should be less than one pound weight. A scrap of 0.032" aluminum approximately 4" wide is to be held on the leading edge as a buffer, and the mallet pounded on the aluminum piece. Numerous light blows are used as the work progresses down the leading edge. It is important to progress down the leading edge slowly, checking the newly formed radius frequently. The rate at which the work was performed by the builder was about 2' per hour, which did not cause marring of the paint.

For checking the leading edge contour, a tool may be purchased from Sears or any other hardware store called a "Copycat". This is a tool consisting of many small wires in a holder that are pushed in when pressed against the wing. Using this method the builder reworked the entire leading edge of the wing, and lowered the stall to where the other wing was stalling first, at about 60 M.P.H. At last report, the builder was going to rework the other wing, expecting an even stall at a lower speed.

To substantiate this rework, the same technique was performed by Bushby Aircraft on the prototype Mustang II, N1117M. This aircraft had a "right wing first" stall that was corrected by installation of a stall strip on the left wing during the early '70's. This resulted in a straight stall at 64 M.P.H. Examination of the wings showed the right wing having a sharper leading edge at the tip section. The stall strip was removed and flight tested again (solo), which showed a "right wing stall" still at 64 M.P.H. Using the rework method, the outer 6" of the wing leading edge was modified to obtain a nice looking radius. Another test flight showed some improvement so this treatment was extended inward, with more testing. After reworking the outer 18" of the wing, a nice even stall was obtained at 55 M.P.H. Thinking it desirable to have a slight left stall when solo, a little more rework was accomplished. This added work proved to be slightly undesirable because it placed the stall characteristic back to where it had been originally. The rework performed by Bushby Aircraft was also done quickly, without the aluminum buffer piece, and with a heavier mallet. The actual time that it took to work 18" of the leading edge was 15 minutes, which resulted in chipping the paint off. As is true with most things related to aircraft, the slow and easy way is best.

Increasing the radius of the entire leading edge will reduce the cruise speed somewhat. As only 18" was modified on the prototype N1117M, there was no noticeable change. It is reported that Mustang II builders obtain a stall about 55 to 60 M.P.H. with a nice pair of wings. If your Mustang cannot achieve this, try reworking the leading edge. Be aware that other factors such as a heavy empty weight also add to a higher stall speed, so be aware!

3/2021:
Before reworking the wing leading edge, the first step should be to verify the accuracy of the airspeed indicator. Errors in the static port can cause an erroneous airspeed reading and the airplane may not be stalling as fast as you think.
The next step would be to check the wing leading edges with profile radius templates.
If the problem is one wing stalling before the other and the leading edges are fairly close the next step would be to check the wing angles of attack at the root and tip with a full profile board. Verify the left wing and right wing angles match. Of course a heavy wing at cruise would be the main indicator of dissimilar wing angles. Is there a fixed trim tab on an aileron?

Weight and Balance Report

Mustang II

Registration No. ____________ Serial No. M-II-__________ Date ______________

Datum used is Fuselage Station ZERO. Station Zero is located 47.75" forward of the firewall.
Location of Main Wheel weighing point is Sta. _____________
Location of Tail Wheel weighing point is Sta. _____________

AIRCRAFT WEIGHTS AS FOLLOWS

	Scale Reading	Tare	Net	Station	Moment
Left Wheel					
Right Wheel					
Tail Wheel					
TOTALS	Empty Aircraft Weight				

EMPTY WEIGHT C.G. = Total Moment / Total Weight = Sta. _______________ {typ. ~sta 64.5}

Most FORWARD C.G. Determination

ITEM	WEIGHT	STATION	MOMENT
Aircraft Empty Wt.			
Oil (max. qts.)			
Fuel Header (max gal)			
Pilot			
TOTALS			

FORWARD C.G. = Total Moment / Total Weight = Sta._____________

Most REARWARD C.G. Determination

ITEM	WEIGHT	STATION	MOMENT
Aircraft Empty Wt.			
Oil (min. qts.)			
Fuel Header (min.)			
Pilot			
Passenger			
Baggage			
TOTALS			

REARWARD C.G. = Total Moment / Total Weight = Sta._________.

CENTER OF GRAVITY LIMITS are STA. 66.75 to 72.75. (16% to 28% MAC)

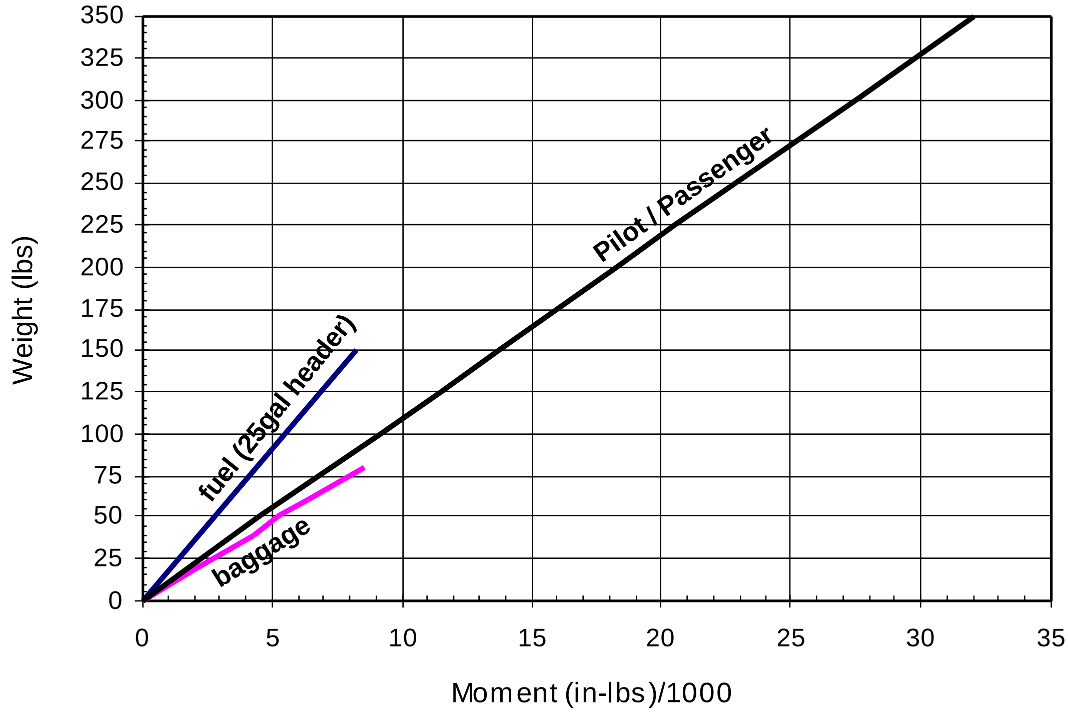
USEFUL LOAD = ___________lb. - ___________lb. = ____________lb.
(Gross Wt.) (Empty Wt.) (Useful Load)

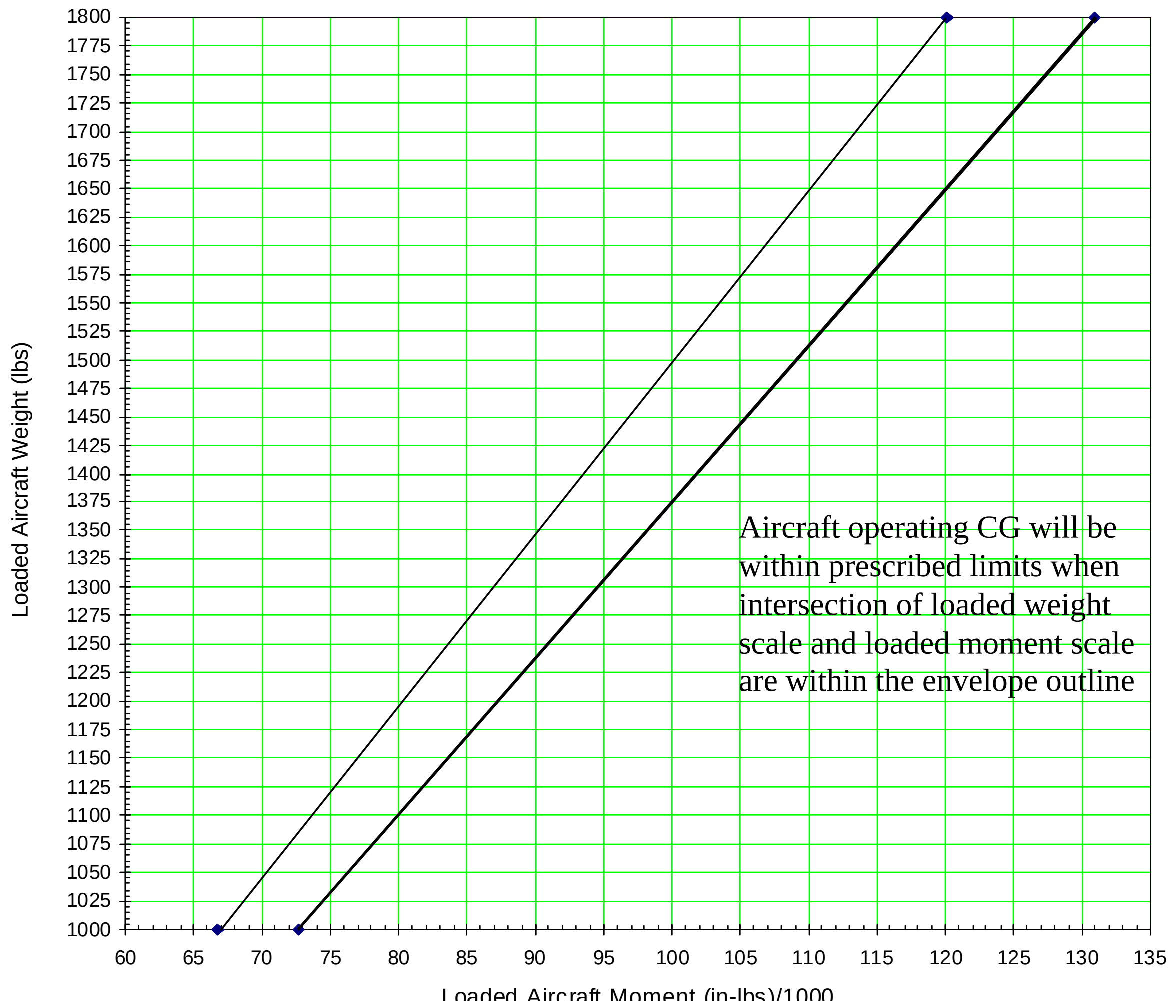
A list of all equipment included in the Empty Weight is to be attached to this form.

7/15/97 CKT

Mustang II

Moment Determination





Center of Gravity Moment Envelope

1/31/99

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Mustang II Service Letter

Date: April 19, 2021

Subject: Weight and Balance on a newly acquired Mustang

To safely operate a Mustang II, the Center of Gravity needs to be between stations 66.75 and 72.75 at all times during the flight. Flying out of the CG limits will have detrimental effects on the handling characteristics of the airplane. Upon acquiring a Mustang II a new owner should weigh the airplane and redo the weight and balance worksheet before any aerobatic maneuvers are performed and certainly before carrying a passenger. Do not trust the paperwork as it could be out of date or incorrect to begin with.

As part of a pre-buy inspection a quick and easy way to get an estimate of the empty weight CG is to weigh the tailwheel with the airplane in the level flight attitude. A typical *empty* Mustang II should have a tailwheel weight of between 34 and 45 pounds.

For a typical set up the weight on the tailwheel should be the empty weight multiplied by 0.034 (3.4% of the empty weight). A weight much higher than this value indicates an aft empty weight Center of Gravity and a possible aft CG problem.

The main gear station location can play a factor here and change the 0.034 multiplier a fair amount if its located much different than sta 58.7. If the main gear is further forward there will be more weight on the tailwheel. The following page is a print out of a Tail Weight Excel worksheet file that is available on the Mustang Website:

http://mustangaero.com/downloads/Mustang_Revisions/M-II%20Revisions/Mustang-II_Tail_Weight.xlsx

The empty weight CG location for most Mustang II's should be close to station 64.5 but this can vary and the airplane may need to be modified for a new owner. For example a builder that weighs 230 pounds or more will probably have the empty weight CG set a little further forward so the airplane may need to be changed for a new owner that only weighs 140 pounds. Moving the battery or other equipment is the easiest way to do this.

An Excel worksheet for the weight and balance of a Mustang II can be found here:

http://mustangaero.com/downloads/Mustang_Revisions/M-II%20Revisions/Weight_and_Balance_Mustang-II.xlsm http://mustangaero.com/downloads/Mustang_Revisions/M-II%20Revisions/Mustang-II_Tail_Weight.xlsx

For a Mustang II with:

Sta Location Main Gear =	58.7	[typical value but can change for specific airplane - NOTE a small change will make a noticeable difference] [this is per the plans with the main gear axle 15" fwd of sta 73.75, the center of the C/S main spar]
Sta Location Tailwheel =	228	[typical value but can change for specific airplane]
Sta CG empty =	64.5	[should be close to 64.5 but can change for specific airplane]
Header Fuel Tank =	0	[change to appropriate gallons - NOTE each 8gal only reduces tail weight by 1 pound]

Weight Tail = [Weight Empty * (Sta Loc CG Empty - Sta Loc Main)] / (Sta Loc Tail - Sta Loc Main)

So For a Typical Mustang II: Weight Tail = 0.034 * Weight Empty

Weight Empty =	1000	[enter a value]
Then:		
Weight with Fuel =	1000	
Sta CG with Fuel =	64.5	
Weight Tail =	34.3	pounds

Weight Empty =	1275	[enter a value]
Then:		
Weight with Fuel =	1275	
Sta CG with Fuel =	64.5	
Weight Tail =	43.7	pounds

** Note the tailwheel needs to be weighed in the level flight position. For a standard M-II, the cockpit side rails should be level as shown above.