

341

PHOENIX, AZ  
MAY 27  
1982



# SKYBOLT NEWS

12026 South Tomi Drive  
Phoenix, Arizona 85044

Copyright 1982 H.G.McKenzie  
all rights reserved

FIRST CLASS MAIL

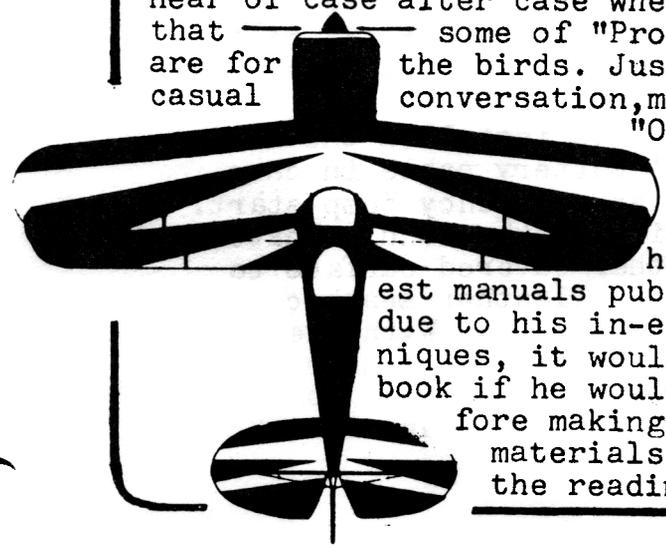
SERIES #5, VOL.#4

# 351

Randy Echtinaw  
402 W. South St.  
Hastings, MI. 49058

## HANGAR FLYING with MAC

Reflections.....some further comments on an earlier article in Series #5, Vol.#2 regarding "Old Mechanics" advice that is in sharp contrast to that which is advised by the manufacturer of a given product. Point in case....proper application of the Stit's covering process. Ray Stit's has spent many thousands of dollars in testing and researching his products to insure that the quality of his product is beyond reproach. Yet, today, we hear of case after case where some "Old Salts" are advising that some of "Procedure Manual" recommended methods are for casual the birds. Just recently I had a customer who, in conversation, mentioned that he had talked to an



"Old Mechanic" and discussed the proper method for shrinking Poly-Fiber (dacron) fabric. Now, prior to my conversation with this customer, I had supplied him with all of the latest manuals published by Stit's and told him that due to his in-experience with modern covering techniques, it would be best for him and his pocket-book if he would carefully read this material before making his first purchase of any covering materials. While presenting him with all of the reading material, I carefully instructed

him in the proper use of a Flat Iron for the fabric shrinking process. I also instructed him in the need for "Calibrating" his Flat Iron to achieve the success he was entitled to with his choice of the Stit's Process.

When my customer came back about a week later to make his purchase, "Lo and Behold" he floors me with the statement that this "Old Mechanic" had advised him that a Flat Iron was a waste of time and that if he would come by his shop that he would loan him a "Heat Gun" so he could do the job properly. Since my customer knew after talking to me earlier, how very important it was to use the proper temperatures, he asked the "Old Mechanic" what method he should use with the "Heat Gun". I could'nt believe my ears when he said he was told to just tighten the fabric as much as he could and just go by feeling the fabric for tautness. When he asked the "Old Mechanic" what happened if he used too much heat in any given spot, he was told..Oh, once in awhile that happens but it only makes a "Hard Spot" in the fabric and does'nt hurt anything. That "Hard Spot" he was told about was the near melting of the fabric and occurs at the "Transformation Point" between ruined fabric and a "Big Hole". The "Old Mechanic" was in the process of restoring and recovering a Staggerwing Beech at the time of his conversation with my customer. By the time this "Old Salt" is through, it should'nt cost his customer more than \$10,000.00 for a "Custom Applied, Ruined In Advance, Cover Job."

#### THE GATES BATTERY\*\*A SEALED, LEAD ACID, NON-VENTED SYSTEM

Finally! a battery designed expressly for Aerobatic and Homebuilt aircraft. The following photos #1, 2, and 3, show this beautiful power package installed in the McKenzie-Udall Skybolt N99MU. Battery location is just aft of the rear seat and to the righthand side of the fuselage.

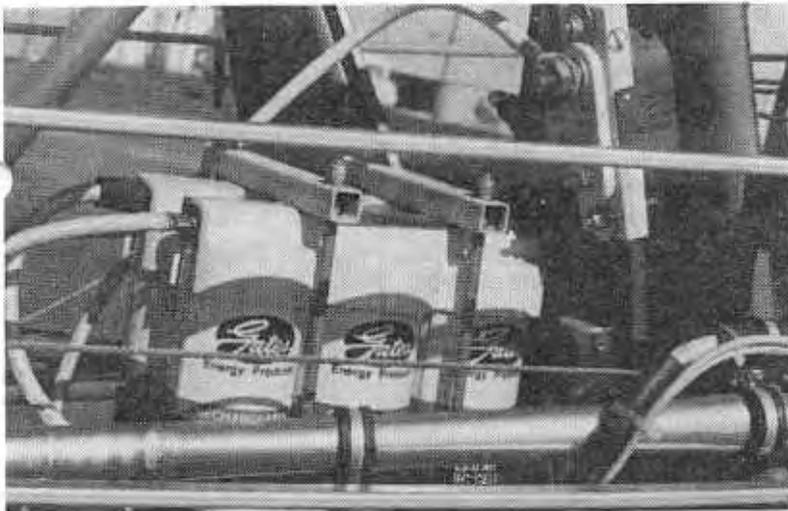
In photo #3 you will see how we have installed the female receptacle for the external battery cable in case it is ever necessary to provide an emergency jump start. The seatback panel is covered with leather and we have made a plug with a matching leather covered surface to fit into the female receptacle. The leather seatback cushion stays in place with Velcro Strips. With the Aux. power receptacle mounted in this fashion, we can eliminate designing and installing some type of more complex external socket on the aircraft. Mike came up with the

# 353

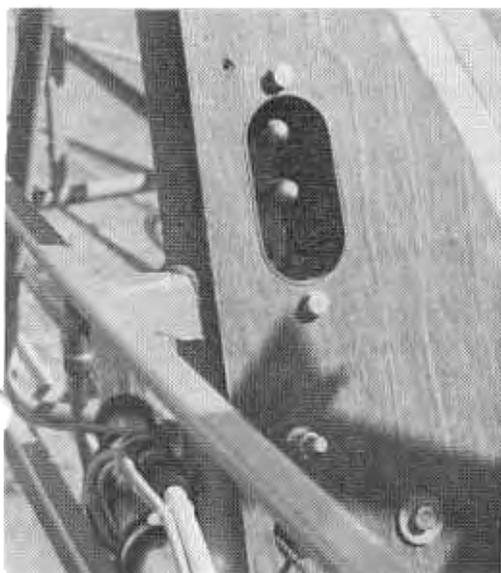
idea for this installation and a very good one it is.



#1 This shot was taken from the lefthand side of the fuselage just aft of the rear seat. In the lower foreground is the elevator push-pull tube that goes from the reverser to the walking beam. Note the simple battery mounting and hold downs. Hidden from view by the push-pull tube is a grounding lug welded to the fuselage.



#2 This shot was taken from the righthand side of the fuselage just aft of the rear seat. Note the connections to the aft side of the Aux. Power supply, female receptacle. In the foreground is the 1" o.d. alum. tube that goes from the firewall to just in front of the tailwheel. It's the crankcase breather line. Not clearly shown, but also mounted on the aft side of the seatback panel the Master Switch Solenoid.



#3 This shot is of the front face of the rear seat, back panel, showing the Aux Power receptacle.

This is also a pretty fair shot of the aluminum stringer and stringer stand-off at the rear seat. The stringer shown is the center stringer of the 3 used on the sidewall. When the photo was taken, a Cleco was in place to hold the stringer. A Stainless Pop-Rivet is used for final installation.

(3)

This 6-cell, 12 Volt Gates B-C Energy Pak is just what we have been waiting for. The following information has been taken verbatim from the Manufacturers brochure.

Features:

- 1. It's lighter than conventional batteries..weighs just 22 lbs.
- 2. More cranking power...44% more\*
- 3. Leak proof..Totaly sealed power cells ideal for aerobic or inverted flight
- 4. 1200 Amp surge capability
- 5. Compact Size..7.7 x 5.1 x 6.8..Fits standard bat. box
- 6. 10 year service life.. with normal care
- 7. Liquid free design..Totally rechargeable for years of service life..

A note from yours truly. This is not a Gel-Cel type of battery.

\* Based on mfg'rs. estimates

The Manufacturers description of the 2 volt, 25.0 amp/hour sealed rechargeable "B-C" cell is as follows.

The unique design of the Gates Energy Cell overcomes many of the former limitations of the lead acid system. At the same time, it retains the low cost, reliability, ruggedness and long life which have always been assets of the lead acid battery. The cell is truly sealed--no loss of acid, acid vapor or water-- and incorporates recombination of gases within a starved electrolyte system. This unique cell is constructed with thin, spirally wound, pure lead plates which result in low impedance, low corrosion and long life. The self-resealing safety valve will vent under abusive overcharge conditions at an internal pressure of 50 psi.

- a. Can be charged or discharged in any position
- b. Use constant current or constant voltage charging
- c. Can be used for fast cycling or long term float applications
- d. Low internal impedance allows VERY HIGH DISCHARGE CURRENTS
- e. No loss of electrolyte during normal overcharging
- f. Excellent mechanical and vibrational strength.
- g. Absolutely "NO MEMORY EFFECTS"
- h. No damage due to cell reversal
- i. The metal can is electrically isolated preventing accidental shorting.
- j. Cells can be paralleled for additional capacity

Most of you are well aware that normal lead acid batteries lose their stored energy when allowed to stand idle. Elec. Engineers call this an "OPEN CIRCUIT" state. This loss of energy is due to the fact that the active materials are in

a thermally unstable state. The rate of discharge is dependent on the chemistry of the system and the temperature at which it is stored.

The Gates Cell is capable of LONG STORAGE PERIODS without damage. A fully charged B-C Cell has a voltage rating of 2.18 volts. When a B-C Cell has self discharged down to 2.05 volts ( Open Circuit Voltage ) the cell is in a state of charge of 35%. At this state of charge, the B-C Cell has 82% of it's normal storage time still remaining at 25 degrees Centigrade (77 degrees F. ) If a fully charged Cell has a storage time of 1200 days, then our Cell which has self discharged to 35% of full charge still has 984 days left before it will self discharge to a level of 1.81 volts which is the lowest point that a B-C Cell should be allowed to reach before re-charging. At 0 degrees C. (32 degrees F.) it will take approx. 7000 days for a "B-C Cell" in an Open Circuit state to self discharge from 2.18 volts down to 1.81 volts.

Most subscribers know that I have been anything but complimentary, about Gel/Cell batteries. I have friends who have hangars full of them ( Dead as a door nail) that have failed within very short time periods. Usually 6 to 8 months. In my part of the country, due to high temps. and low humidity, Gel/Cels dry out and become useless in a short time. Another enemy of the Gel/Cell is the high initial charging rate that occurs after a hard engine start and the generator or alternator comes on the line with a blast of high current. At this time you may wish to re-read some of my comments in Series #3, Vol. #4, Page #1 and 2. After all of this, you can readily see why I have never invested in a dealership for Gel/Cels.

NOW!.....HOLD YOUR HAT "HEATHCLIFF".....TIMES AND THINGS IS CHANGING.....As of Dec. 1,1982..... STARFIRE AVIATION,INC. has been awarded a dealership for Gates Energy Paks and we now have them in stock along with the required, approved battery charger.

Model EM820-2005  
12 Volt, 25 Amp Hour Energy Pak.....\$179.50

Model EM1225-CC11B1  
Battery Charger.....\$ 92.50

I agree with you that the price is high. But, when you amortize the cost over the life expectancy of the battery, it amounts to a price of \$17.95 per year."Hell's Bells",

346  
Pedro! You spend more than that just for flashlight batteries for junior's elec. frog that you bought for Xmas.

### PLANS TYPE LANDING GEAR, RE-VISITED

Before I launch into this article about the "Plans Type" Landing Gear, let's regress to the March 1977 issue of the Skybolt News and make a correction. On Page 8, on the 6th. line up from the bottom. The line reads as follows. "mark on the longeron, 6" aft of the centerline of the "O" Station vertical tube." Correct this line to read as follows. "mark on the longeron, 11" aft of the "O" Station.

The correction above moves the Axle back 5" from the point called out in the plans and results in a beautiful handling "Bolt", both from the taxi mode as well as the take-off landing mode.

I have had many, many conversations with builders who have completed their aircraft only to be completely dissatisfied with the way that the Skybolt handled in respect to the gear. Some of the conversations have been with builders who have ground looped their "Bolt" with resulting major damage and are now in the process of building a new gear assembly. As a "Case in point"... the following is a letter from one of our good customers who finished his "Bolt" back in 1977. Fortunately he was never involved in an accident due to the gear, but on the other hand, was completely disgruntled his Skybolt. In 1980 he asked me to build him a new set of Horizontal Tail Surfaces with Dynamic Balance. Also on the order was 1 each, new set of Landing Gear Legs for which he sent me the measurements taken from his fuselage fittings. But alas, enough of my rambling on. Let Mal Meadow tell you in his own words exactly what happened after he made the change over to the new parts.

210 E. CESSNA DR  
ERIE, COLO 80516  
MAY 8, 1982

HI MAC,

JUST FINISHED INSTALLING THE NEW  
LANDING GEAR YOU BUILT FOR MY 'BOLT  
(AT LONG LAST!) AND THOUGHT YOU  
MIGHT BE INTERESTED IN THE RESULTS.

FIRST COMMENT: THE FIT TO THE EXISTING MOUNTS WAS OUTSTANDING - AS GOOD OR BETTER THAN THE ORIGINAL GEAR, AND THAT'S NOT EASY TO DO WHEN THE AIRPLANE IS 1000 MILES FROM WHERE THE STRUTS ARE BEING FABRICATED.

WEIGHT ON THE TAILWHEEL IS NOW 118 POUNDS WITH A CHUTE IN THE REAR PIT AND 18 GAL. OF FUEL (FRONT PIT EMPTY). LANDINGS (3 POINT & WHEEL) ARE MUCH BETTER, PARTICULARLY THE 3-POINTERS (AND I NEED ALL THE HELP I CAN GET!). TAKEOFFS ARE ALSO IMPROVED GREATLY - NO MORE TENDENCY TO "SKIP" ON TRANSITION FROM GROUND RUN TO FLIGHT.

ALSO, AND THIS MIGHT BE MY IMAGINATION, BUT ELEVATOR FORCES SEEM TO BE SLIGHTLY LIGHTER DUE TO PLACEMENT OF THE GEAR, AND CONSEQUENTLY THE C.G., FURTHER AFT.

ALL IN ALL, THE MOD WAS WELL WORTH THE TIME AND MONEY - MANY THANKS!

BEST REGARDS,  
Mal  
MAL MEADOR

DUAL CANOPY INSTALLATION ( PART 5)

In Series #4, Vol. #6 , on Page 12, we see 2 Photos of the Canopy Locking Pins that are operated by the combination Lock Pin Lever and Indicator. In Photo #4 of this issue we see an exposed view of the inner workings of the Canopy Lock Pin Control mechanism. For purposes of clarity, the Rear Instrument Panel is removed.

In Photo #5 we see a view of the "Pulley Mounting T" A cable runs from the Cable Bushing shown, down and under the Lower Pulley and then to the Control Knob and Shaft assembly shown in Photo #6. The Control Knob is located in the center of the Rear Instrument Panel, the Shaft of which, operates on the under side of the fuselage cross-member to which the Instr. Panel is attached. The Panel that you see in Photo #4 is the Front Seatback, Bulkhead.

Fig #4

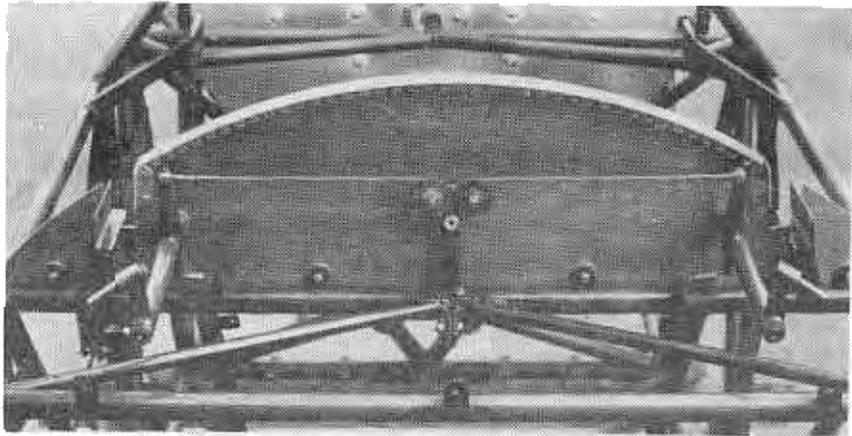
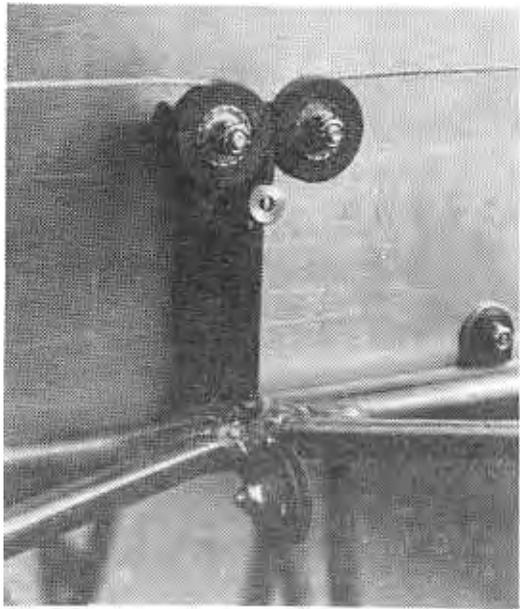


Fig #5



"LOCKED"

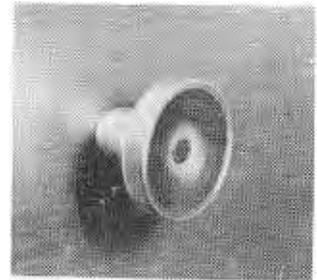
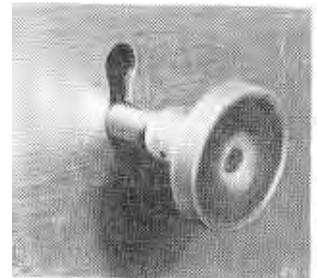


Fig #6

"UN-LOCKED"



### NEW AILERON HINGES FOR THE FIREBOLT.

The new Aileron system that I have designed for the Firebolt can very effectively be used on the Skybolt since I am using the very same basic wing on the Firebolt. I have long felt, that a contributing factor to the Aileron Flutter problem of the Skybolt was partly due to the very wide spacing of the Aileron Hinges. This results in the mass of the Aileron (span wise) being un-supported and thereby reacting as a spring at the very slightest vibration induced resonance. Therefore, on the Firebolt I decided to install a 3rd Aileron Hinge on each Aileron. It is a simple matter on the Lower Wings since we have an open wing rib bay right in the center of the aileron. On the Upper Wing we have to make a slight change. The present inboard hinge stays right where it is shown on the Skybolt Plans. The outboard hinge is moved to the outboard side of the rib at Sta. 123. We now install a 3rd Aileron Hinge at Sta. 106.5. Slave Struts are still used on the inboard set of hinges ( Upper and Lower ).

The new Aileron mounting system should result in a much firmer support of the entire surface. NOW....since all Aileron systems are subject to being proved through extensive flight testing I do hereby categorically state that if you choose to use this system and the following hinge design shown in FIG. #1, you are completely on your own and do so at your own risk.

The 2nd objective while not as important as the aerodynamic objective, is however worthy of "Top Billing". For too long now, builders of many designs are at the mercy of the Designers whims and fancies. People are getting tired of "Heating and Beating" 4130 sheet steel into weird shapes and configurations. AND, you can believe me mister when I say, YOU ARE NOT GOING TO MAKE A QUALITY AILERON HINGE CHANNEL THAT MOUNTS ON THE AILERON SPAR UNLESS.....YOU HAVE ONE HELL OF A VICE, BENCH AND THE BIGGEST LEATHER MALLET MADE. On top of all of this it is imperative that you make a steel bending block. Just writing this last paragraph has left me physically breathless just thinking of the chore.

Now.. 'long come this lazy 'ole Scotchman who says "Hoot Mon", let's take the stuff off the shelf and do it the easy way. And, since there's nothing new under the sun really, let's take part of an Old Design" and put 1 New part with it to make our new Aileron Hinges easy to make.

In FIG. #1 you will see our new hinge. The forward half of the hinge which is bolted to the aft face of the rear wing spars is made ala Starduster Too with a slight change in material thickness and type. The Main Web that carries the KP3A Bearing is .250 -- 2024 T3 Aluminum. The riveted Flanges are .125--2024 T3 extruded Aluminum Angle with radiused edges and inside corner. The only other permissible change in material that is allowed is 7075 T6 Alum. in place of the 2024 T3. The Alum. Rivets must be AN470AD4 Rivets. No substitution of Rivets is permitted.

When reaming the holes in the 2024 T3 alum.hinge webs it is mandatory that the hole for the KP3A Bearings be reamed exactly .0005 undersize. This will insure that the bearing fits with a light "Press Fit". If the hole is over size, "SCRAP THE PART". If the hole is more than .0005 undersize you greatly increase the risk of starting a stress fracture in the Alum. Web at the very tip or you will distort the Bearing to the point that it binds during operation.

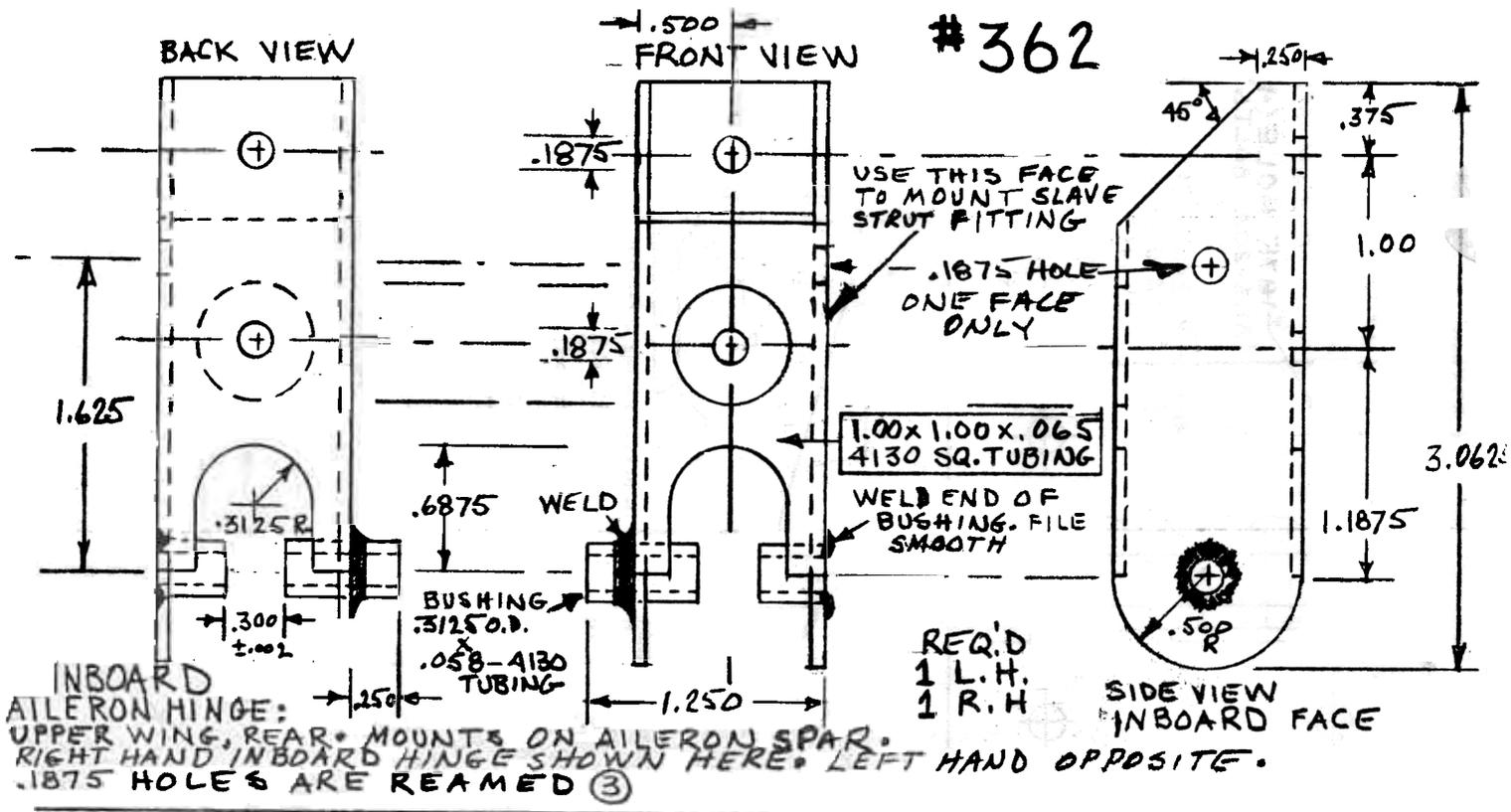
With respect to the Rear portion of the Aileron Hinge that bolts to the Aileron Spar, it is a simple matter of removing some of the metal from the 1"x1"x.065 - 4130 Square Tubing to produce a very accurate part. A nice feature that results from this newly designed part is that we acquire a nice wide..smooth...mounting surface 1" wide compared to approx. 5/8" on a "Plans Type" "Heat and Beat" fitting used on the Skybolt. You will last of all, "Happily Note", there are only 4 4130 parts to make and they are used on the Inboard Ends of both Upper and Lower Ail. The rest of the Rear Hinge Portions are made from the same Alum. Angle that we used to Rivet to the Webs for the Forward Portion.

#### CHECKING THE THRUST LINE

Since we are running out of space in this issue, I will cover the specifics of the Thrust Line in the next issue.



#362



INBOARD AILERON HINGE. LOWER WING. REAR. RIGHT HAND INBOARD HINGE SHOWN. LEFT HAND OPPOSITE. MATERIALS SAME AS ABOVE.

