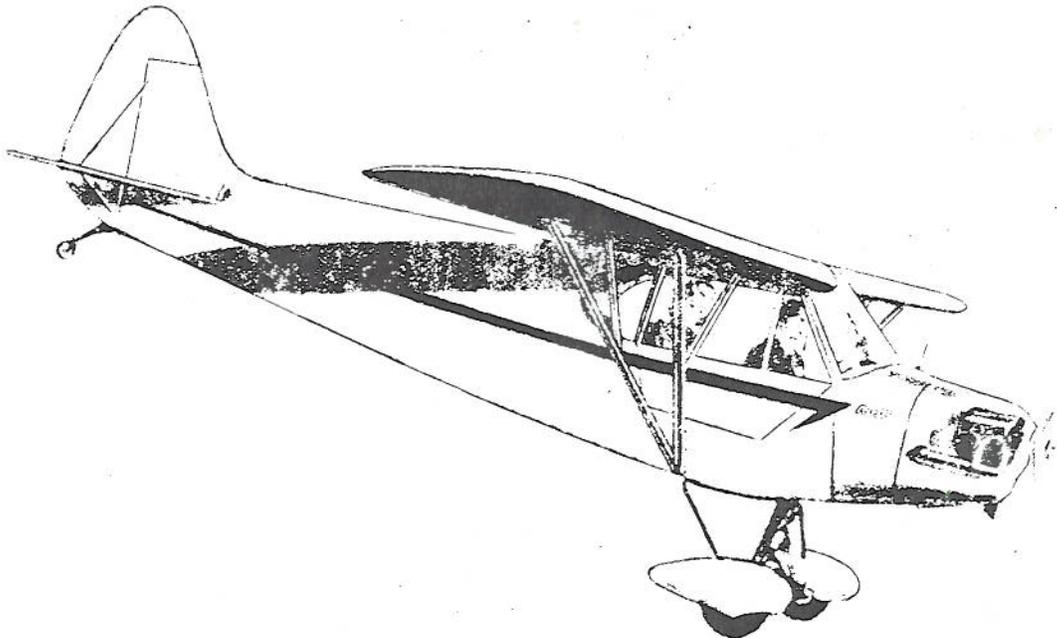


Engineering Details
on

REED CONVERSION

of
PIPER J3C-65



to
CLIPPED-WING CONT. A-75

EARL C. REED

1805 GRAND AVE. ROOM 215 KANSAS CITY, MO.

OCT 7 1952

***** MODIFICATION ADVANTAGES *****

1. BETTER PERFORMANCE.
2. APPX. SAME OPERATING COSTS.
3. LESS EXPENSE TO RECOVER WITH FABRIC.
4. LESS HANGAR SPACE FOR 28' WING.
5. BETTER DIRECTIONAL STABILITY.
6. BETTER ROUGH WEATHER CHARACTERISTICS.
7. EASIER TO HANDLE ON GROUND.
8. LESS AFFECTED BY GUSTS WHEN PARKED.
9. STRONGER OUTBOARD FITTINGS FOR TIEDOWNS.
10. BETTER APPEARANCE.
11. STRONGER STRUCTURE DUE TO SHORT COUPLING.
12. LIGHTER WEIGHT.
13. EASIER TO CLEAN & KEEP CLEAN.
14. LESS CHANCE FOR DRAGGING WING TIPS.
15. BETTER MANEUVERABILITY. *
16. IMPROVED VISIBILITY.

The Wing layout Presented in this set of plans is basically the same as the four place PIPER CLIPPER with the exception that the Orig. J3 cabane assembly is retained. The length of each panel is identical to the CLIPPER, but the total span is somewhat less due to the difference of fuselage width.

The J3 Triangle Cabane Necessitates the continued use of this sturdy but unusual Root Design. No changes in the Cabane Structure is therefore needed.

The Main Spar Modification consists of laying off a distance of 40 1/2" from Root of spars which should bring the root end compression Tube up to the holes that formerly anchored the Second outboard Compression Tube. Hence, no new holes need be drilled in the wood spars in this area. Then it is just a matter of Removing the unneeded main & false Ribs and reinstalling the Orig. Root Rib & Tube in their True positions at the new location.

If the Orig. Root Tube is retained along with the Root Rib, then the Cable fairlead can be used as it was in the Reg. Wing., Therefore, no change is needed in the Compression Tubes.

Orig. Diam. of Root Bay Drag & Antidrag wires shall also be retained.

This System is then a matter of Removing the Unnecessary items, and Retaining the proper ones.

The only new holes that will be needed are the Root Wing Fitting holes, and they may be laid out by using the discarded spar ends as a pattern. These fittings shall be Drilled & Installed Exactly as they were before., the Jury Strut Fitting holes, and the Outer Strut Fitting Reinforcement holes are Described in detail elsewhere in this Manual.

It will be necessary to obtain an Extra set of Front (large) Struts for this Modification. They will be used, when modified to replace the smaller Rear Struts formerly used.

Modification of All Four Struts is Covered in detail.

The Final Main Revision is in the Aileron Cables which must be Shortened to properly Rerig the Controls, which presents no problem. The revised Cables should not be rigged to Taunt and Turnbuckles should show not more than THREE exposed threads after rigging.

In Final assembly, it should be born in mind that your ship will now have Improved performance and the entire Airframe should be Reinspected for Old & Brittle Window Material, Broken Lockstitch Cords, & Loose Fairing & Accessories. A Trim Ship is not only a Joy to the Owner, but is also Appreciated by the Flying & Nonflying Public Alike.

Each of the Sections should be thoroughly studied & understood before starting the Work. All work to be done or Supervised by a properly Certificated Mechanic, and He shall sign all the proper Logs & Forms the same as any similar Alteration or Repair.

HELPFUL WING MODIFICATION SUGGESTIONS

- #1. First remove wings from fuselage and layout on Saw horses or wing stands at a suitable height for easy working and inspection.
- #2. If Wing Fabric is in good condition, Remove only enough fabric from Root End to allow removal of #2 Comp. Tube. Otherwise, remove carefully, all fabric and clean and inspect entire wing structure and accessories for damages & Repairs. Make out list of items needing Attention.
- #3. Remove Leading Edge material at root end and loosen Drag and Antidrag wires in Root Bay. Then Remove all False Ribs, Reg. Ribs, and Root Compression Tube From Root Bay. This will leave the Spars Bare up to Comp. Tube #2.
- #4. Layoff the Exact distance of $40\frac{1}{2}$ " from Root on each Spar. This mark should be transversed vertically with pencil by using a tri square on face of each Spar. Also mark across top of Spar at same point for a sawing guide. A thin piece of scrap wood should be clamped on the opposite side of Spar from which you intend to saw. this gives a smooth saw cut.

NOTE.... Always Double check dimensions before sawing....

- #5. After sawing Front Spar Squarely off at the $40\frac{1}{2}$ " mark, lay off lower slope line and saw off at same angle as Orig. (appx. 103°) but use the section of Spar that you just removed as a pattern as some ships do vary. Use same method on rear spar. Square cut. (no slope). When all Cuts have been made then plane & sand smooth and apply First Coat of Varnish immediately. (never leave saw cuts over nite without protection.) First Coat can be thinned before Applying. Two more coats of regular Spar varnish to be Applied later.
- #6. While Varnish is drying, remove #2 Compression Tube and Bolt Root Compression Tube in the #2 holes. Check over conditions of Root Ribs & make any reinforcements or repairs as may be needed.
- #7. When Varnish has dried, layout holes to be drilled for Root Spar Fittings. One Successful Method of doing this is to find the angle of hole centers on the old spar section (front) and lay off similar line on new Spar end. On most ships checked this angle was appx 103° but you should still check the angle on your own spars and use them as a pattern. Then slip Spar fitting into place on front spar with slope line showing thru exact centers of each fitting hole. Tap end of fitting snugly up against end of Spar & double check hole alignment again before clamping fitting to spar with parallel or 'C' Clamps.
- #8. With Fittings firmly clamped in proper position, start drilling the holes as follows. Chuck up proper size drill bit in a hand brace and drill by hand thru holes in fitting only far enough to establish the hole outlines. (appx $3/16$ " deep.) this should be done from both sides of spar fitting. Then remove fitting (which has not been damaged by excessive hole drilling)

WING MODIFICATIONS (con) #2.

- #8.(con.) and finish drilling the holes approx. 3/5ths of the way thru the spar electrically from both sides. This is considered the safest method of all for this opp. However, use whichever method the local inspector in your region favors. Holes for Jury & Reinf. fittings to also be drilled at this time.
- #9. After all holes have been drilled, Clean & Varnish areas covered by fittings and start installing all ribs, fittings, and drag wires etc. and safety cables.
- #10. Trammel wing in the usual way and finish by installing the Beading Edge material & trim off excess at Root End. Also, trim off excess trailing edge material. Catch up all other items on your list, and tape up all sharp edges and joints where fabric would bind or crack.
- #11. Follow this same System for the other wing panel. make up a list for this wing also.
- #12. Cover Root Ends and patch holes at outer points. Lockstitch, Dope, and Paint in usual way.
- NOTE... Cables should be tied taut in their proper positions before lockstitching, and checked later for binding. The rest of the modifications are described elsewhere in this manual.



NOTE.... ALWAYS MATCH WING FITTINGS TO FUSELAGE FITTINGS AFTER MODIFYING
AND BEFORE COVERING OR PATCHING ROOT END.

CONSULTING ENGINEERS
CALCULATIONS FOR

MADE BY _____ DATE _____ JOB NO. _____
CHECKED BY _____ DATE _____ SEC NO. _____
SHEET NO. _____

SECTION # I

REPAIR & ALTERATIONS

WINGS &AILERONS

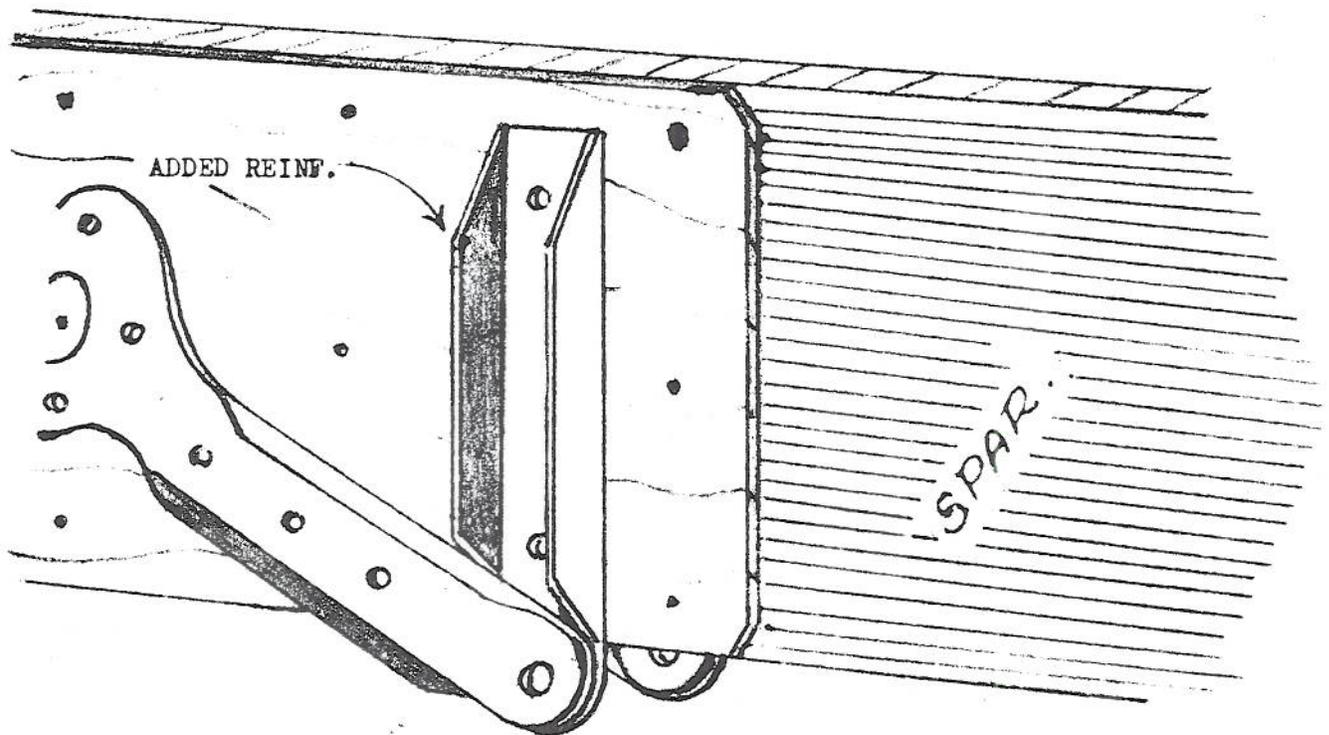
1

VERTICAL REINF. FITTING IS UTILIZED TO COMPENSATE FOR ECCENTRIC STRUT LOADING.

NOTE.... THIS FITTING ALSO REDUCES BENDING LOADS DUE TO TIE-DOWN STRESSES.

INSTALLATION PROCEDURE

OPERATION# 1. BOTTOM OF EACH REINF. FITTING IS INSERTED UNDER BOTTOM OF ORIG. FITTING & A TEMPORARY BOLT OF PROPER SIZE INSERTED THRU ALL FOUR FITTINGS AT THE STRUT END BOLT HOLE. THIS WILL LINE - UP THE LOWER END OF THE FITTINGS.



OP # 2. TOP OF BOTH REINF. FITTINGS SHOULD BE MOVED TO VERTICAL POS. BY USING A TRI-SQUARE OR SIMILAR TOOL, THEN CLAMP IN THAT POS. OVER TOP OF SPAR WITH A "C" CLAMP.

OP # 3. AFTER RECHECKING VERTICAL ALIGNMENT THE TOP $\frac{1}{4}$ " HOLE SHOULD BE DRILLED HALF WAY THRU FROM EACH SIDE & THE PROPER BOLT INSERTED.

OP.# 4. EACH SUCCEEDING HOLE FROM THE TOP ON DOWN SHOULD BE DRILLED AND BOLTED AS IN OP.# 3.

OP.# 5. SAFETY ALL NUTS. REMOVE "C" CLAMP & REMOVE LINE - UP BOLT.

FOLLOW SAME SERIES FOR THE OTHER THREE SPARS.

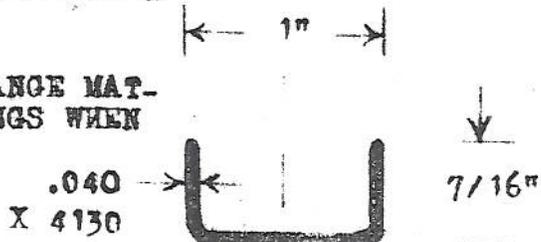
NOTE... SPAR AREAS SHOULD ALWAYS BE CHECKED FOR SUFFICIENT AMTS. OF VARNISH & PROTECTIVE APPLICATIONS.

CALCULATIONS FOR **SPAR FITTING REINFORCEMENTS**

8 REINF. FITTINGS ARE NEEDED FOR THIS CONVERSION.

4 CUT RIGHT HANDED AS ILLUSTRATED &
4 CUT LEFT

REMOVE ONLY ENOUGH SIDE FLANGE MATERIAL TO CLEAR ORIG. FITTINGS WHEN CHANNELS ARE VERTICAL.



NOTE... IF 7/16 X 1" X 7/16" CHANNEL IS NOT AVAILABLE AT TIME OF CONVERSION THEN 1" SQUARE STEEL TUBING OF .040 X 4130 MAY BE USED BY SAWING IN HALF.

ONE PC. OF 1"^{sq.} X 6"^{lg.} TUBING WHEN SAWED IN HALF MAKES TWO FITTINGS. EDGES TO BE FILED SMOOTH AFTER SAWING.

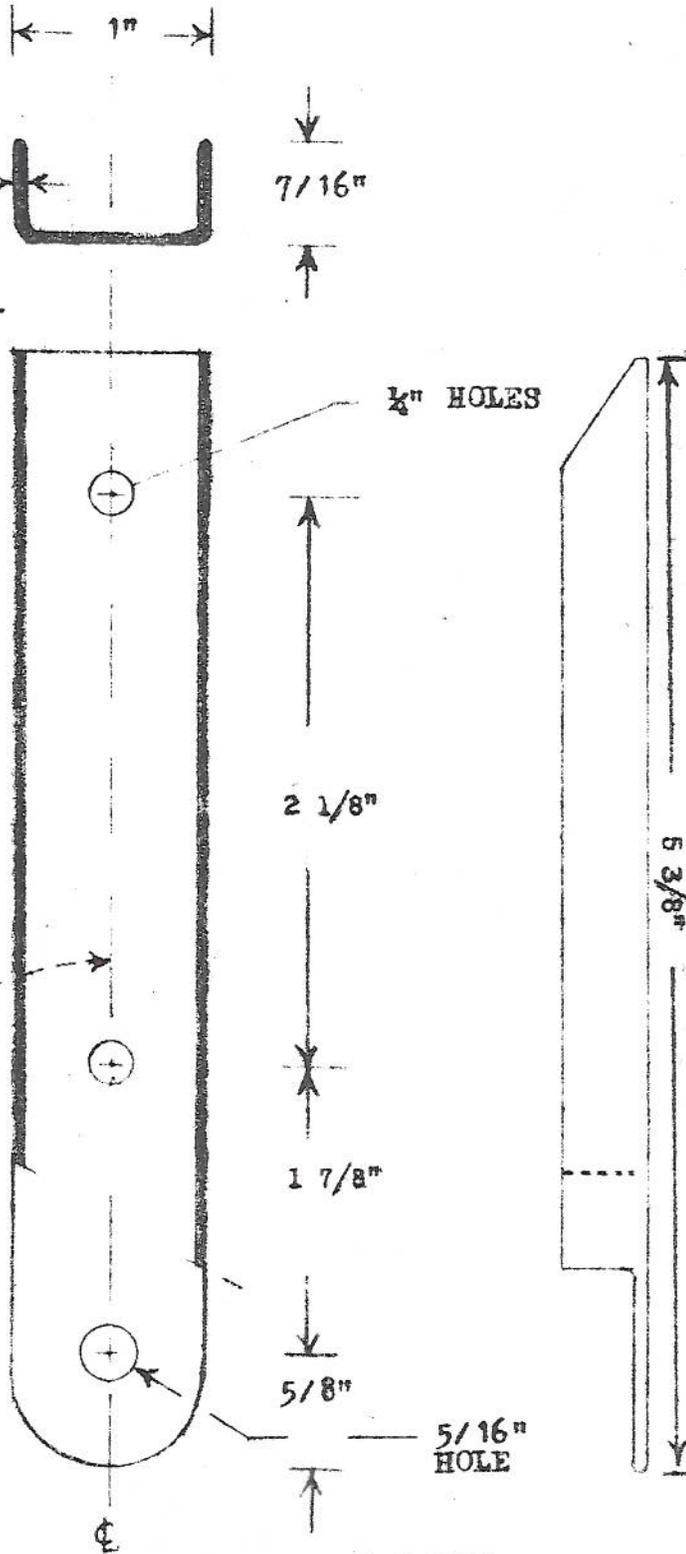
FITTING HOLES ARE THEN READY TO BE DRILLED AND SHOULD ALWAYS BE DRILLED UNDERSIZE, THEN REAMED TO BOLT SIZES.

AFTER HOLES HAVE BEEN REAMED, EACH FITTING SHOULD BE THOROUGHLY CLEANED AND THEN PRIMED WITH A GOOD GRADE OF RED OXIDE PRIMER OR ZINC CHROMATE.

60° plus or minus to clear strut fitting

NOTE... LET PRIMER DRY THOROUGHLY BEFORE INSTALLING.

IF WINGS ARE COVERED, THEN SUFFICIENT FABRIC SHOULD BE REMOVED TO FACILITATE PROPER DRILLING & INSTALLING AT OUTBOARD STRUT POINTS.



Att. # D

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CHECKED BY _____ DATE _____ SEC. NO. _____

SHEET NO. _____

SECTION # 2

REPAIR & ALTERATIONS

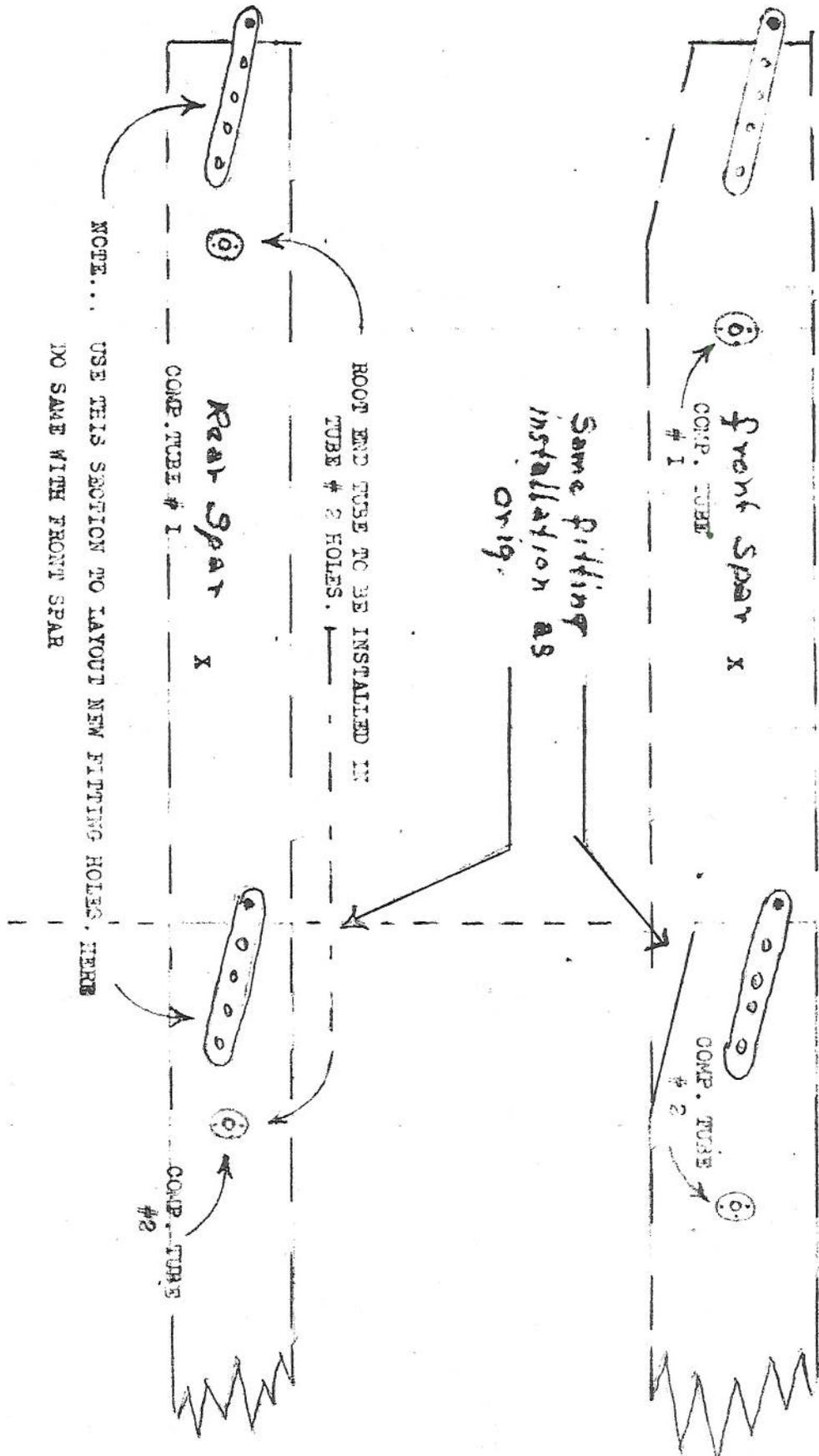
FUSELAGE & STRUTS

2

CALCULATIONS FOR

X... SPAR SECTIONS TO BE REMOVED
40 1/2"

Some fitting
installation as
orig.

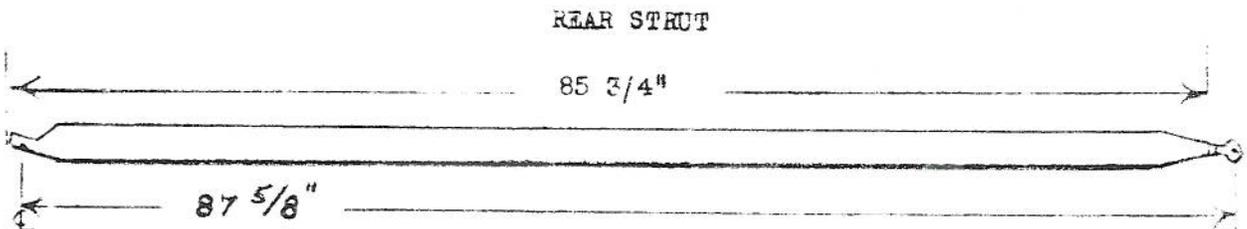
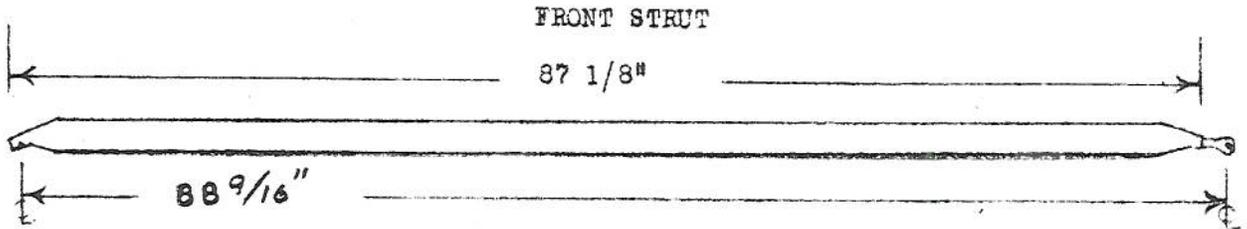


NOTE... USE THIS SECTION TO LAYOUT NEW FITTING HOLES. HERE
DO SAME WITH FRONT SPAR

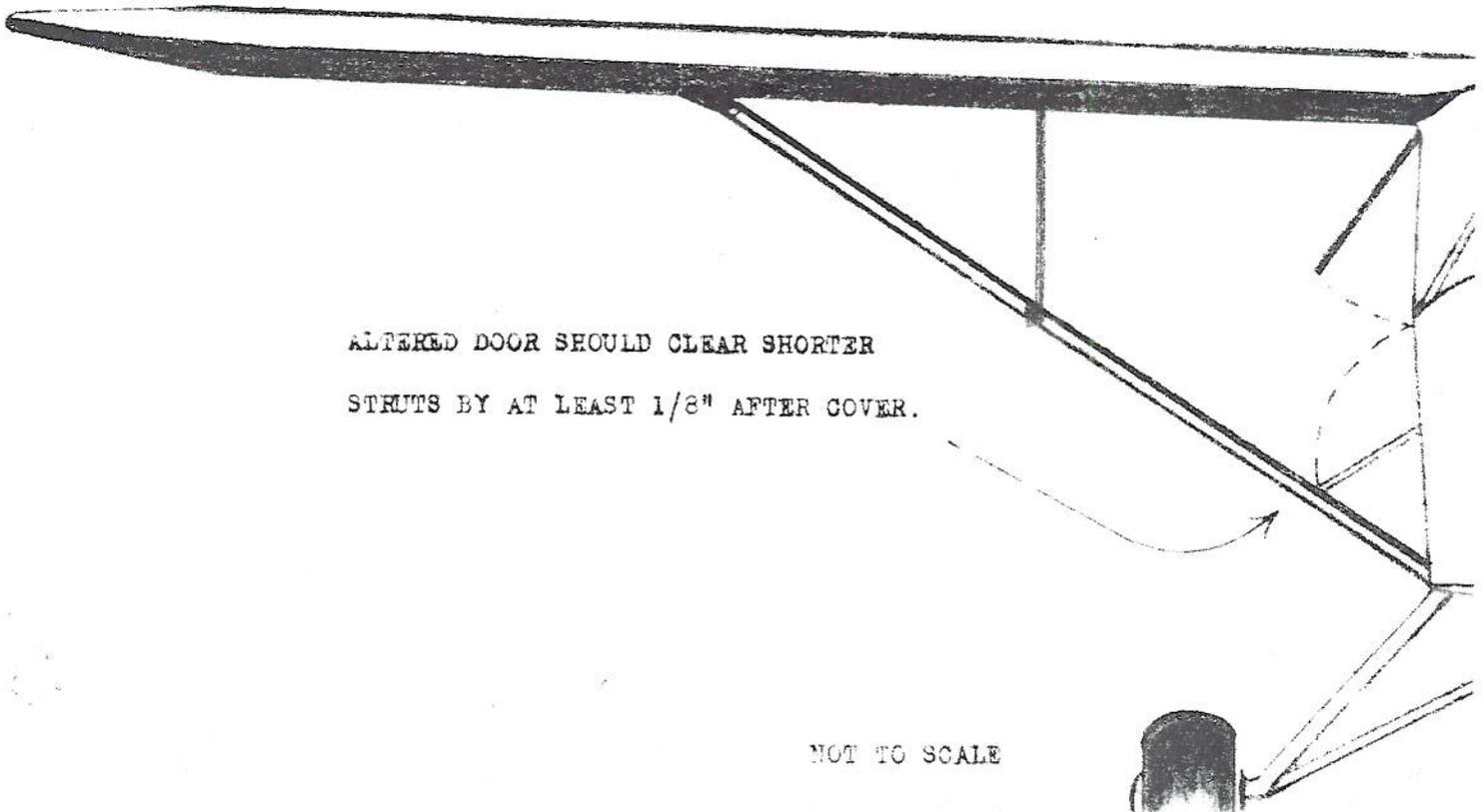
ROOT END TUBE TO BE INSTALLED IN
TUBE # 2 HOLES.

NOT TO SCALE

NOTE... ALL FORKED-END BOLTS WERE
MAGNIFIED



NOTE.. TOP.
END ONLY IS ALTERED. THOROUGH INSP. INTERIOR, AND
EXTERIOR SHOULD BE MADE WHILE STRUTS ARE OPEN FOR RUST ETC.



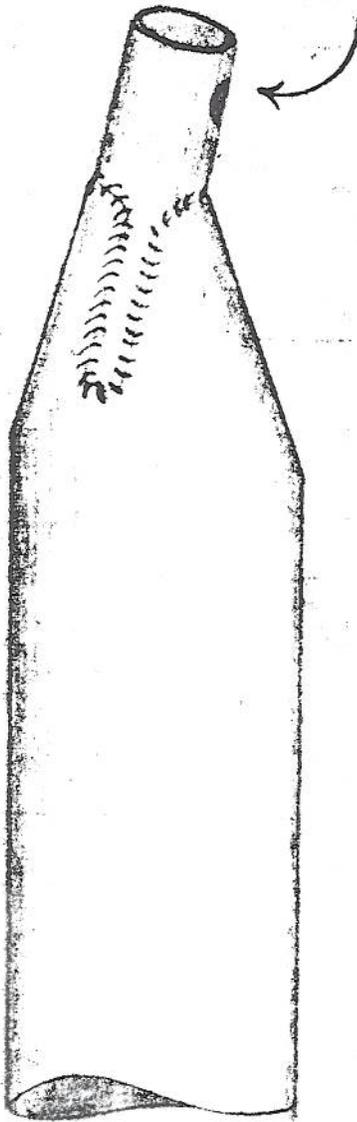
ALTERED DOOR SHOULD CLEAR SHORTER
STRUTS BY AT LEAST 1/8" AFTER COVER.

NOT TO SCALE

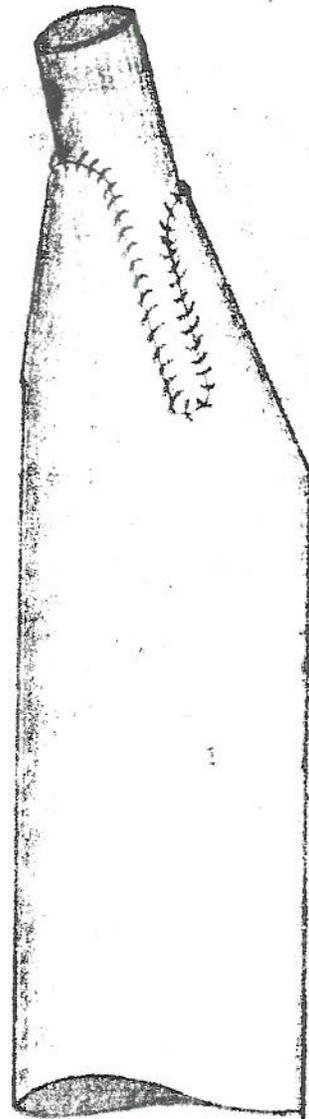
CALCULATIONS FOR STRUT END FITTINGS PIPER

ORIG. TUBE .109 X 4130
NEW TUBES .125 X 4130

SAW SHORTENED STRUTS TO SAME SHAPE
AS ORIG. AND WELD TO FIT WING PLATES.



FRONT



REAR

NOT TO SCALE

NOTE... ONLY TOP HALF OF STRUTS
ARE ALTERED.

NOTE... ALL 4 STRUTS TO SAME SPECIFICATION
IN CROSS SECTION AS FRONT ORIG.

ATT. # B

CALCULATIONS FOR WING STRUT MODIFICATION SUGGESTIONS

- #1. FIRST, CUT OFF TOP OF STRUT SLIGHTLY LONGER THAN NEEDED. THEN SHAPE UP ENDS TO CONFORM TO ORIG. ENDS & TRIM OFF EXCESS.
- #2. WITH WINGS ATTACHED TO FUSELAGE AND SUPPORTED AT WING TIPS, INSERT TUBE IN END OF STRUT TO PROPER LG. AND FIT TO OUTERPLANE FITTINGS. WHEN STRUT ENDS HAVE BEEN SHAPED TO HOLD TUBE TO PROPER FITTING ALIGNMENT, REMOVE STRUT FROM WING AND LAYOUT ON SAW HORSES OR WORK BENCH AND PREPARE TO TACK WELD TUBE IN POSITION. (ALWAYS DOUBLE CHH. DISTANCES BEFORE FINAL WELDING.)
- #3. SOME PREFER AT THIS POINT TO LEAVE TUBES EXTENDED FROM STRUTS $\frac{1}{2}$ " OR SO EXTRA DISTANCE AND WELD THEM IN THAT POSITION. THEN TRIM TO PROPER LG. AFTER WELDING HAS COOLED.
- #4. LAY OUT STRUT HOLE TO MATCH WITH OUTERPLANE FITTING ALIGNMENT HOLE LEAVING PROPER EDGE DISTANCE AS SHOWN. THEN REAM TO FINAL DIA.
..... CARE MUST BE EXERCISED IN THIS OPP.....
- #5. INSERT PROPER PROTECTIVE APPLICATION INSIDE STRUT AND WORK FLUID BACK & FORTH UNTILL ENTIRE INSIDE SURFACE IS COATED. THEN SET STRUT ON END AND DRAIN OFF EXCESS FLUID.
REPLUG TUBE ENDS.
- #6. CLEAN, PRIME AND PAINT

NOTE.... WHEN WINGS ARE SUPPORTED AS IN #2 ABOVE, CARE MUST BE TAKEN TO PREVENT WIND & GUSTS FROM DAMAGING WINGS ETC.

(INSIDE WITH DOORS CLOSED FOR THIS OPP.)

NOTE.... IF YOUR STRUTS ARE OF THE "BUILT UP TYPE", (WITHOUT TUBES), THEN SHAPE NEW ENDS TO CONFORM WITH YOUR ORIG. AND OMIT ROUND TUBING FROM THE BILL OF MATERIALS.

FINAL NOTE.... WHEN TUBES ARE READY TO BE WELDED IN STRUT ENDS CARE SHOULD BE TAKEN TO DIRECT FLAME TO THE TUBE PROPER AND HEAT TO AT LEAST A DULL RED HEAT BEFORE STARTING WELDS.

ADDED NOTES ON STRUT BULLETIN & FINAL RIGGING

SINCE NO ABSOLUTE OR SPECIFIC RIGGING MEASUREMENTS CAN BE OBTAINED FOR ALL AIRCRAFT (MANY HAVE BEEN DAMAGED, AND SOME ARE OVER 14 Yrs. OLD), IT IS SUGGESTED THAT THE FOLLOWING PROCEDURES BE USED....

- #1. PERFORM MODIFICATION AS DESCRIBED IN MANUAL. LEAVE OUT THE INSIDE PROTECTIVE FLUID, AND ALSO LEAVE OFF OUTSIDE FINISH. (PRIMER & PAINT.)
- #2. RUN FINAL FLIGHT TESTS WITH STRUTS UN PAINTED UNTIL SHIP PERFORMS AS DESIRED. (HANDS OFF ETC.) EARLY MORN OR EVE. (CALM)
- #3. AFTER FINAL FLIGHT TEST, REMOVE STRUTS, LEAVING STOP NUTS TIGHT ON LOWER EYE BOLTS. LINE UP EYE BOLT HOLES AND NEW BULLETIN FITTING HOLES WITH A TEMPORARY LINE UP BOLT. FORM & TACK WELD NEW FITTING IN PLACE. KEEP ALL FLAME OFF OF EYEBOLT... . WHEN READY TO WELD, REMOVE EYEBOLT & PROCEED.
- #4. WHEN ALL WELDING IS FINISHED & COOLED, STRUTS ARE READY TO BE PRIMED & PAINTED, OR CHROME PLATED ETC. THE INSIDE PROTECTIVE FLUID CAN NOW BE INSTALLED AND ROLLED BACK & FORTH & DRAINED OFF ETC.

***** THE REASON FOR THESE NOTES IS PLAIN WHEN IT CAN BE SEEN THAT NO FURTHER RIGGING CAN BE DONE AFTER THE C.A.A. BULLETIN HAS BEEN COMPLIED WITH.***** X

- #5. YOU SHOULD RECORD YOUR INDIVIDUAL RIGGING MEASUREMENTS FOR YOUR PLANE IN THE RECORD PAGE OF YOUR MANUAL FOR FUTURE REF. (IN CASE OF FUTURE WING OR STRUT DAMAGES).

X REG. PIPER STRUT SPEC..

N 38631

CONSULTING ENGINEERS

MADE BY E.C. REED DATE _____

JOB NO _____

CHECKED BY _____

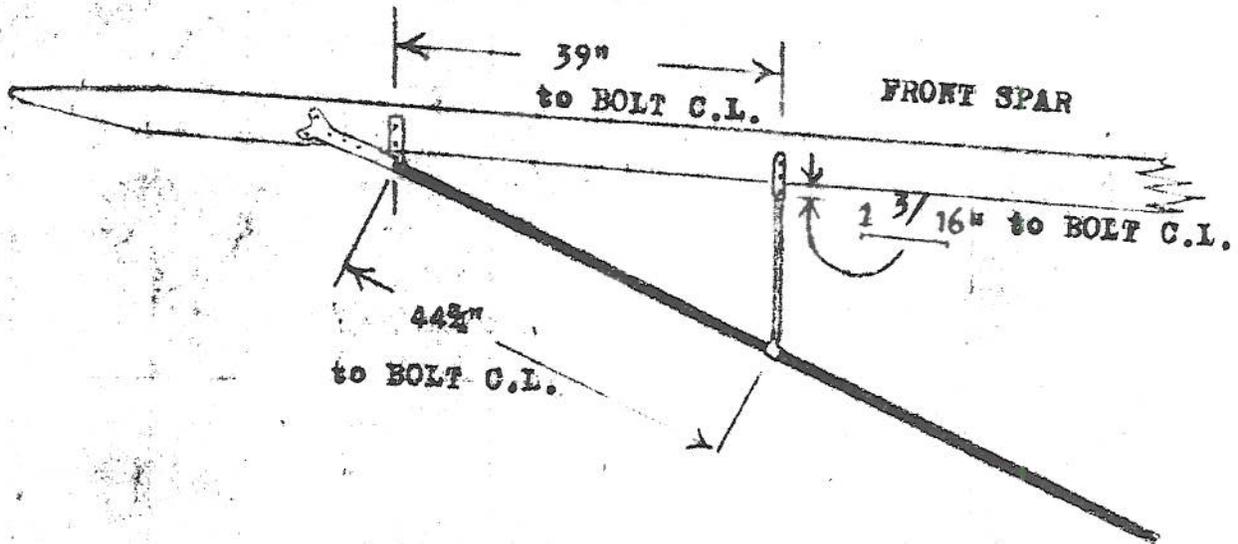
DATE _____

SEC NO _____

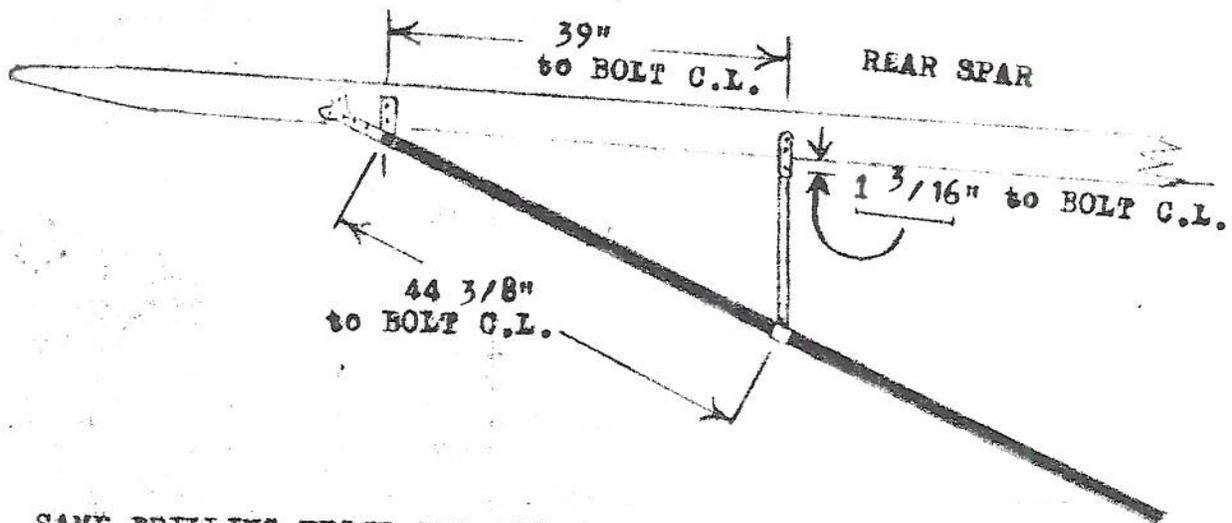
CALCULATIONS FOR

JURY STRUT & FITTING RELOCATIONS

SHEET NO _____



ORIG. JURY STRUTS & FITTINGS RELOCATED AS ILLUSTRATED.



SAME DRILLING PROCEDURE TO BE USED AS ON ROOT FITTINGS.

ATTACHMENT # C

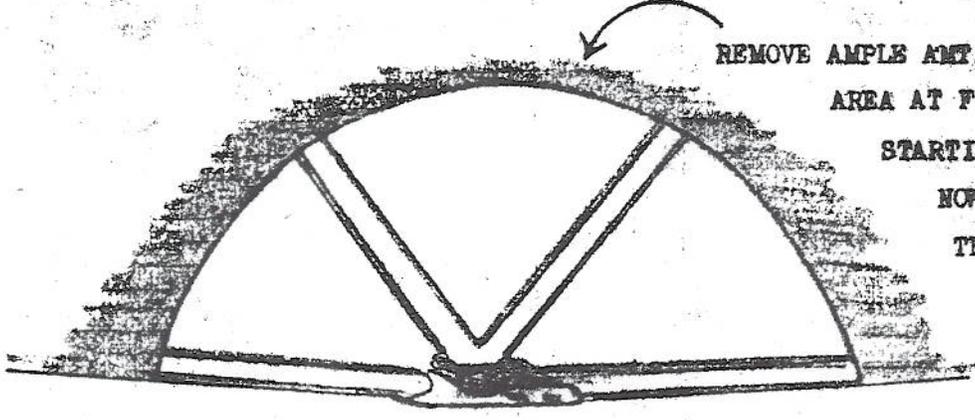
Aileron Cables Should be Modified as follows...

If Existing Cables Are Airworthy, And in Excellent Condition, They May Be Modified on The Ship in The Following Manner.

NOTE... ALL PULLEY MODIFICATIONS (if Req.) MUST BE MADE BEFORE CABLES ARE REVISED.

- #1. With Modified Wing Installed on Ship & Rigged to Proper Dihedral Angle, Begin By Blocking Ailerons In Line With Wing Trailing Edges. Wood Blocks. or Slats & 'C' Clamps or Similar Equip. May Be Used.
- #2. Make Up Cable Splices At Top Center (in cabin.) Using Standard Army & Navy 5 Tuck Splices, or other Approved Splices. A Standard A&N TYPE Turnbuckle with R&L Cable Eyes May Be Used To An Advantage Here. Position The Turnbuckle So that Not More Than Three (3) Threads in Cable Eyes Are Exposed When Top Cables Are Taunt. (NOT TIGHT.)
- #3. Check Top Cables For Alignment Thru Both Wings (NOW.) Before Proceeding Further.
- #4. When Inspection Has Been Made And No Binding Or Cable Misalignment is Present, Proceed To Modify The Lower Cables. (STRUT.)
- #5. The Lower Cables May Be Modified At Either The Ailerons, Or At The Control Stick. If The Ship Is In The Shop, Mod. AT The Ailerons May Be More Handy. In The Field, Some Prefer To Work In The Cockpit. Same General Rules As Defined Above To Be Followed.
- #6. When All Four (4) Cables Have Been Rigged Against The Clamp Blocks On The Trailing Edges, Remove The Blocks And Observe The Edge Alignments In Relation To Wing Trailing Edges. Ailerons Should Not Droop Or Sag. They Should Be Rigged To A Position Slightly Above (appx. $\frac{1}{8}$ ") The Wing Trailing Edge. Final Flight Rigging Should Start From Here.
- #7. All Final Aileron Cable Adjustments Should Find The Cables Flexible But Not Too Loose. (NEVER TIGHT.)

CALCULATIONS FOR FUSELAGE FITTING REWORK

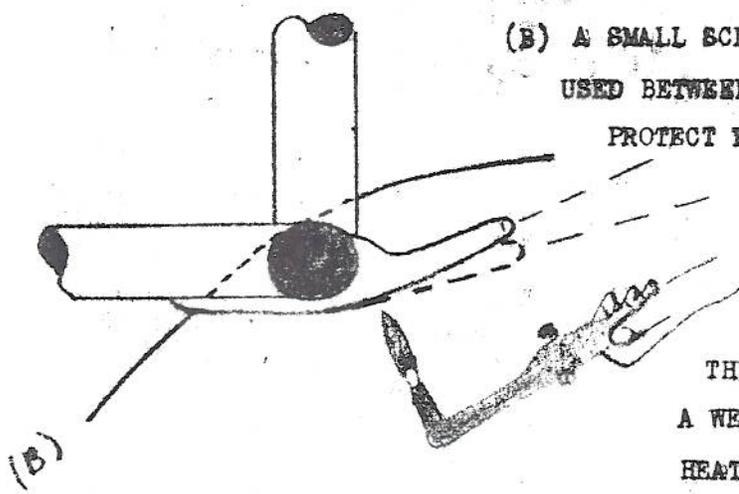


REMOVE AMPLE AMT. OF FABRIC FROM A
AREA AT FITTING BEFORE
STARTING WORK.

NOW IS THE TIME TO INSPECT
THIS AREA FOR RUST AND
PREVIOUS DAMAGES.

CLEAN OUT ENTIRE AREA.

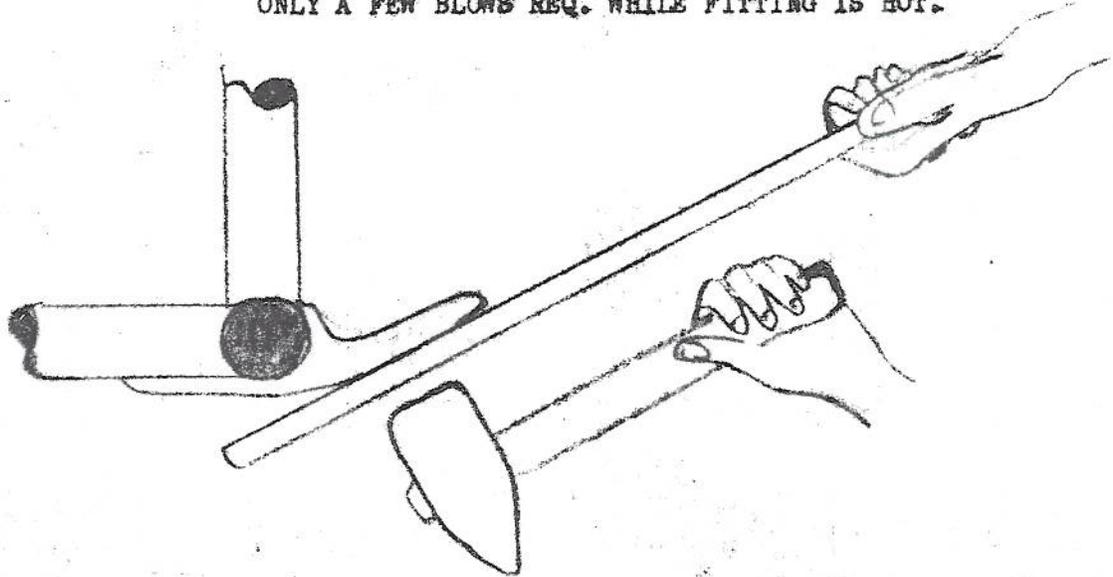
NOTE... ALL TUBES SHOULD BE WRAPPED WITH SUITABLE DAMPENED MATERIAL TO
CARRY OFF HEAT.



(B) A SMALL SCRAP OF SHEET IRON CAN BE
USED BETWEEN LONGERON & FLOORING TO
PROTECT FROM FLAME.

THIS AREA SHOULD BE HEATED WITH
A WELDING TORCH TO JUST A DULL RED
HEAT AND REWORKED IMMEDIATELY TO
PROPER SLOPE. (to fit short struts.)

ONLY A FEW BLOWS REQ. WHILE FITTING IS HOT.



NOTE... DO NOT USE HAMMER DIRECTLY ON FITTING. USE THICK PIECE OF
FLAT STOCK AS ILLUSTRATED.

CONSULTING ENGINEERS

MADE BY E.C.R.

DATE 5-27-52

JOB NO. 38581

CHECKED BY

DATE

SEC. NO.

CALCULATIONS FOR MODIFIED CABIN ACCESS DOOR

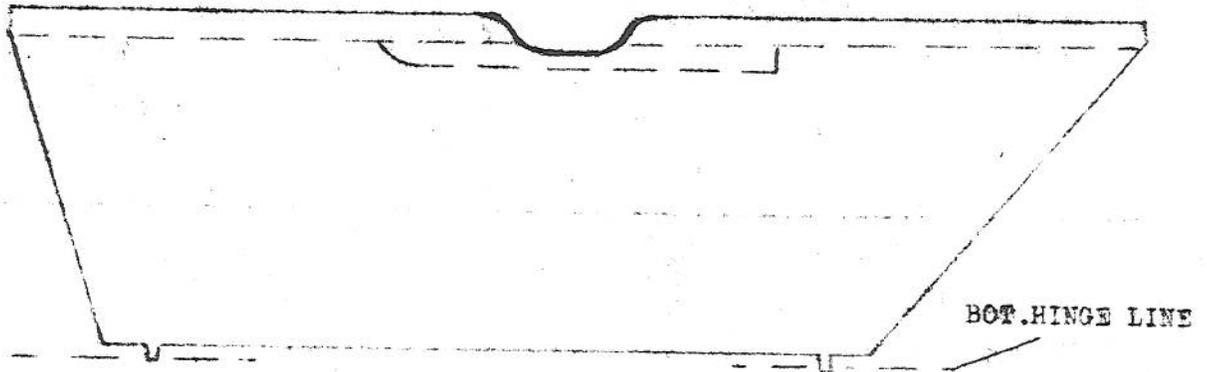
MOD. PIPER

SHEET NO.

THIS ALTERATION NECESSARY FOR
DOOR TO CLEAR SHORTER STRUTS.

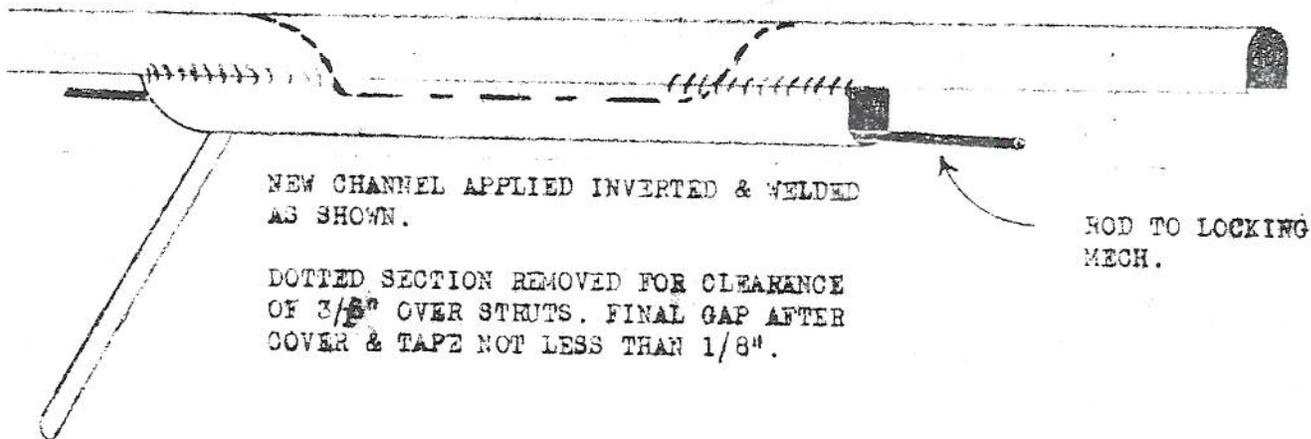
(NON STRUCTURAL)

MAIN DOOR



NEW CHANNEL SAME MATERIAL & SHAPE
AS ORIG.

TOP DOOR CHANNEL

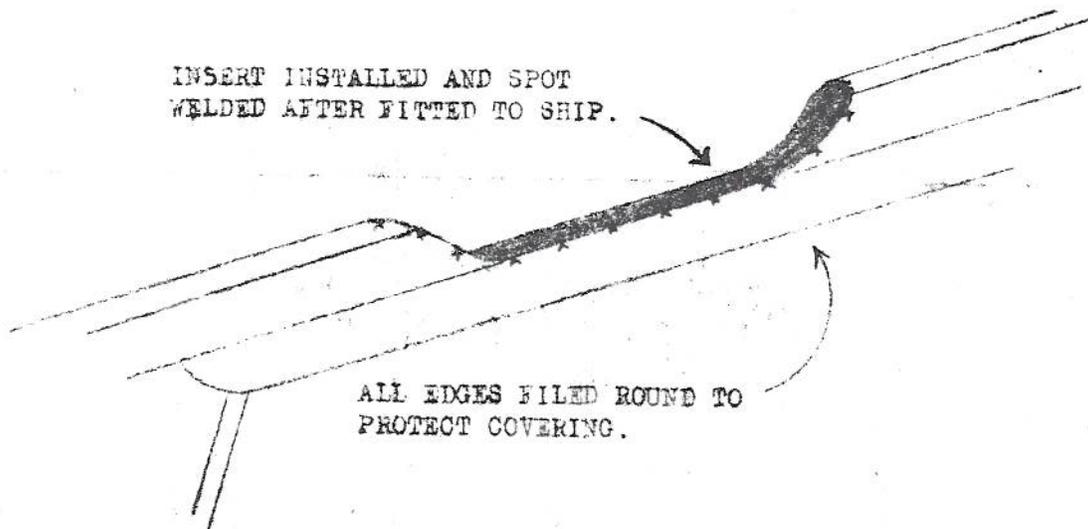


NEW CHANNEL APPLIED INVERTED & WELDED
AS SHOWN.

DOTTED SECTION REMOVED FOR CLEARANCE
OF $3/8$ " OVER STRUTS. FINAL GAP AFTER
COVER & TAPE NOT LESS THAN $1/8$ ".

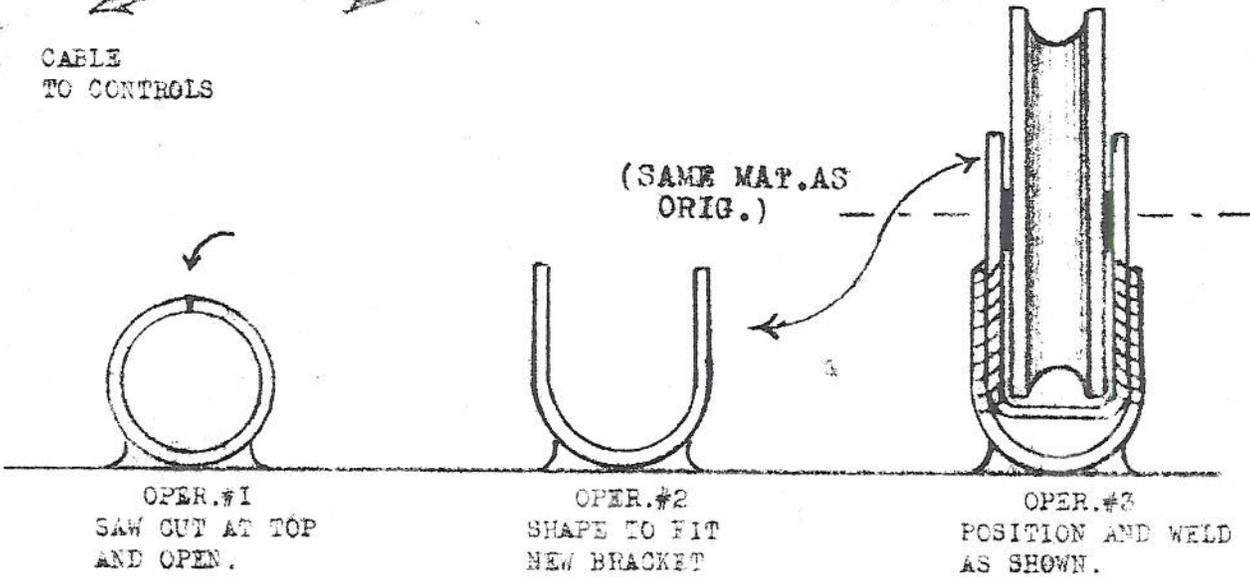
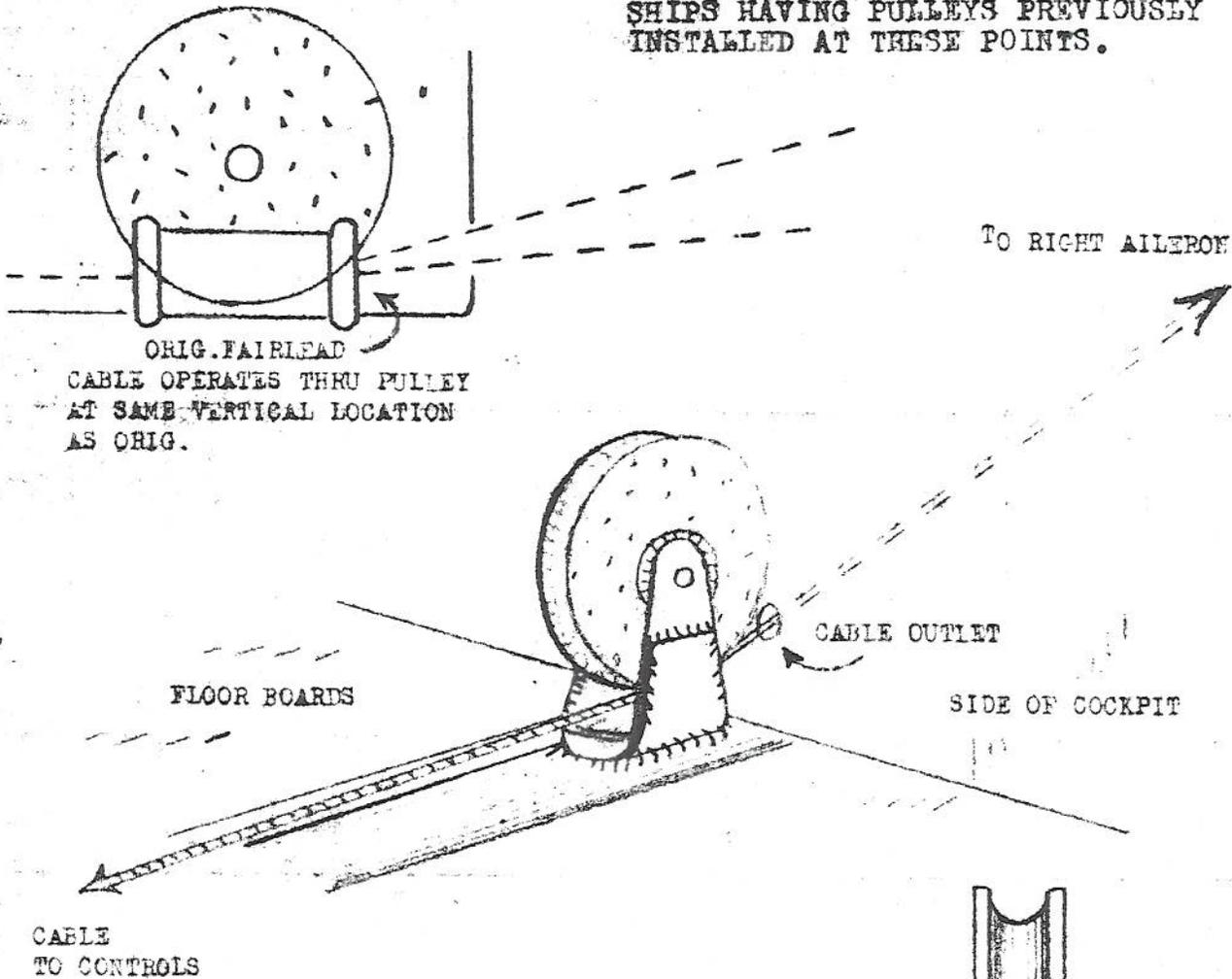
ROD TO LOCKING
MECH.

INSERT INSTALLED AND SPOT
WELDED AFTER FITTED TO SHIP.



ALL EDGES FILED ROUND TO
PROTECT COVERING.

NOTE... THIS ALTERATION NOT REQUIRED FOR SHIPS HAVING PULLEYS PREVIOUSLY INSTALLED AT THESE POINTS.



... NOTE... BOT. SECTION OF BRACKET IS NEW BRACKET (same as orig) FORMED TO RETAIN CABLE IN PULLEY
 AN BOLT
 AN CAST NUT
 AN WASHERS

SEE OPER.# 3

FOR EACH OF 2 UNITS

ATT # A

CALCULATIONS FOR ACCESSORY & RIGGING DATA

REED 65 HP. CONTINENTAL AIRCRAFT MOD.

65

ENGINE... TYPE. 4 CYL. HOR. OPP. AIRCOOLED.
MAKE CONTINENTAL A-65
H.P. 65 H.P. AT RPM.
SERIAL #.

PROPELLER TYPE. 2 BLADE FIXED PITCH METAL
MAKE McCAULLRY DIA. LIMITS 69.5" TO 71"
DES..... 1A 90 OR 1B 90 FROM 2150 TO 2250 RPM.
SERIAL #.

REED 75 HP. CONTINENTAL AIRCRAFT MOD.

75

ENGINE... TYPE. 4 CYL. HOR. OPP. AIRCOOLED
MAKE CONTINENTAL A-75
HP. 75 HP. AT RPM.
SERIAL #.

PROPELLER TYPE. 2 BLADE FIXED PITCH METAL
MAKE McCAULLRY DIA. LIMITS 69.5" TO 71"
DES..... 1A 90 OR 1B 90 FROM 2150 TO 2250 RPM.
SERIAL #.

RADIO ...
MAKE
WEIGHT .. MOMENT ARM.

OTHER EQUIPMENT
MAKE
WEIGHT... MOMENT ARM

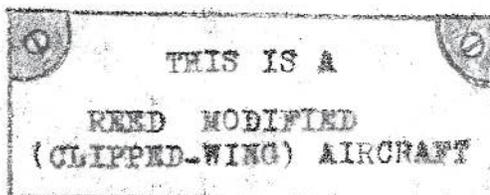
RIGGING DATA ETC.

NOTE... THIS AIRCRAFT, WHEN PROPERLY RIGGED, SHALL CONFORM TO THE FOLLOWING.....

1. ONE (1) DEGREE FOR WING PANELS. (DIBEDRAL).
2. ONE (1) DEGREE WASHOUT (EACH PANEL).

NOTE... THE LAST FULL RIB (OUTBOARD) TO BE USED FOR THIS CMK.

3. WEIGHT BAL. TO BE COMPUTED AFTER MODIFICATION.
4. CENTER OF GRAVITY RANGE... PLUS 10.9 TO PLUS 19.4
5. APPROPRIATE PLACARD TO BE INSTALLED ON INST. PANEL IN FULL VIEW...



CALCULATIONS FOR

APEX. MOD. BILL OF MATERIALS (AIRCRAFT)

IF PRESENT WING FABRIC IS IN GOOD CONDITION, ONLY THE FOLLOWING INEXPENSIVE STRUCT. ITEMS WILL BE REQUIRED.

- #1. 2 FT. OF ROUND TUBING (4 PC. 6" X 7/8" X .125 X 4130).
 2 FT. OF SQUARE TUBING (4 PC. 6" X 1" X .040 X 4130 HALVED).
 2 FRONT (LARGE) CUB J3 WING STRUTS.

PLUS MISC. SMALL PIECES OF FABRIC & METAL FOR PATCHING & MINOR ALTERATIONS.
 IE; SMALL STRAPS FOR PULLEY BRACKETS, DOOR MOD, LARGE REAR JURY STRUT STRAP AND A FEW CABLE ACES. (A TURNBUCKLE, THIMBLES ETC.)

NOTE... IF THE SQUARE TUBING LISTED ABOVE IS NOT AVAILABLE AT TIME OF MODIFICATION, THEN THE EQUIVALENT STEEL IN FLAT STOCK CAN BE FORMED INTO SUITABLE CHANNEL AT ANY SHEET METAL SHOP OR TIN SHOP OR A METAL BRAKE.

NOTE... IF YOUR AIRCRAFT DOES NOT HAVE AILERON CABLE PULLEYS AT THE FLOOR AREA, THEN ADD TWO 2" AIRCRAFT PULLEYS & NECESSARY AN BOLTS & NUTS TO THE MATERIAL LIST.

#2. THE ONLY ITEM OF ANY EXPENSE MIGHT BE A FASTER PROP. AND EVEN THIS CAN BE HELD TO A MINIMUM IF YOU SHOP AROUND FOR A GOOD USED OR RECONDITIONED ONE. THIS ITEM CAN BE OBTAINED ACCORDING TO THE TYPE OF PERFORMANCE YOU WANT, AND CAN AFFORD.

A McCULLLEY 1A 90 CM 7144 GIVES GOOD TAKEOFF & CRUISE AND IS RECOMMENDED FOR THIS MOD. BUT THE FINAL TOUCH IS IS UP TO YOUR INDIVIDUAL REQUIREMENTS.

IT IS USUALLY WISE TO SHOP LOCALLY FOR THIS ITEM AS MOST SOURCES WILL USUALLY LET YOU TRY IT OUT FOR PERFORMANCE BEFORE YOU BUY IT.

NOTE... THIS MANUAL HAS BEEN CONDENSED TO THE MINIMUM TO SAVE YOU \$\$\$ FIRST IN INITIAL COSTS, AND SECOND, IN MODIFICATION COSTS. THEREFORE THERE ARE MANY SMALL REFINEMENTS THAT CAN BE USED TO INDIVIDUAL ADVANTAGE THAT IS NOT INCLUDED IN THIS TEXT.

FOR EXAMPLE... THE SMALL OPENING OR GAP DUE TO THE CABIN DOOR ALT. AT THE TOP CAN BE TREATED IN MANY WAYS.

ONE OWNER I NOTED WORKED OUT A NOVEL WAY TO LOCK IT FROM OUTSIDE. ANOTHER OWNER MERELY SLIPPED A PIECE OF PYRALIN UNDER THE TOP WINDOW TO COVER THE GAP WHEN DOOR WAS CLOSED.

SOME OF THE INCIDENTAL MEASUREMENTS HAVE NOT BEEN INCLUDED FOR THIS REASON SO THAT THE OWNER CAN PUT ON THE FINISHING TOUCHES AS HE WISHES. MOST OF THESE MINOR ITEMS CAN BE CAUGHTUP AFTER THE SHIP IS BACK IN ACTION. WINDSHIELD TREATMENT IS ALSO AN OPPORTUNITY FOR INDIVIDUAL TASTE, AND IDEAS ALTHOUGH MANY PREFER TO INSTALL LEADING EDGE & WINDSHIELD THE SAME AS IT WAS ORIG.

FINAL NOTE... IT SHOULD BE BORN IN MIND ALSO, THAT THIS MOD. IS INTENDED TO PUT THE CUB BACK IN THE CLASS WITH OTHER SIMILAR AIRCRAFT

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