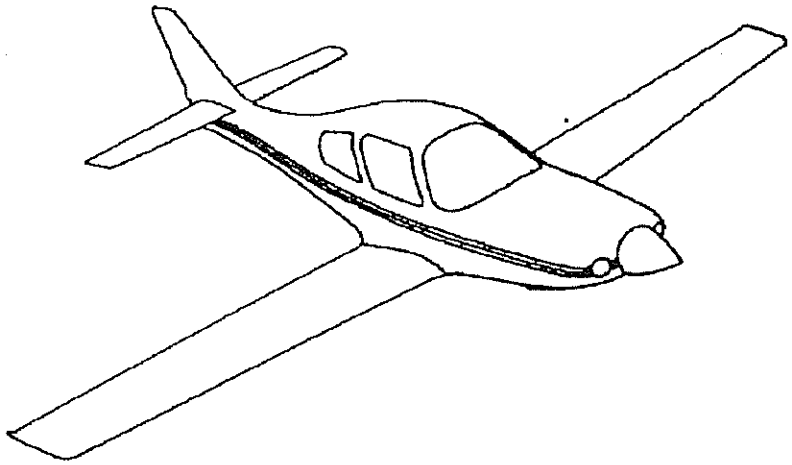
LANCAIR® IV



Manual supplement
for

Fuel Probe Installation

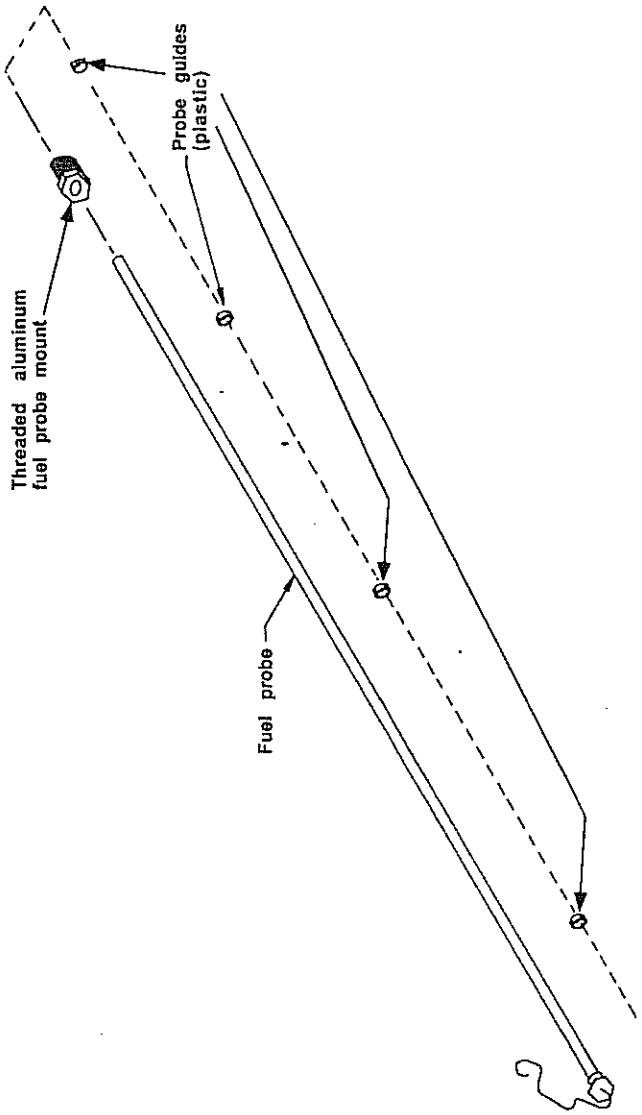
Vision Micro Systems
&
Electronic's International

FUEL PROBE INSTALLATION

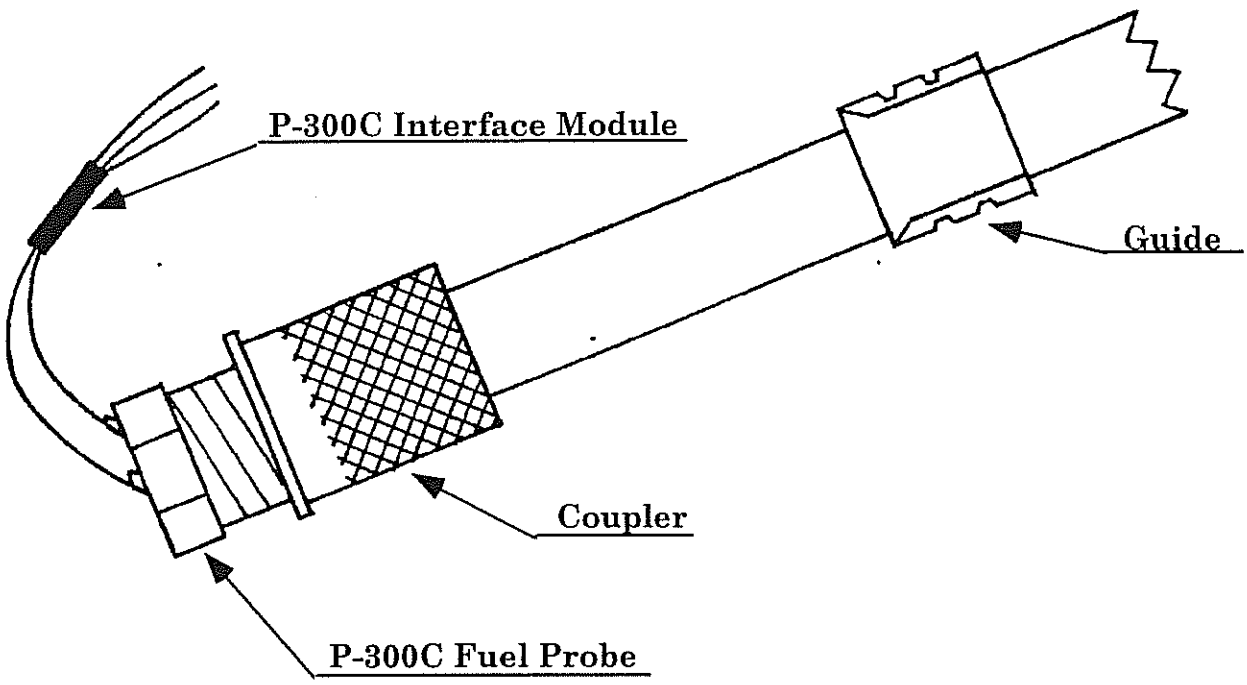
This section deals with the installation of the fuel probes. These are capacitance type probes running from near the bottom of the fuel tank inboard, to near the top of the tank outboard. Some fuel will remain when the gauge reads "Empty". A small amount of this fuel will be unusable, because the fuel pickup location is slightly above the bottom of the tank. Installation instructions are given for a standard fuel probe, mounted from the inboard end of the wing, and an 11' 4" extended fuel probe, mounted from the outboard end of the wing.

Vision Micro Systems Fuel Probe

Figure 1



P-300C Fuel Probe
IMPORTANT INFORMATION!



Notes:

1. When temporarily fitting the Probe to the Coupler, use oil on both fittings. Otherwise, the threads will seize even if the connection is only finger tight.

2 When permanently connecting the Probe to the Coupler, **use teflon tape or paste.**

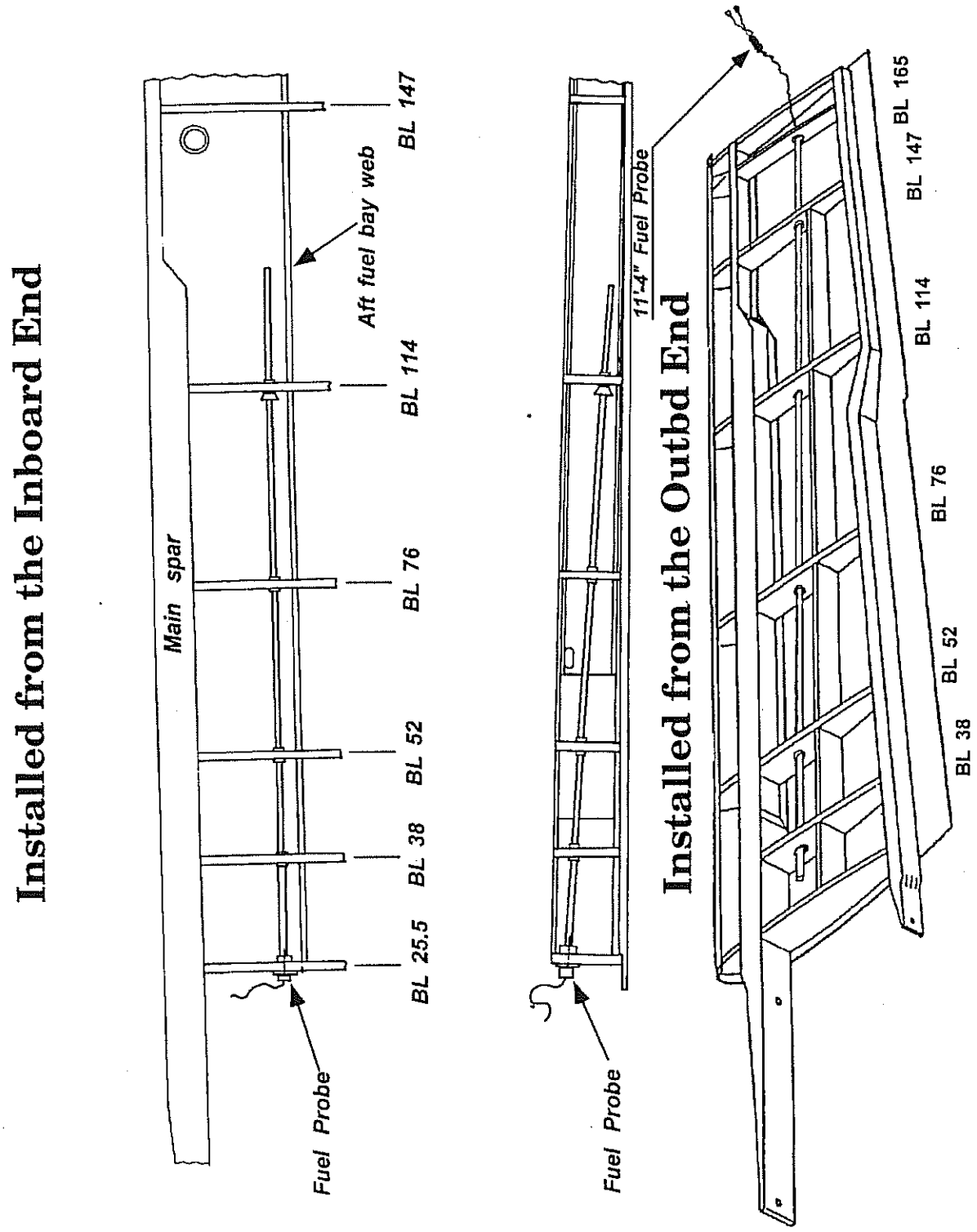
3. Do not over tighten the screws attaching the P-300C Interface Module to the Probe.

4. The Guides should be installed with the beveled end facing the Coupler.

5. Know that the advantage to the 11' 4" fuel probe, for extended tanks, (which is mounted from the outboard end of the wing) is that only the wing tip will need to be removed to reach the Probe. Just remember to move the mounting bushing to BL 165.

Fuel Probe Installation

Figure 2



H1. Begin by marking on the ribs where to make circle cuts to mount the probe guides. Each cut will be located 1 1/2" forward of the fuel bay web, so draw vertical reference marks on ribs BL 25.5, 38, 52, 76 and 114 if the fuel probe is being installed from the inboard side of the wing. Draw reference marks on the ribs BL 165, 147, 114, 76, 52 and 38 if installing the fuel probe from the end of the wing. Make a locator tool out of tongue depressors. Weight the tool with lead fishing weights and hang it on a line running the length of the wing. See Figure 3.

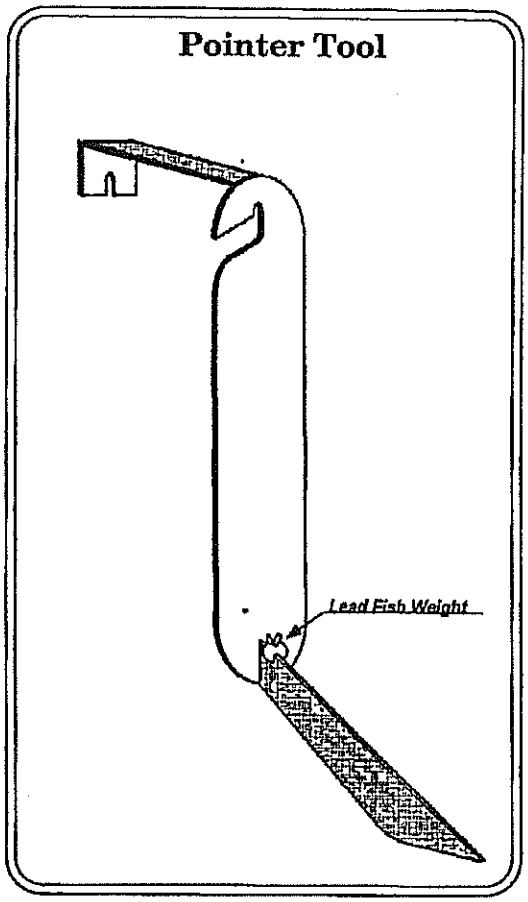
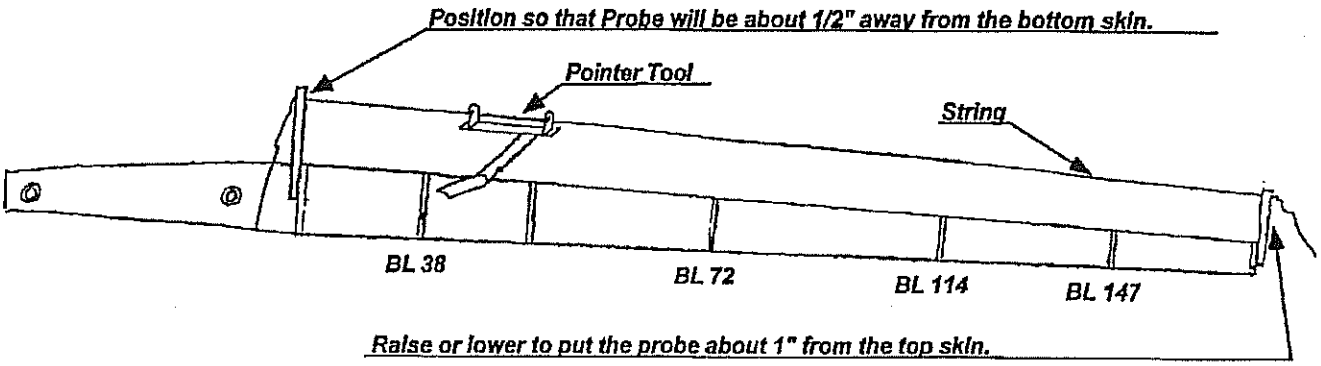


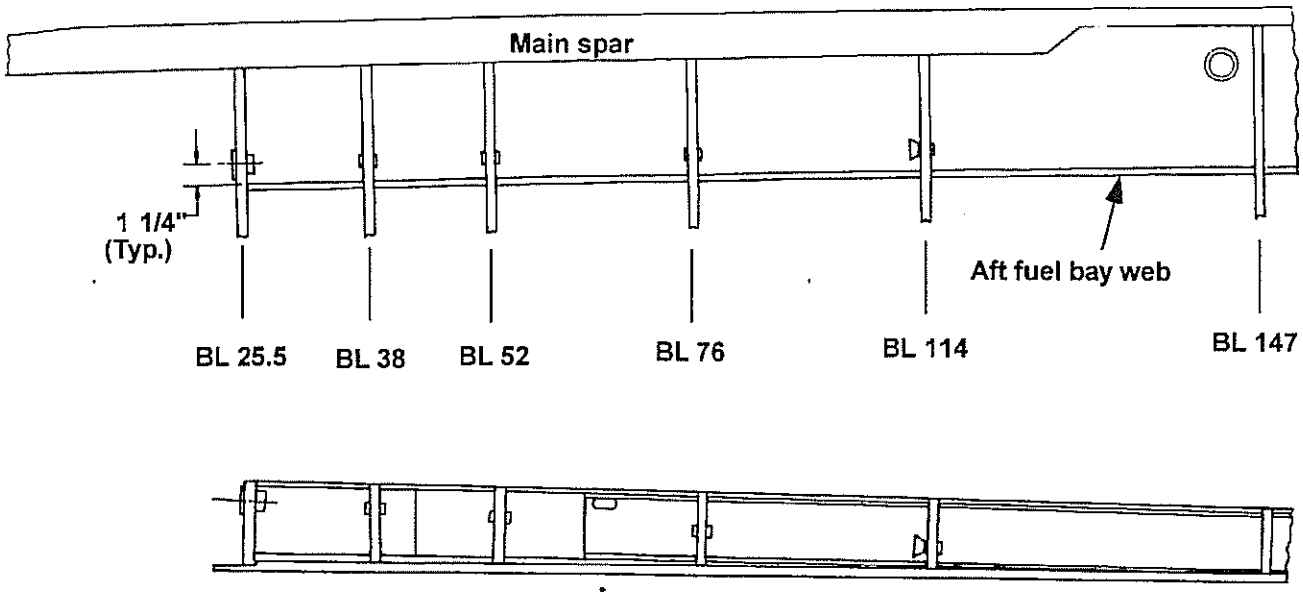
Figure 3



H2. Mark the necessary ribs (see paragraph H1) at the location that the pointer hits.

Fuel Guide Top and Profile Views (Inboard Installation)

Figure 4



H3. Drill small holes through each rib at these locations. Don't drill the ribs out to the full circumference yet.

H4. To check the alignment of the holes, pull a string through the ribs from BL 25.5 to BL 114 (inboard installation) or from BL 165 to BL 38 (outboard installation). Grind the holes in each rib so the string runs through the center of each. Be sure to use the center of the BL 25.5 and BL 114 holes (inboard installation) or the center of the BL 165 and BL 38 holes (outboard installation) as a guide to center the rest. Plan for the end of the probe to be between 1/8" and 1/4" from the inner surface of the top wing skin. If the probe tip is too close, it could vibrate against the skin and cause wear or give incorrect readings.

H5. Grind out the holes in the ribs so the probe guides and threaded aluminum probe mount can slide into position. The BL 25.5 rib (inboard installation) or the BL 165 rib (outboard installation) will require a larger hole for the threaded aluminum probe mount.

H6. Remove the probe guides and sand them with #40 grit in preparation for bonding. The threaded aluminum probe mount is cast with a rough surface where it will be bonded into the rib.

H7. Clean the probe guides and probe mount with solvent or alcohol, but don't use acetone or MC as they will as they may damage the guides.

H8. Remove about 1/8" of core material around the circumference of the probe guide holes in the ribs. Also form a core trough where the threaded aluminum mount will be located.

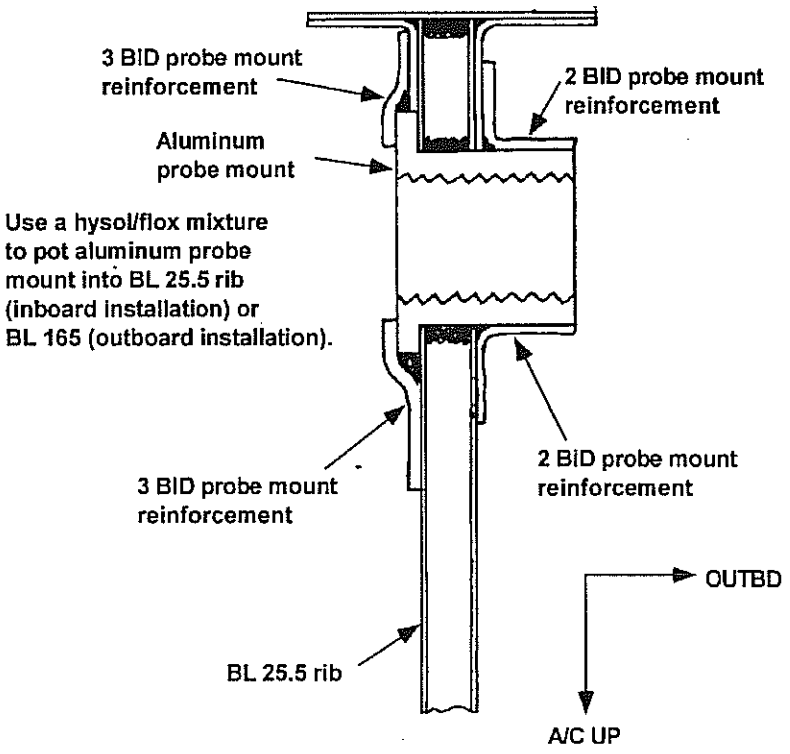
H9. Sand the ribs around the holes for about 1/2", and clean with MC.

H10. Mix a batch of flox and fill the 1/8" troughs in the ribs. Carefully slide the probe guides and the threaded probe mount into position. To maintain proper alignment while the flox cures, slide the fuel probe into position and screw it into it's threaded mount (one or two threads is all that's required for alignment here). Pack more flox around the areas where the probe guides and threaded mount pass through the ribs, forming a fillet around each one. Allow to cure.

H11. Sand the bonding surface and apply the 3 BID laminate to reinforce the bond between the threaded aluminum probe mount and the inboard face of the BL 25.5 (inboard installation) or the outboard face of the BL 165 (outboard installation) rib. Only 2 BID is required on the opposite face of the rib. See Figure 5.

Reinforcing aluminum probe mount

Figure 5



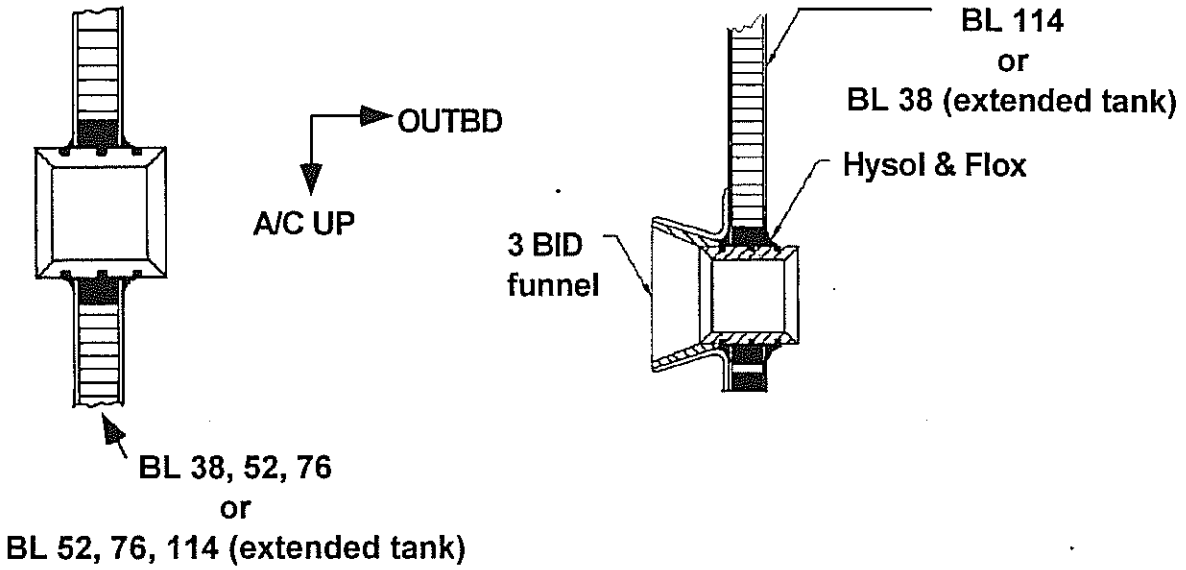
H12. A probe guide extension is helpful on the BL 114 (inboard installation) or the BL 38 (outboard installation) rib. The guide is shaped like a funnel and will be very useful if you ever have to take the probe out after the wing has been closed. Form the guide extension by applying release tape to a small plastic funnel. Use 3 BID to form the guide on the funnel.

H13. When the 3 BID has cured, pop the guide extension loose from the funnel and trim as necessary so the extension will fit flush with the plastic guide in BL 114 or BL 38. See Figure 6.

H14. Bond the guide extension to the guide and the proper rib with 2 BID. Be sure that there is a smooth transition from the inside of the guide extension to the plastic guide.

Probe Guide Extension

Figure 6



NOTES:

1. Make sure the bottom skin is placed so that it does not interfere with the fuel pick up, strainer or drain.

2. Use the probe to install all plastic sleeves.

3. Slide the sleeves and mounting bushing on the probe and bond into each rib with hysol.

4. Cut the hole for the sleeve larger on outboard rib skin.

LANCAIR® IV

Manual.supplement
for

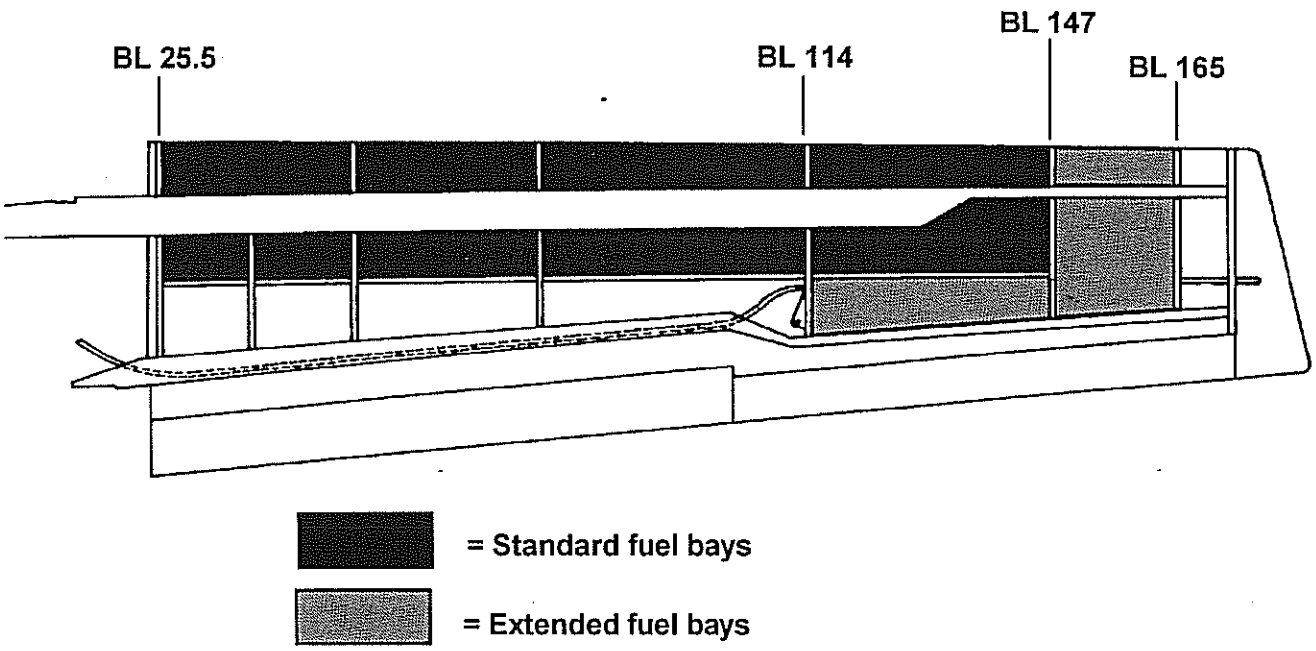
Extended Fuel Tanks

EXTENDED FUEL TANK INSTALLATION

This is the only extended fuel tank option for the Lancair IV that has been engineered and authorized by the factory. A computer flutter analysis has proved this option to be airworthy.

Utilizing the extra wing area described in this section will add about 5 gallons to each wing's fuel capacity.

Extended Fuel Tanks
Figure EF-1

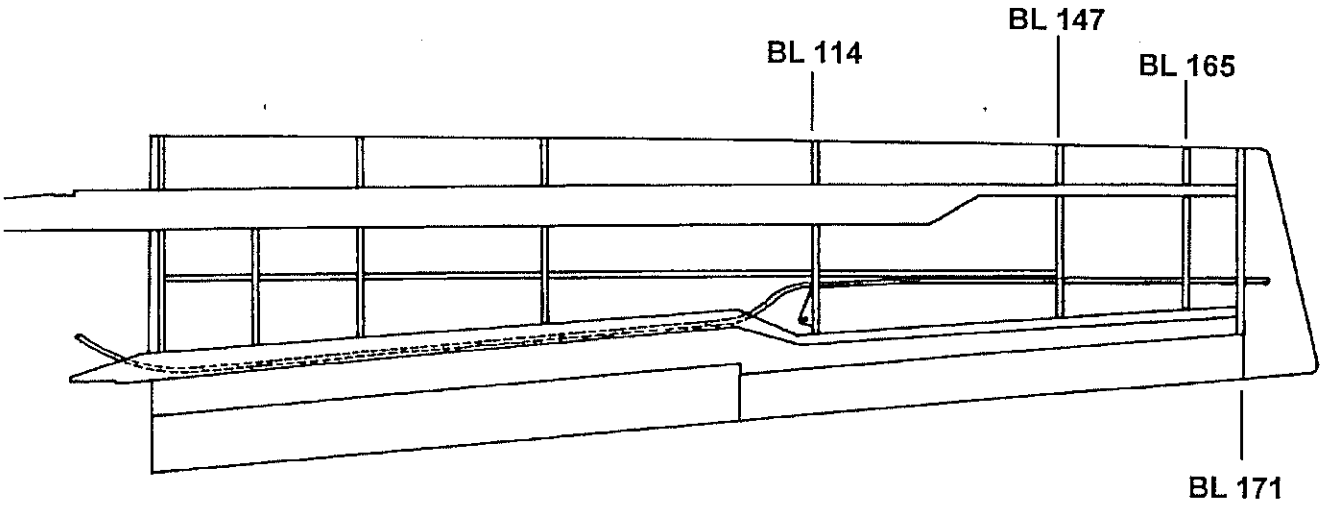


CONTENTS

F. SEALING BL 114 NUTPLATES
A. BL 165 RIB INSTALLATION

The extended fuel option requires installation of an additional rib at BL 165. This rib is made from 2 ply per side prepreg.

BL 165 Rib
Figure A:1



A1. Cut cardboard rib templates (one nose rib, one main rib) that will fit in the wing at BL 165.

A2. Use the templates you just made to cut BL 165 nose and main ribs from 2 ply per side, 1/4" thick prepreg sheet. Fit the ribs into your wing. A small notch is required over the vent line and the plastic electric tube.

A3. Use 40 grit to sand the areas of the wing skin and spars where the BL 165 rib will be bonded. Clean these areas with MC.

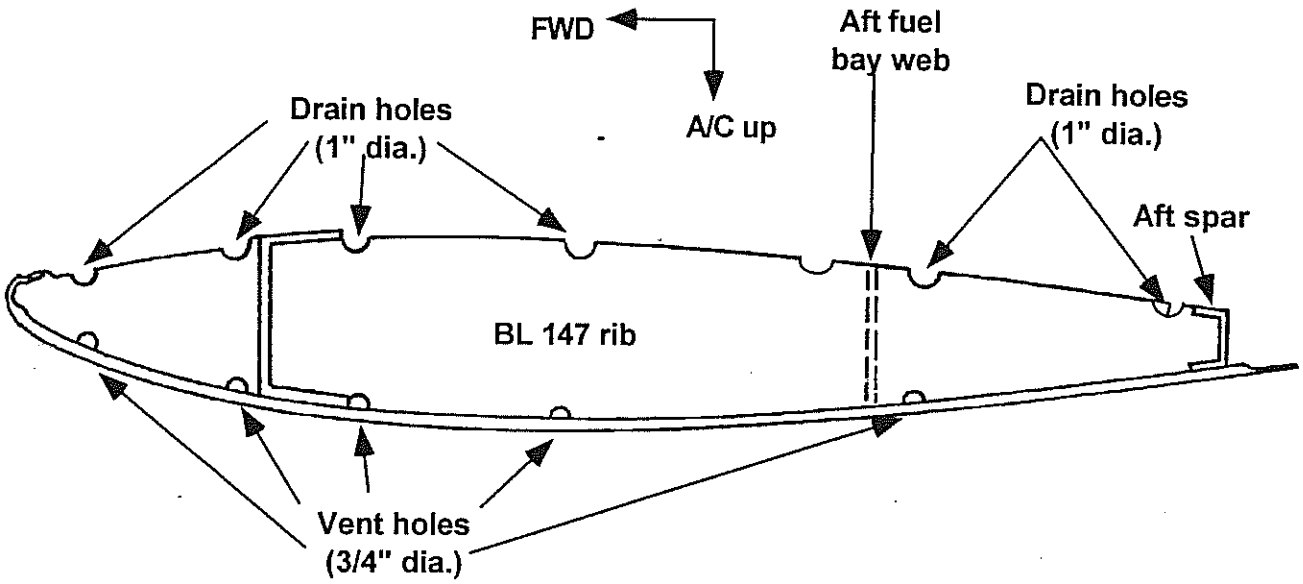
B. VENT AND DRAIN SYSTEM CHANGES

Additional vent and drain holes must be added to the BL 147 ribs, the aft fuel bay web, and the main spar. It is also required to shorten the aluminum vent line at the top of the tank.

B1. Grind vent and drain holes in the BL 147 ribs as shown in Figure B:1. These holes should be shaped like a half circle, just like the vent and drain holes you ground out when initially installing the wing ribs.

B2. Push back or grind out the core to form troughs around the vent and drain holes you have just ground. Fill around the holes with a 50/50 micro/flox mixture to seal the core areas from fuel.

Vent and Drain Holes in BL 147 Rib
Figure B:1



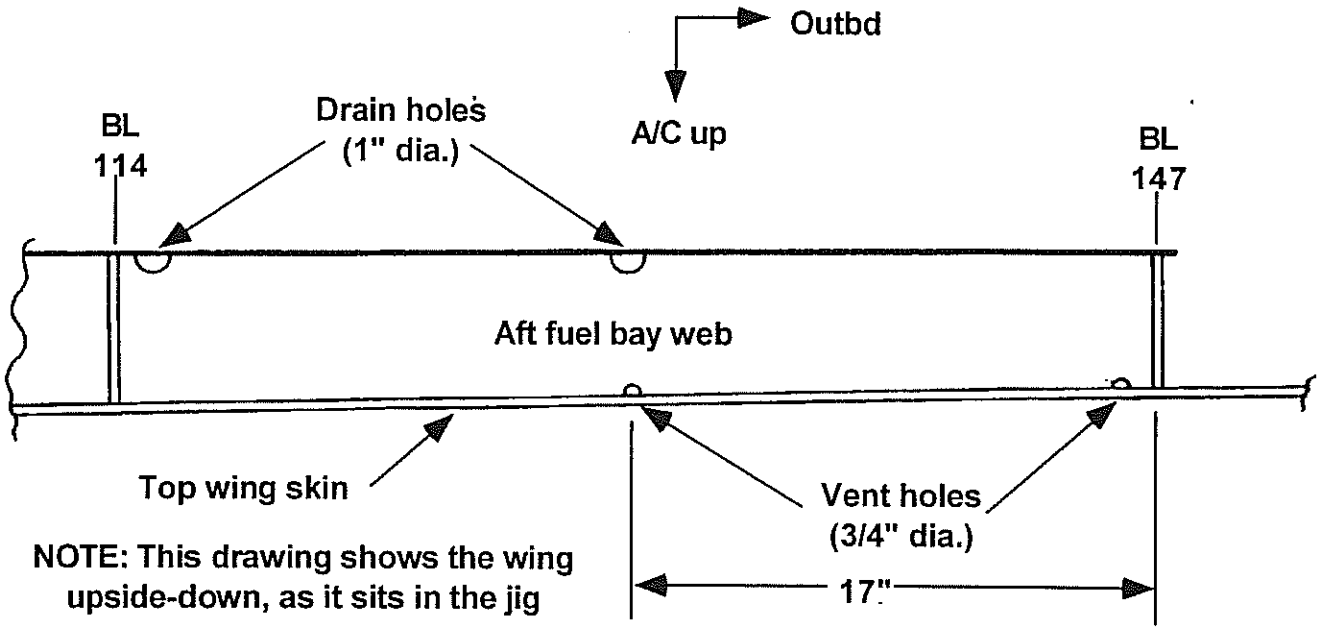
NOTE: This drawing shows the wing upside-down as it sits in the jig.

B3. Grind vent and drain holes in the aft fuel bay web between the BL 114 and 147 ribs as shown in Figure B:2.

B4. Remove the core from around the vent and drain holes you ground in the fuel bay web and fill these areas with a 50/50 micro/flox mixture.

Vent and Drain Holes in the Aft Fuel Bay Web

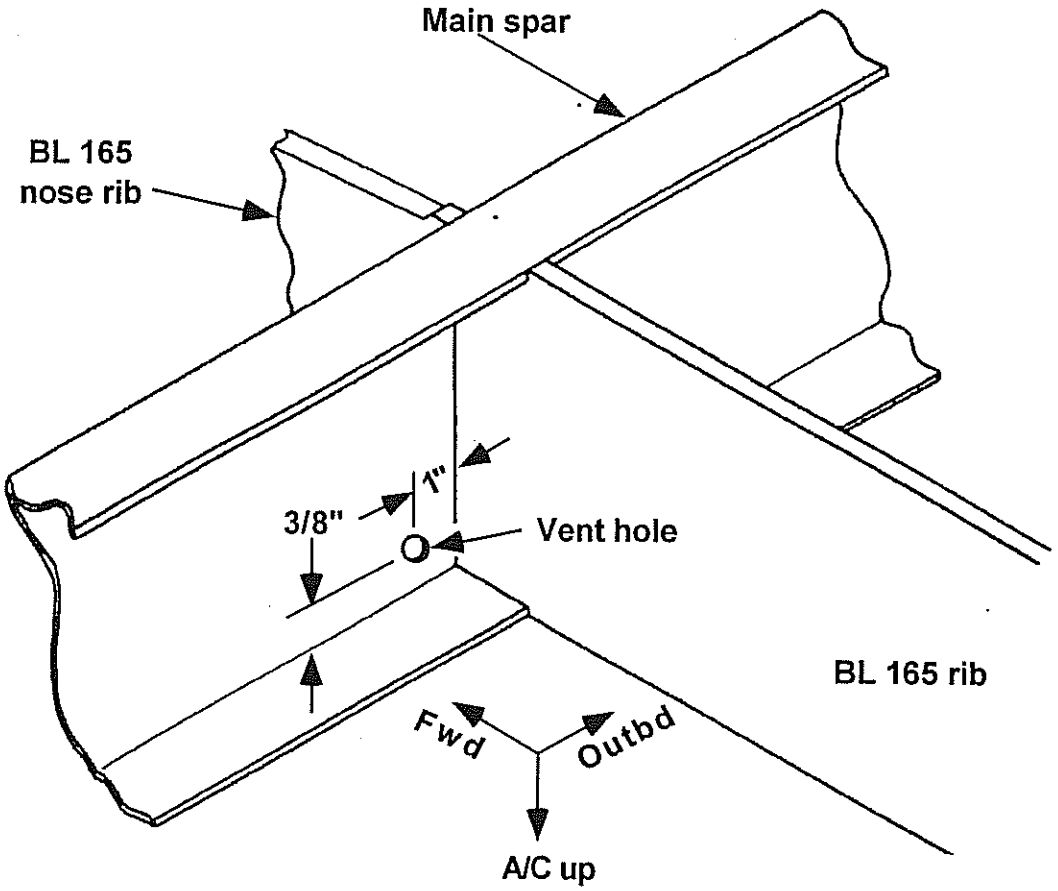
Figure B:2



B5. Grind a vent hole in the main spar web as shown in Figure B:3.

B6. Remove the core around the vent hole in the main spar and fill around the hole with a 50/50 micro/flox mixture.

Vent Hole in Main Spar
Figure B:3



B7. Shorten the aluminum fuel vent line so its inboard end stops at BL 164.5, 1/2" inboard of the BL 165 rib. Apply 2 BID to secure the vent line to the inboard face of the BL 165 rib, just as you had done at the BL 147 rib. Refer to Chapter 6, Figure 6:E:1.

B8. Fill the vent line hole in the BL 147 rib with epoxy/flox. This will protect the rib from fuel.

C. RELOCATING FUEL FILLER NECK

If you have already installed the fuel filler necks inboard of the BL 147 ribs, you will have to relocate them to just inboard of the BL 165 ribs. If you haven't yet installed the fuel filler necks, so much the better, disregard Steps C1-C9 and install the filler necks at the new location shown in Figure C:2.

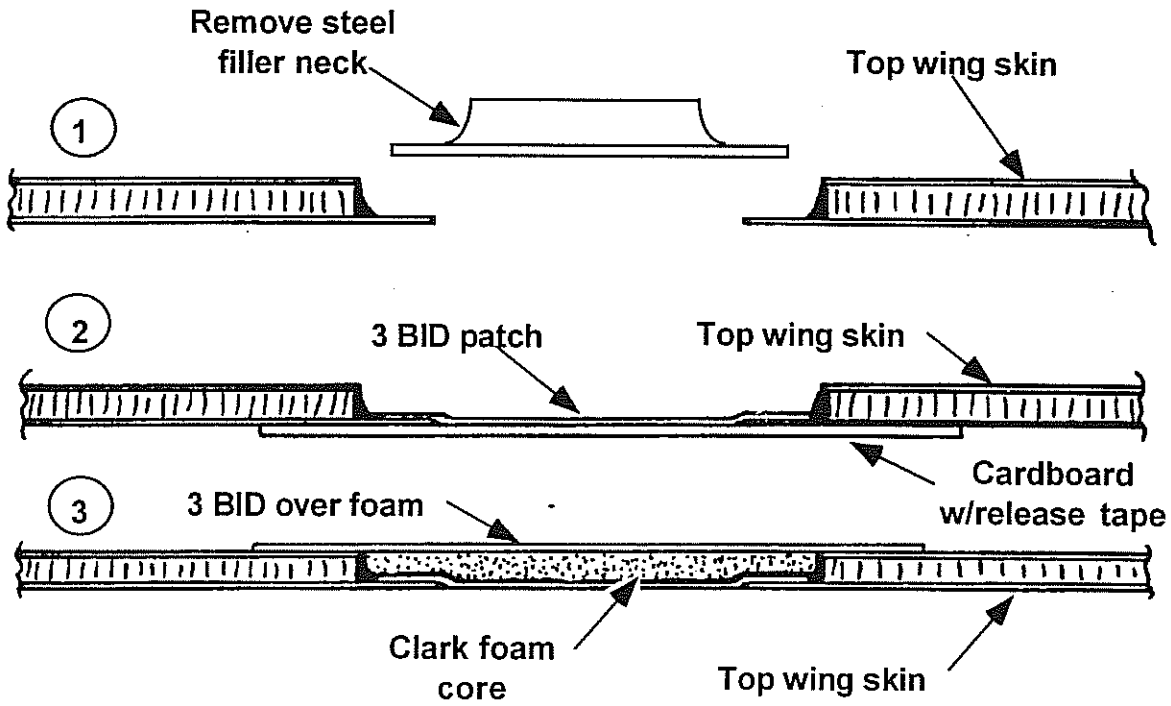
C1. To relocate a fuel filler neck, grind away the Hysol and fiberglass from around the edges of the neck. Use a wood chisel to carefully pry under the edge of the neck and remove it from the top wing skin.

C2. Now you have a round hole in your top wing skin that does nothing. You must patch this opening securely. Use 40 grit to sand the area of the top wing skin where the filler neck was bonded. Clean this area with MC.

C3. Apply release tape to one side of a piece of cardboard. The cardboard should be large enough to cover the filler neck hole.

C4. Use instant glue or tape to secure the cardboard piece to the outer surface of the top wing skin. The release tape should be against the wing surface and covering the filler neck hole.

Patching Filler Neck Hole
Figure C:1



C5. Apply 3 BID to the area where the filler neck was bonded, covering the filler neck hole. This BID patch replaces the outer laminate of the original skin. The cardboard release will form the BID to the proper shape.

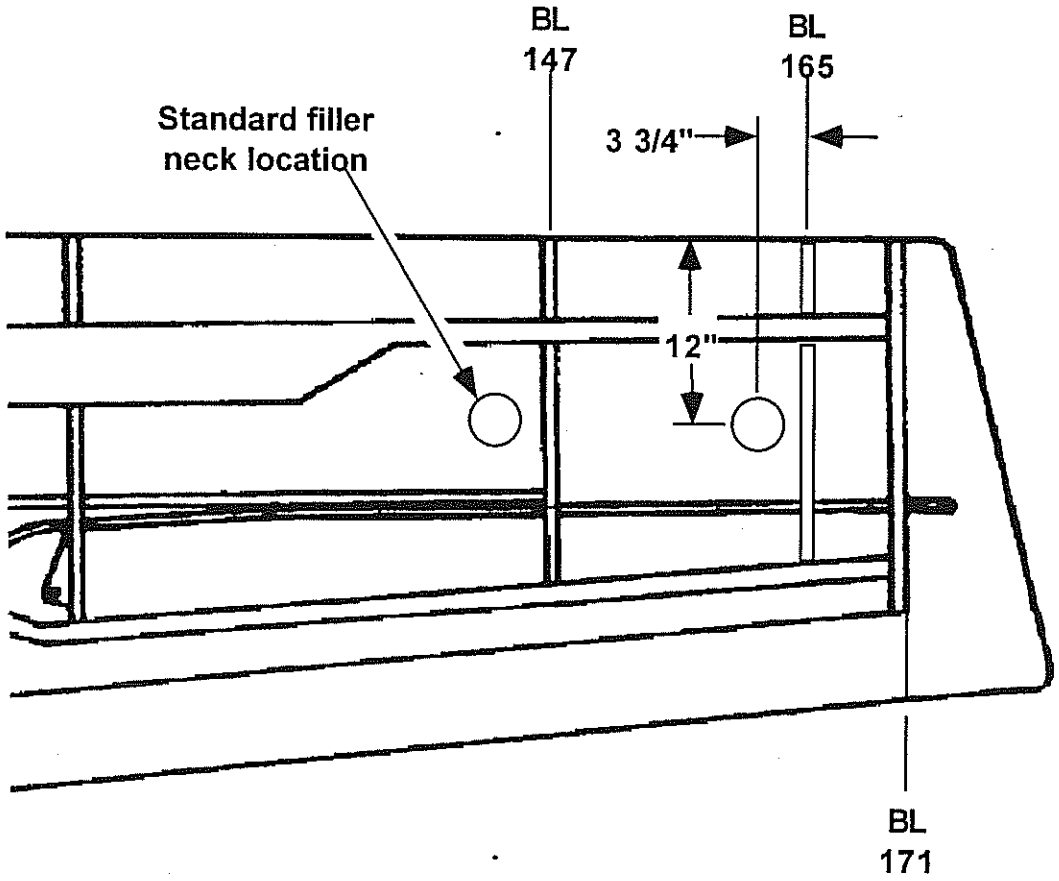
C6. To replace the core, use a round piece of 1/4" thick Clark foam. Bond the foam into the filler neck area with a thin epoxy/micro mixture.

C7. To finish the patch, apply another 3 BID to the Clark foam area, extending onto the original inner laminate by 1". Apply a thin coat of epoxy/micro to the Clark foam area before laying the 3 BID. With a little microballoon smoothing on the outer surface of the wing, the patch will be complete.

C8. Clean off the fuel filler neck by chipping off the old Hysol and fiberglass. Use 40 grit to rescuff the bonding areas of the filler neck. Clean the filler neck with MC.

C9. Install the fuel filler neck at the new location given in Figure C:2. Refer to Chapter 6, Section G for instructions on installing the filler neck.

New Filler Neck Location
Figure C:2



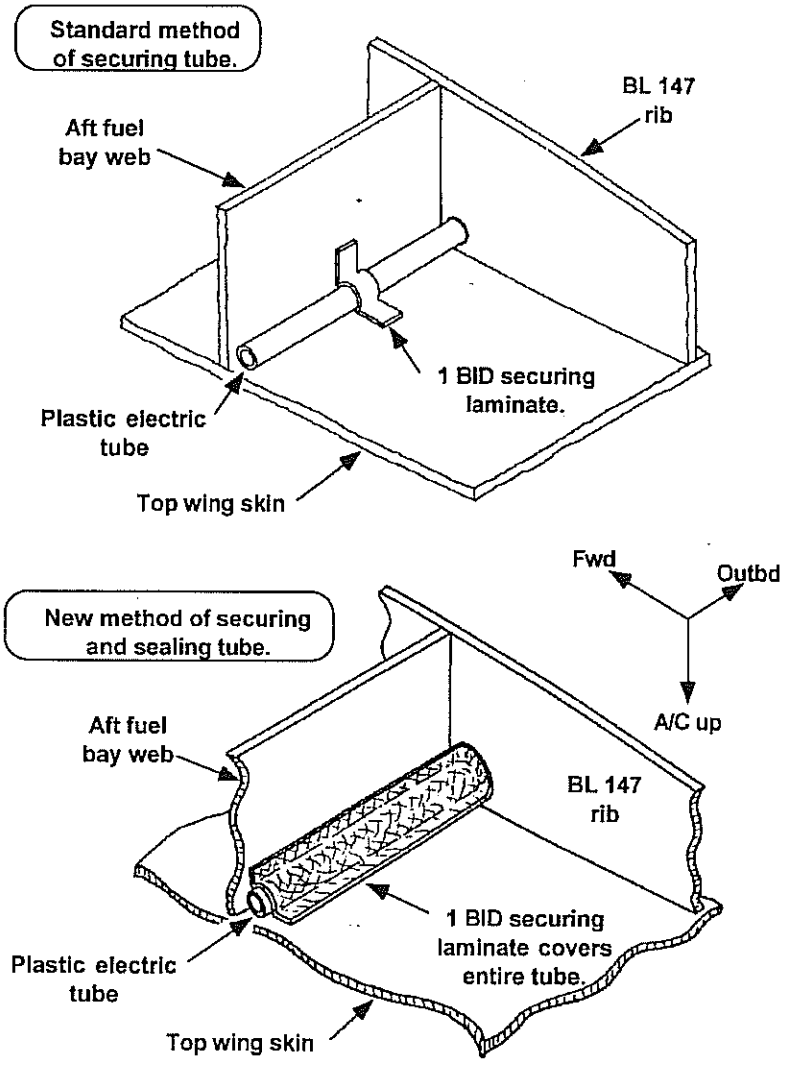
D. ELECTRIC AND PITOT TUBE MODIFICATIONS

The thin walled, black plastic electric tube now must run through the fuel area between BL 114 and 165. Since the tube is not fuel proof, you must cover it with BID. The aluminum pitot tube line is also now immersed in the extended fuel area of the left wing.

D1. If you have already installed the black plastic electric tubing, it will be secured to the surface with small sections of BID. To seal the tube in its harsh new environment of the fuel tank, you must cover the tube with 1 BID, overlapping onto the top wing skin 1" on both sides of the tube. Be sure to sand and clean both the plastic tube and the surrounding wing skin and rib surfaces.

Sealing Electric Tube in Fuel Area

Figure D:1

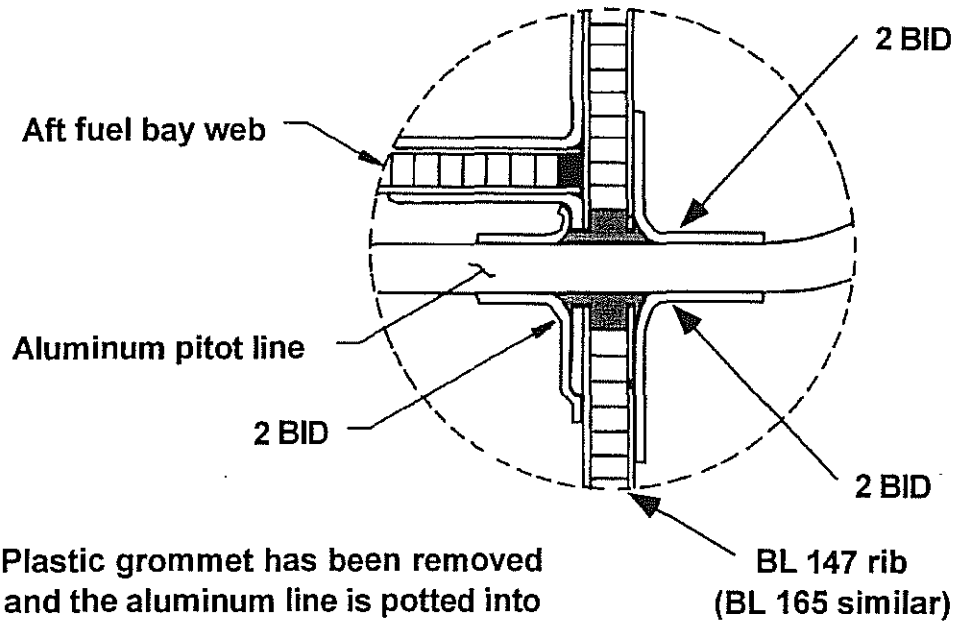


D2. If you have already routed your pitot tube line and installed the plastic grommets in the BL 114 and BL 147 ribs, you will have to remove those grommets. The pitot tube should be potted into position on those ribs using epoxy/flox, as shown in Figure D:2.

D3. Use 2 BID to reinforce the areas where the aluminum pitot tube line passes through the BL 114, BL 147, and BL 165 ribs. There is no reason to cover the entire length of tube with BID because the aluminum is impervious to fuel.

Pitot Tube Line Reinforcement

Figure D:2

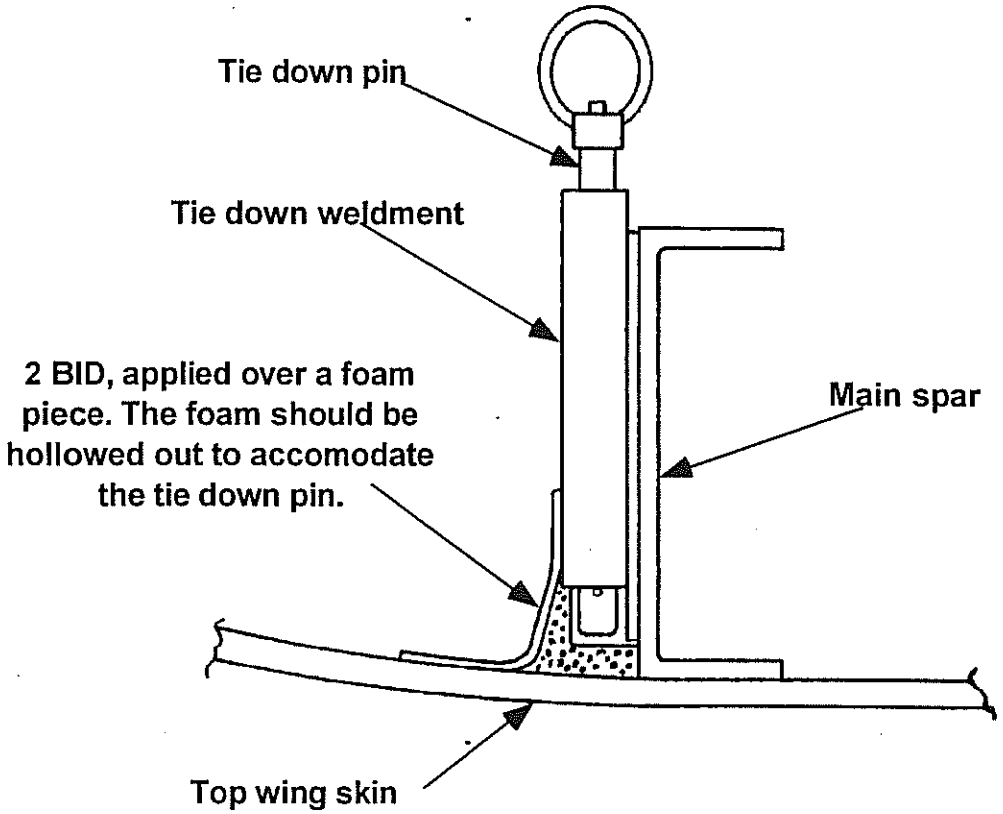


E. TIE DOWN MODIFICATIONS

Because the tie down is mounted in the extended fuel section, it must be sealed off to prevent leakage.

E1. Form a small piece of Clark foam into a shape that will surround the top portion of the tie down assembly, where the tie down pin will extend through its housing and lock. Bond this foam piece in position with epoxy/micro. Make sure you can still get the tie down pin in position and locked. See Figure E:1.

Forming Pin Housing Cover
Figure E:1



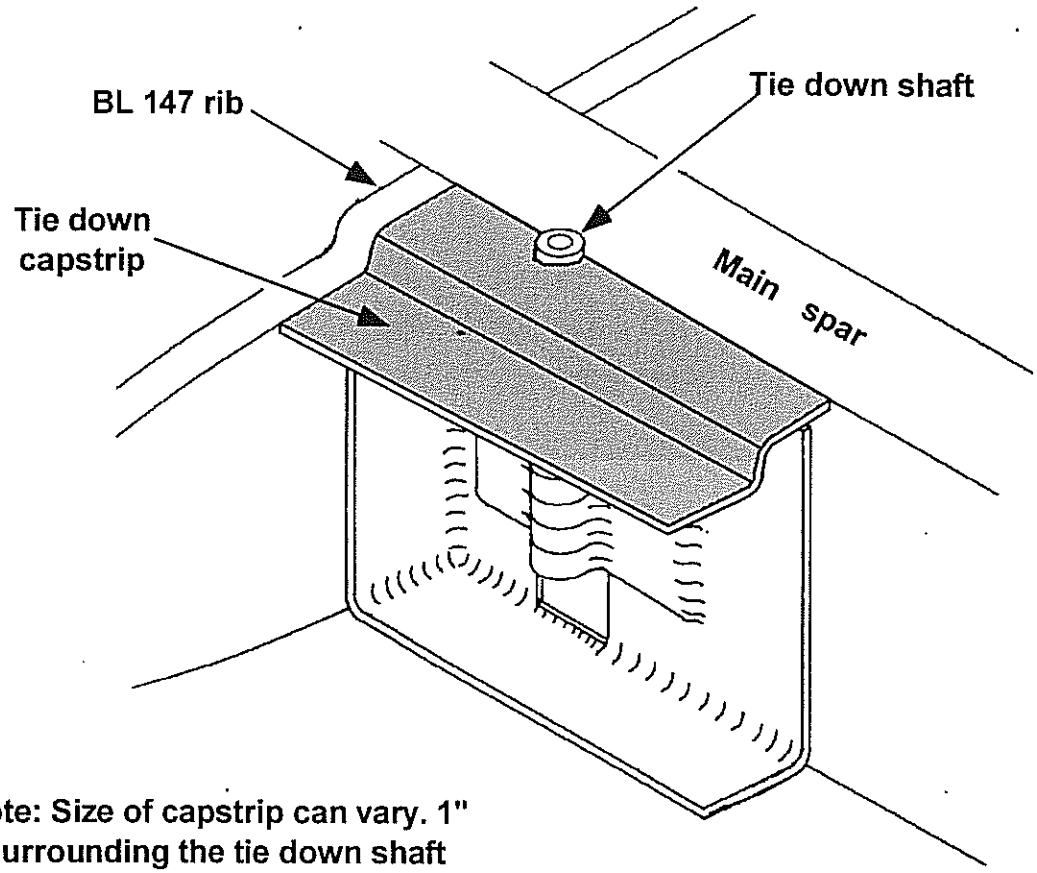
E2. Use 40 grit to sand the area around the foam piece you just installed. Clean this area with MC.

E3. Apply 2 BID to the foam piece, extending the BID 1" onto the surrounding surfaces. This should seal off the top of the tie down assembly.

E4. To seal the bottom of the tie down assembly, a capstrip is needed. Apply a layer of release tape to the inner surface of the bottom wing skin in the tie down area.

E5. Apply a 2 BID capstrip to the inner surface of the bottom wing skin that will cover the area around the tie down shown in Figure E:2.

Tie Down Capstrip
Figure E:2



Note: Size of capstrip can vary. 1" surrounding the tie down shaft would be sufficient.

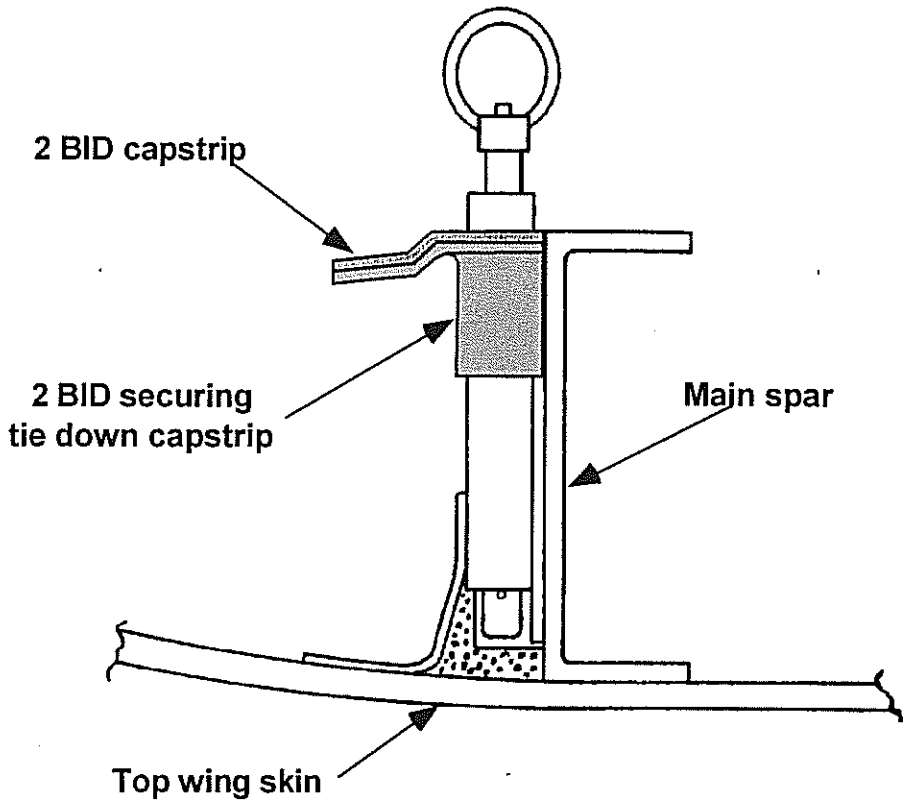
E6. Apply some thick epoxy/flox around the tie down area that will secure the capstrip in position.

E7. Carefully lower the bottom wing skin into position and weight it down in the tie down areas.

E8. After the micro and 2 BID capstrip have cured, remove the bottom wing skin carefully to avoid breaking loose the capstrip.

Securing Tie Down Capstrip

Figure E:3



E9. Secure the capstrip in position with 2 BID, overlapping onto the surrounding surfaces by 1". Be sure to sand and clean the areas where the 2 BID is applied. This capstrip should seal off the bottom portion of the tie down assembly.

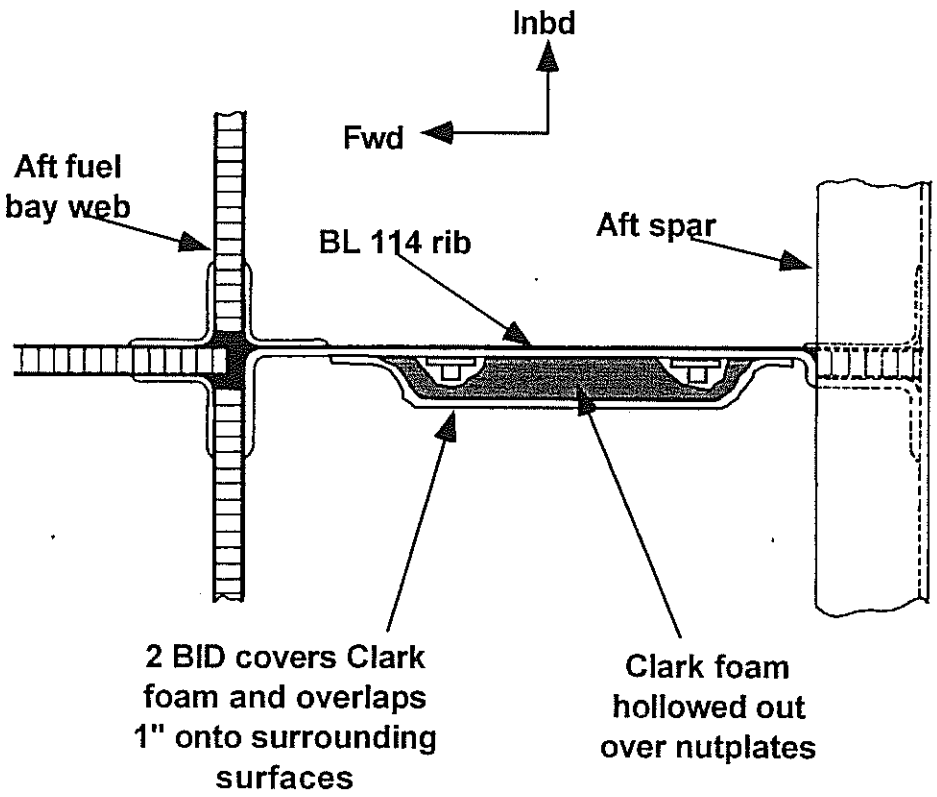
F. SEALING BL 114 NUTPLATES

There are four nutplates riveted to the outboard face of BL 114 rib that are used to secure the bellcrank brackets. These nutplates must be covered to avoid fuel leakage.

F1. Cut a piece of 1/2" thick Clark foam that will cover the four nutplates on the outboard side of the BL 114 rib. You'll have to sand little depressions in the foam to accomodate the nutplates and allow the foam to rest flat against the rib.

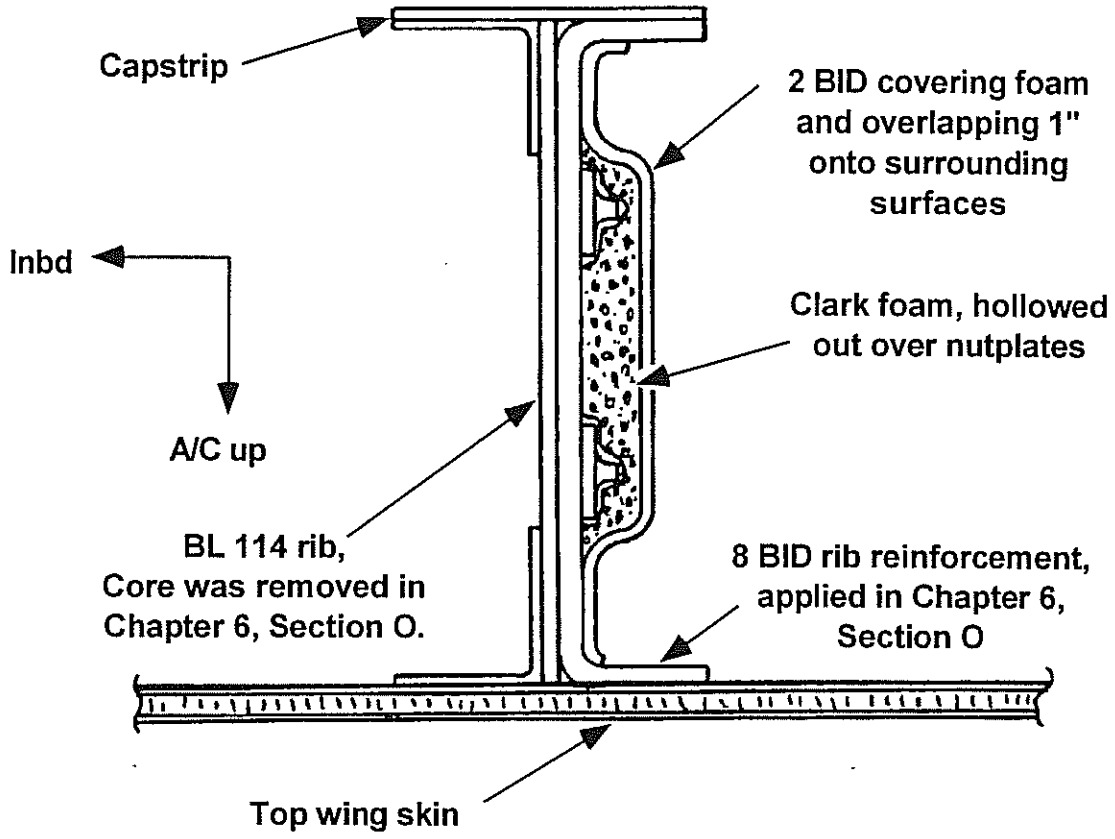
F2. Use epoxy/micro to bond the Clark foam cover to the outboard face of the BL 114 rib. Be sure you don't foul the nutplate threads with the micro. It is a good idea to screw the bolts into the nutplates to protect the threads.

Foam Nutplate Cover
Figure F:1:a



Foam Nutplate Cover

Figure F:1:a



F3. Round the edges of the foam nutplate cover and form micro radii in the corners.

F4. Spread a thin coat of epoxy/micro onto the foam nutplate cover surface, then apply 2 BID, overlapping 1" onto the surrounding surfaces. You'll only be able to overlap onto the capstrip about 1/2", but that is sufficient.

F5. Now be sure you can bolt the bellcrank brackets in place and not damage the Clark foam nutplate cover.

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HIGH PERFORMANCE EPOXY RESIN
LOW VISCOSITY

DESCRIPTION: High performance multifuctional epoxy resin blend containing minimal reactive diluent content for maximum property retention. Resin allows fast and efficient wetting of reinforcement materials. 100% solids, very clear. Highly resistant to crystallization.

USES: High performance composites, low viscosity filament winding compounds, hand lay up laminating, tooling, casting and chemically resistant flooring.

PROPERTIES OF 1307 RESIN:

Viscosity:	1800 - 2000 cps
EEW:	185 - 195
Color:	2 (max)
Weight/Gal:	9.4 - 9.6

MIXING: Use JEFFCO 1307 epoxy at the recommended temperature range of 50^0 - 100^0 F. Use of JEFFCO 1307 below 45^0 F is NOT recommended. All standing water must be removed. Surfaces must be free of contaminants such as dirt, oil or grease. Mold surfaces must be waxed or otherwise released prior to application of epoxies. Proportion JEFFCO resin and hardener in accordance with instructions on hardener label. Mix resin and hardener thoroughly for 3-5 minutes being certain to scrape bottom and sides of mixing container. Mix no more material than may be applied in 10 - 15 minutes or before the expiration of pot life of the system, whichever is shorter.

CURING: Keep application at the recommended use temperature for a minimum of 24 hours. Full properties are developed in 7 days at ambient temperatures. See hardener data for specific cure schedules and properties.

HOW SUPPLIED: Gallon bottles at 9# net, Pails at 40# net, 55 Gallon drums at 500# net. Sold FOB San Diego, CA. or through authorized JEFFCO distributors. JEFFCO epoxies are moderately priced. DOT - not regulated.

MATERIAL SAFETY DATA SHEET

Jeffco Products, 5252 Kearny Villa Way, San Diego, CA. 92123
Emergency Phone:(619) 576-9900
Infotrac:(800) 535-5053

MSDS: JEFFCO 1307 (RESIN COMPONENT)

Effective Date: 1/4/94 Date Printed: 1/8/94

1. INGREDIENTS

Reaction products of Epichlorohydrin and Bisphenol F 85%
CAS # 28064-14-4

Remaining ingredients are trade secret

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200) in addition, other substances not Hazardous per this OSHA Standard may be listed Where proprietary Ingredient shows the identity may be made available as provided in this standard.

2. PHYSICAL DATA

BOILING POINT: not applicable
VAP PRESS: not applicable
VAP DENSITY: not applicable
SOL. IN WATER: none
SP. GRAVITY: 1.16
APPEARANCE: water-white to yellow liquid to semi-solid
ODOR: faint epoxy odor

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 480^{o}F
METHOD USED: PMCC

FLAMMABLE LIMITS
LFL: not applicable
UFL: not applicable

EXTINGUISHING MEDIA: foam, CO_2, dry chemical

FIRE AND EXPLOSION HAZARDS: none

FIRE-FIGHTING EQUIPMENT: Wear positive pressure self-contained breathing apparatus.

4. REACTIVITY DATA:

STABILITY: (CONDITIONS TO AVOID) Excess heating over long periods of time degrades the resin.

INCOMPATIBILILTY: (SPECIFIC MATERIALS TO AVOID) Base.

HAZARDOUS DECOMPOSITION PRODUCTS: The by-products expected in incomplete pyrolysis or combustion of epoxy resins are mainly phenolics, carbon monoxide and water. The thermal decomposition products of epoxy resins therefore should be treated as potentially hazardous substances and appropriate precautions should be taken.

HAZARDOUS POLYMERIZATION: Will not occur by itself but masses more than 1 pound of product plus aliphatic amine will cause irreversible polymerization with considerable heat buildup.

5. ENVIRONMENTAL AND DISPOSAL INFORMATION

ACTION TO TAKE FOR SPILLS/LEAKS: Soak up in absorbent material and collect in suitable containers. Residual may be removed using steam or hot soapy water.

DISPOSAL METHOD: Burn in adequate incinerator or bury in an approved landfill; in accordance with local, state and federal regulations.

6. HEALTH HAZARD DATA:

EYE: Minor transient irritation. No corneal injury likely.

SKIN CONTACT: May cause allergic skin reaction in susceptible individuals. Prolonged exposure not likely to cause significant skin irritation. Repeated exposure may cause skin irritation.

SKIN ABSORPTION: A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. The LD_{50} (rat) greater than 4000 mg/kg. No hazards anticipated from ingestion incidental to industrial exposure.

INHALATION: Vapors are unlikely due to physical properites. Not a problem unless heated to high temperature.

SYSTEMIC AND OTHER EFFECTS: Except for skin sensitization, repeated exposures to low molecular weight epoxy resins of this type has been reported to produce skin cancer in a highly sensitive strain of mice. However, high levels of impurities compromise the validity of the findings. Epoxy resin that is representative of current manufacturing processes is not believed to be a cancer hazard to humans. Results of mutagenicity test in animals have been negative. It has been shown to be negative in some in vitro mutagenicity test and positive in others.

7. FIRST AID:

EYES: Irrigation of the eye immediately with water for five minutes is good safety practice.

SKIN: Contact will probably cause no more than irritation. Wash off in flowing water or shower. Wash clothing before reuse.

INGESTION: Low in toxicity. No adverse effects anticipated by this route of exposure incidental to proper industrial handling.

INHALATION: Remove to fresh air if effect occurs. Consult medical personnel.

NOTE TO PHYSICIAN: No specific antidote. Supportive care. Treatement based on judgment of the physician in response to reactions of the patient.

8. HANDLING PRECAUTIONS:

VENTILATION: Food room ventilation usually adequate for most operations.

RESPIRATORY PROTECTION: For brief contact, no precautions other than clean body-covering clothing should be needed. Use impervious gloves when prolonged or frequently repeated contact should occur.

EYE PROTECTION: Use chemical goggles.

9. ADDITIONAL INFORMATION

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:
Practice good caution and personnel cleanliness to avoid skin and eye contact. Avoid breathing vapors of heated material.

10. NFPA HAZARD RATING

4 = EXTREME	HEALTH	1
3 = HIGH	FIRE	1
2 = MODERATE	REACTIVITY	0
1 = SLIGHT	SPECIFIC	-
0 = INSIGNIFICANT		

11. REGULATORY INFORMATION

STATUS ON SUBSTANCE LISTS: The concentrations shown in this document are maximum or ceiling levels (expressed in wight %, unless otherwise specified) to be used for regulations. Trade Secrets are indicated by "TS".

FEDERAL EPA:

COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION and LIABILITY ACT of 1980 (CERCLA):

N/A

SUPERFUND AMENDMENTS and REAUTHORIZATION ACT of 1986 (SARA) TITLE III:

N/A

EPA HAZARD CLASSIFICATIONS:

Acute Hazard	Chronic Hazard	Fire Hazard	Pressure Hazard	Reactive Hazard
no	no	no	no	no

Section 313 requires submission of annual reports of release of toxic chemicals that appear in 40 CFR 372 (for SARA 313). This information must be included in all MSDSs that are copied and distributed for this material.

Components present in this product at level which could require reporting under the statue are:

Chemical Name	CAS Number	% By Weight
NONE		

If you are unsure if you must report more information, call the EPA Emergency Planning and Right-To-Know Hot Line: 800-535-0202 or 202-479-2449.

TOXIC SUBSTANCES CONTROL ACT (TSCA):

The components of this product are contained on the chemical substance inventory list.

OTHER REGULATORY INFORMATION:

None known to this firm.

The information herein is given in good faith, but no warranty expressed or implied is made. JEFFCO PRODUCTS urges suppliers and users of this product to evaluate its suitability and compliance with local regulations as JEFFCO PRODUCTS cannot forsee the nature of the final application nor final location of usage.

DOT SHIPPING INFORMATION:

Not regulated.

END OF MSDS JEFFCO 1307

5252 Kearny Villa Way
San Diego, CA. 92123
(619) 576-9900

EPOXIES
CONSTRUCTION SPECIALTIES
LAMINATING AND TOOLING
ENVIRONMENTAL CONTAINMENT

Quality products since 1989

JEFFCO 3102

FAST ROOM TEMP EPOXY HARDENER

DESCRIPTION: Aliphatic mannich base hardener. Fast setting, even in thin films. Good low temperature cure. Excellent chemical resistance. Fast wetting of fiberglass reinforcements. Easy to use 4:1 mix ratio. 100% solids. High HDT with post cure. DOT: Not Regulated.

USES: Hand lay up laminating, marine construction, RTM, vacuum bagging, tooling, fairing compounds, "hot" coating or sealing of wood or porous substrates, chemically resistant coatings.

PROPERTIES OF 3102 HARDENER:

Viscosity @ 77F, cps	1500
Weight per Active H	50
Color (Gardener)	6
Weight per Gallon	9.0 Lbs
Mix Ratio, parts per 100 of resin	25 - 26
Pot Life (150 grams)	11 - 15 minutes
Thin Film set Time, hours	1.5

CURED PROPERTIES WITH 1301, 1303, 1304T or 1308 RESIN:
(cure schedule: Gel @ ambient + 2 hours @ 212^{0}F or 7 days at 77^{0}F)

HDT (ASTM D648-264) F	214
Service Temperature F	225 +
Barcol Hardness	84
Flexural Strength, psi	17,900
Flexural Modulus, psi	377,000
Tensile Strength, psi	9,450
Tensile Modulus, psi	493,000
Elongation %	2.5

HOW SUPPLIED: Quart Bottles at 2# net, Gallon Bottles at 8# net, Pails at 40# net, 55 Gallon Drums at 450# net. Shipped FOB San Diego, CA. or through authorized JEFFCO distributors.

CHEMICAL RESISTANCE
(3 WEEK IMMERSION)

REAGENT	% WEIGHT GAIN (OR LOSS)	
Xylene	0.7	
Toluene	2.8	
1,1,1 Trichloroethane	0.9	
MEK	nr *	(OK for splash service)
EB (Ethylene Glycol Monobutyl Ether)	6.1	
Ethyl Alcohol	1.0	
Methyl Alcohol	8.5	
Water (distilled)	0.5	(< 0.02 in 24 hours)
5% Detergent Solution	0.5	
10% Sodium Hydroxide	0.4	
50% Sodium Hydroxide	(0.1)	
10% Sulfuric Acid	1.7	
70% Sulfuric Acid	1.0	
10% Hydrochloric Acid	1.1	
20% Nitric Acid	1.4	
10% Acetic Acid	7.3	
Skydrol	0.0	
Synthetic Gasohol	12.4	

(LEGEND nr = not recommended, - not tested)

Note: Above tests are performed on panels using JEFFCO 1301 Epoxy resin cured with 26 PHR JEFFCO 3102 Hardener - gel @ 77^0 F + 2 hours @ 212^{0}F + 7 days @ RT.

MATERIAL SAFETY DATA SHEET

JEFFCO PRODUCTS, 5252 Kearny Villa Way, San Diego, CA 92123
Emergency Phone: (619) 576-9900
Infotrac:(800) 535-5053

MSDS: JEFFCO 3102 (HARDENER COMPONENT)

Effective Date: 2/14/94 Date Printed: 2/14/94

1. INGREDIENTS

Phenol	< 15 %	CAS# 108-95-2
Triethylene Tetramine	< 05 %	CAS# 112-24-3
Formaldehyde Polymer with Phenol and TETA	> 85 %	CAS# 32610-77-8

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200) in addition, other substances not Hazardous per this OSHA Standard may be listed. Where proprietary Ingredient shows the identity may be made available as provided in this standard.

2. PHYSICAL DATA

BOILING POINT:	N/A
VAP PRESS:	N/A
VAP DENSITY:	N/A
SOL. IN WATER:	Slightly soluble
SP. GRAVITY:	1.08
APPEARANCE:	Amber colored liquid
ODOR:	Amine odor

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 277^0 F
METHOD USED: PMCC

FLAMMABLE LIMITS
LFL: N/A
UFL: N/A

EXTINGUISHING MEDIA: Use alcohol foam, CO_2, dry chemical

FIRE AND EXPLOSION HAZARDS: Use full protective clothing (see Section 8)

FIRE-FIGHTING EQUIPMENT: Use a positive pressure, self-contained breathing apparatus.

4. REACTIVITY DATA:

STABILITY: (C0NDITIONS TO AVOID) Can autoignite in air at approximately 572°F,300°C.

INCOMPATIBILILTY: (SPECIFIC MATERIALS TO AVOID)
Epoxy resins under uncontrolled conditions.

HAZARDOUS DECOMPOSITION PRODUCTS: Nitrogen oxides when burned.

HAZARDOUS POLYMERIZATION: Will not occur.

5. ENVIRONMENTAL AND DISPOSAL INFORMATION

ACTION TO TAKE FOR SPILLS/LEAKS: Large spill -- dike up and pump into appropriate containers. Small spill -- use noncombustible absorbent material/sand and shovel into suitable containers.

DISPOSAL METHOD: Large quantities should be recovered. Collect small quantities in waste metal drums and seal for removal to an approved landfill, or incinerate in accordance with local, state and federal regulations.

6. HEALTH HAZARD DATA:

EYE: May cause severe irritation with corneal injury, which may result in permanenet impairment of vision, even blindness. Vapors may irritate eyes.

SKIN CONTACT: May cause severe injury to skin following prolonged or repeated contact, and may cause skin sensitization or other allergic responses.

SKIN ABSORPTION: A single prolonged exposure may result in the material being absorbed in harmful amounts.

INGESTION: Single dose oral toxicity is low. The oral LD_{50} for rats is 2140-3990 mg/KG. Ingestion may cause gastrointestinal irritation or ulceration. Ingestion may cause burns of mouth and throat.

INHALATION: May cause respiratory sensitization or asthma in susceptible individuals. Excessive exposure may cause irritation to upper respiratory tract.

SYSTEMIC AND OTHER EFFECTS: Repeated excessive exposures may cause liver and kidney effects. Result if in vitro ("test tube") mutagenicity tests have been negative.

7. FIRST AID:

EYES: Immediate and continuous irrigation with flowing water for at least 30 minutes is required. Promptly seek medical attention.

SKIN: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing, preferably under a safety shower. Seek medical attention immediately. Avoid prolonged or repeated contact to skin. Wash thoroughly after handling.

INGESTION: Do not induce vomiting. Give large amounts of water or milk if available and transport to medical facility.

INHALATION: Remove to fresh air if effects occurs. Consult a physician.

NOTE TO PHYSICIAN: Corrosive. May cause stricture. If lavage is performed, suggest endotracheal and/or esophagoscopic control. If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Supportive care. Treatment based on judgement of the physician in response to reactions of the patient.

8. HANDLING PRECAUTIONS:

EXPOSURE GUIDELINE(S): None established.

VENTILATION: Control airborne concentration below the exposure guideline. Use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator.

SKIN PROTECTION: Use protective clothing impervious to this material. Selection of specific items such as gloves, boots, apron or full-body suit will depend on operation. Safety shower should be located in immediate work area. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse. Contaminiated leather items, such as shoes, belts and watchbands, should be removed and destroyed.

EYE PROTECTION: Use chemical goggles. If vapor exposure causes eye irritation, use a full-face respirator. Eye wash fountain should be located in immediate work area.

9. ADDITIONAL INFORMATION

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Ground all transfer equipment. Hold bulk storage under a nitrogen blanket. This product should not come in contact with copper or copper-bearing alloys. Good general housekeeping procedure should be followed.

10. NFPA HAZARD RATING

4 = EXTREME	HEALTH	3
3 = HIGH	FIRE	1
2 = MODERATE	REACTIVITY	0
1 = SLIGHT	SPECIFIC	-
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COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION and LIABILITY ACT of 1980 (CERCLA):

N/A

SUPERFUND AMENDMENTS and REAUTHORIZATION ACT of 1986 (SARA)
TITLE III:

N/A

EPA HAZARD CLASSIFICATIONS:

Acute Hazard	Chronic Hazard	Fire Hazard	Pressure Hazard	Reactive Hazard
yes	yes	no	no	no

Section 313 requires submission of annual reports of release of toxic chemicals that appear in 40 CFR 372 (for SARA 313). This information must be included in all MSDSs that are copied and distributed for this material.

Components present in this product at level which could require reporting under the statue are:

Phenol at a level < 15%

If you are unsure if you must report more information, call the EPA Emergency Planning and Right-To-Know Hot Line: 800-535-0202 or 202-479-2449.

TOXIC SUBSTANCES CONTROL ACT (TSCA):

The components of this product are contained on the chemical substance inventory list.

OTHER REGULATORY INFORMATION:

None known to this firm.

The information herein is given in good faith, but no warranty expressed or implied is made. JEFFCO PRODUCTS urges suppliers and users of this product to evaluate its suitability and compliance with local regulations as JEFFCO PRODUCTS cannot forsee the nature of the final application nor final location of usage.

DOT SHIPPING INFORMATION

Not regulated

NEICO AVIATION INC.
2244 Airport Way, Redmond, OR 97756 (503) 923-2244 Fax 503-923-2255

Service Bulletin SB005-91

Subject: Shell DPL-862 resin, TETA curing agent
Date: 4-9-91 (2 pages)

First of all, please check to verify that your airframe kit is supplied with the above resin system. This system is considered superior in many respects to previous systems used. As with any system, there are always tradeoffs so please read and follow the following directions carefully regarding use of these materials.

1. **Mix Ratio** (BY WEIGHT)
   14-18 parts TETA to 100 parts DPL-862 resin

2. You will note that the curing agent is very runny, almost water like in viscosity. While this makes for a very strong system since the resin is diluted very little, proper mixing does become much more important.

   WARNING:
   It will be your responsibility to thoroughly mix all batches of resin/curing agent and also to verify, on a regular basis, the accuracy of your ratio mix. If you are using an epoxy pump that has been calibrated for this ratio, it is still MANDATORY to check the ratio on a REGULAR basis. There are a multitude of factors that can adversely affect the ratio such as a clogged port or a seal that has an impurity stuck under it, etc. YOU MUST REGULARLY CHECK THE RATIO MIX AND VERIFY IT TO BE CORRECT. Failure to do so could result in improper or insufficient cure properties of the resin which in turn could result in bond failure.

3. **Epoxy Pump Setup:**
   When setting up your epoxy pump, it is very important to align the two dispensing spouts such that they will pour their respective fluids closely together in the mixing cup. To achieve this, bend the two spouts together such that the curing agent spout (smaller diameter and smaller container) is within 3/16" of the resin spout. This will allow the curing agent to land in the cup, essentially on top of the larger volume of resin and it greatly promotes a good mix.
4. To verify the accuracy of your pump, you'll need a very accurate ounce scale. Set the scale to zero out with you mixing cup on it (this is to zero out the "tare" weight).
5. Pump at least ten to 15 full strokes from the pumper into individual cups.
6. Weigh the resin cup and note the weight.

7. Multiply that weight by 0.18. This arrived at number is what the curing agent cup should weigh. Ratios as low as 14 per hundred are acceptable however the mixing then becomes even more critical. The ratio should be very accurate, however if it is off, correction must be made either to the pump itself (perhaps cleaning) or correct the ratio through noting the additional pumps required of which ever part requires increasing.
8. After pumping the desired amounts into your mixing cup, carefully stir the resin and "fold" in the curing agent with crossing stir movements. With a relatively low volume of curing agent, it is critical to stir the mixture very thoroughly. Do not allow any resin on the bottom or corners of the cup to not get fully mixed - this is the most common error in mixing. Mix thoroughly for at least two to four minutes before using or before mixing in any other materials such as micro or flox.
9. Be ready to apply the mixed resin immediately. While you do not have to work at a hectic pace, the resin will "kick" much more quickly when piled up thick in your cup. This is due to the "exotherm" characteristic of this and most resin systems.
8. Keep the lids secured on both resin and curing agent containers and do not heat excessively. Keeping the resin at a steady 72-78°F is ideal. This can be accomplished using a small watt light bulb placed in the pumper box. Typically a 25 watt bulb works well, but do check the temperature and adjust if it gets too hot or too cold.
9. The curing time will vary greatly depending on ambient temperature and thickness of resin (ie: number of plies of BID tapes, amount of micro or flox mixed in, etc.). Generally, setting times will vary between one hour and 12 hours. Full cure at room temperature will require several days and an elevated temperature post cure is always recommended. At room temperature, for a relatively normal 3 BID layup, the resin should firm up within 4-6 hrs. A partial cup of resin will "exotherm" and "kick" often within 30 minutes thus it should not be left thick in a cup for long prior to use. At room temperature, the resin system will actually continue to gain strength for up to 30 days.
10. CAUTION
    While this resin system is by no means the most toxic, in fact it is less toxic than most systems used by kit suppliers, proper handling is critical to good health. The curing agent is typically the most toxic of the two elements and extreme care must be exercised to keep this agent off your skin. You should wear protective gloves and have adequate ventilation when ever using any resin system. Read and follow all printed warning / usage statements by the manufacturer.
    NOTE:
    Also read and follow the instructions supplied with by the pumper Manufacturer regarding the removal of air bubbles in the pumper system.

NEICO AVIATION INC.
2244 Airport Way, Redmond, OR 97756 (503) 923-2244 Fax 503-923-2255

Service Bulletin SB004-91

Subject: Mixing & shelf life of Hysol 9339 structural adhesive
Date: 3-1-91

1. First, always check your structural adhesive to verify that it is in fact, Hysol 9339. This is recommended since, from time to time as deemed useful, Neico may elect to change systems.

2. Hysol 9339 is mixed in the ratio of 100 parts A (thick light colored) to 44.5 parts B (thinner dark colored). This ratio is by WEIGHT not volume.

3. The preferred mixing method is:
   a.) Using an accurate ounce scale, place the cup on the scale and zero it out.
   b.) Spoon in an amount of Part A that you estimate would represent about 2/3rds of the total amount of adhesive desired.
   c.) Weigh this amount and multiply that weight by 1.445 and note the figure.
   d.) Add Part B to the cup until the newly arrived at figure is reached.
   e.) Mix thoroughly for at least two to three minutes or until completely mixed. Be sure to scrape the sides, bottom corners, etc. during the mixing process.

4. Note that the shelf life of the resin is set from date of shipment (DOS) to Neico Aviation. That date is stamped on the labels when Neico receives the shipment.

   Shelf life is listed as one (1) year from (DOS) date of shipment.

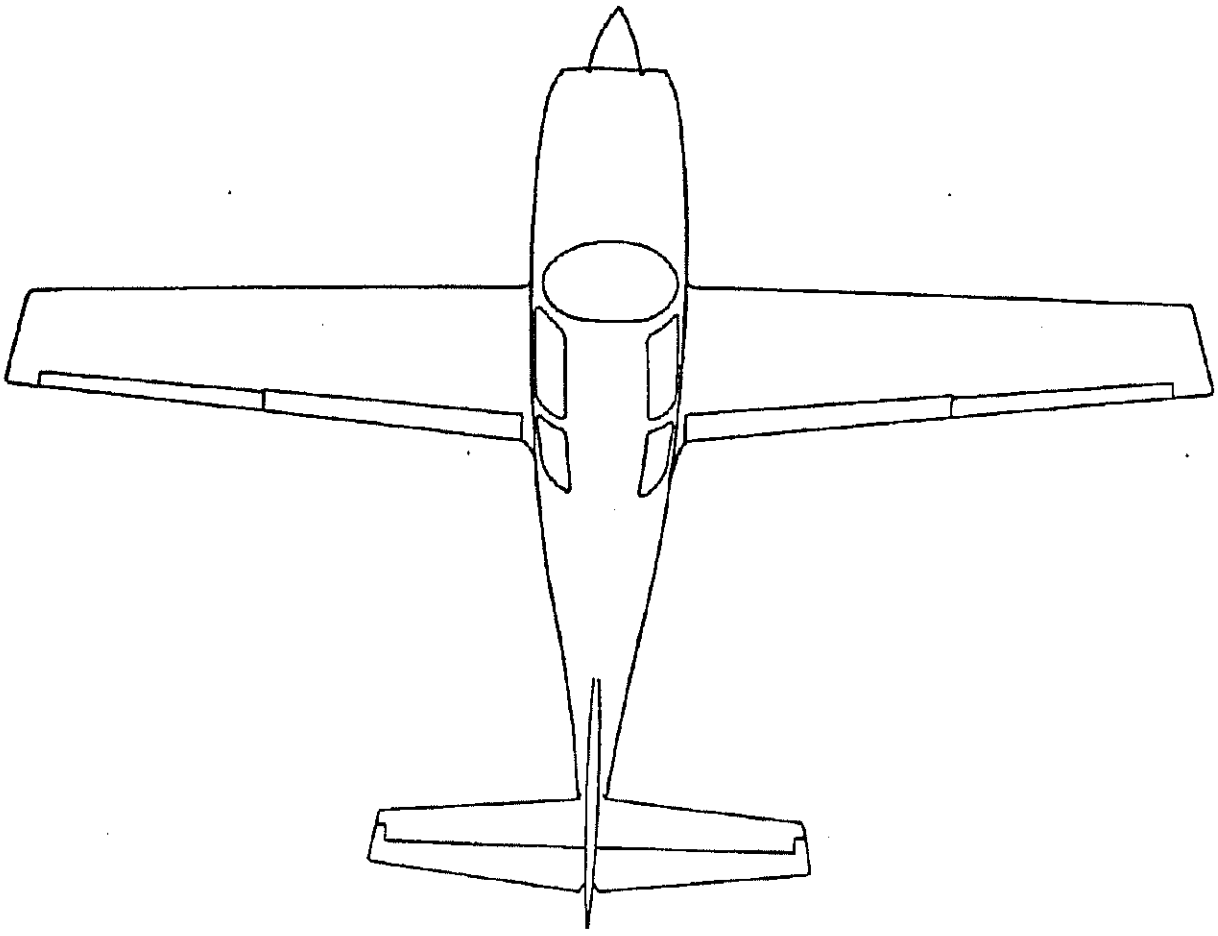
   Shelf life is NOT determined from "date of Mfg." which could be much earlier. This is because Dexter Hysol Corp. requalifies their pre-made adhesive batches as they process them for shipment and thus guarantee the shelf life from that time.

Sample ratios & weights: (in ounces)

Part A		Part B		Total wt.
1	+	.445	=	1.445
2	+	.89	=	1.89
3	+	1.335	=	4.335
4	+	1.78	=	5.78
5	+	2.225	=	7.225
6	+	2.67	=	8.67
7	+	3.115	=	10.115
8	+	3.56	=	11.56

LANCAIR® IV

KIT ASSEMBLY MANUAL



Dear Future Lancair Flyer,

Welcome to the world of kit built aircraft. Building a kit plane is both educational and recreational and is without question, one of today's most active areas of general aviation. If you're new to homebuilding, then you will be pleasantly surprised by the warm fraternity of friends you'll soon be making since "homebuilders" are truly a special breed of people. In fact, many builders find the building process and the new friends they make, as rewarding as the eventual and spectacular hours of flying.

Your Lancair IV kit is composed of truly, state of the art, advanced composite materials. Virtually all molded parts are produced under high pressure (about 2000psf) and cured at 250°F± 5°'s. This high temperature process is the commercial aviation industry standard and produces the strongest possible parts with extremely high strength to weight ratios. With such high temperature cures, dimensional stability is also far superior to room temperature cured parts produced by many other kit manufacturers. With these advanced materials, the longevity of your investment will also be greatly enhanced.

Carbon Fiber is a dominate structural material with the Lancair IV. This is without question the one of the finest structural composite materials available today and again, is the clear choice of all military and commercial aviation applications.

We are always working to simplify assembly techniques as periodic revisions to the assembly manuals reflect. We encourage you to join a local EAA chapter if one is near you and also suggest you subscribe to the Lancair Mail newsletter which serves as a conduit for builder ideas, shortcuts, flying tips, etc.

The Lancair IV is indeed an aircraft for the elite that sets newer and higher standards in design, comfort and performance, standards by which all others will be judged. And, with dedication and a conscientious effort, you'll soon have a fine example of the Lancair IV flying that you can be proud of for decades to come.

We welcome you and look forward to seeing you and your spectacular new Lancair IV at a future fly-in.

Sincerely,

Lance Neibauer
Neico Aviation Inc.

PREFACE

This manual provides detailed step-by-step instructions for assembling a Lancair IV Kit. However, hands on experience with fiberglass construction techniques and various hand tools is assumed. If you do not have that background knowledge, the study of other, more basic texts will be necessary. Suggested references are given on the following page.

Although one person might build this kit alone, there will be times when an extra pair of hands or eyes will be very helpful and will speed assembly. Besides, working with a friend can be a great deal more fun.

If you do not already belong to the local chapter of the Experimental Aircraft Association (EAA), you may want to join. The EAA chapter nearest you will probably have members already building aircraft who will be happy to help you. Contact the EAA at the following address for the location of the nearest chapter:

EAA
Wittman Airfield
Oshkosh, WI 54903-3065
(414) 426-4876

RECOMMENDED BACKGROUND INFORMATION

Composite Materials Practice Kit: This kit contains various materials with which to practice and develop your fiberglass construction technique. It also contains a copy of Burt Rutan's **Moldless Composite Sandwich Homebuilt Aircraft Construction book described below.** This kit is **very highly recommended** for all newcomers to fiberglass construction and is a good refresher to others.

Moldless Composite Sandwich Homebuilt Aircraft Construction: by Burt Rutan. Though the hot wire shaping technique covered by this book is not used on the Lancair IV, this book has a great deal of other excellent, basic fiberglass construction information. **Very Highly Recommended.**

Building Rutan Composites: This is a video tape by Burt Rutan. Although it covers some techniques not used on the Lancair IV, it shows you how the experts handle fiberglass construction.

Composite Construction For Homebuilt Aircraft: by Jack Lambie. This book is an additional source of a great deal of useful construction information and goes into the theory of aircraft design as well. His Chapter 9 Safety in Working With Composite Construction is particularly worth reading. This book would be a useful addition to the above.

The above publications, practice kit and video tape are available from:

Aircraft Spruce & Specialty Company
Box 424
Fullerton, CA 92632
Phone: 1-800-824-1930 or 1-714-870-7551
FAX: 1-714-871-7289

The following recommended books largely describe aspects of aircraft construction other than working with fiberglass:

Firewall Forward: by Tony Bingelis is packed with vital information about engine installation. You'll need this when you're getting ready to install the engine.

The Sportplane Builder: by Tony Bingelis has a lot of useful information on aircraft construction in general such as electrical systems, instrumentation and fuel systems.

These two books can be obtained from:

EAA Aviation Foundation
Wittman Airfield
Oshkosh, WI 54903-3065
Phone: 1-414-426-4800

WARNING

IF DURING CONSTRUCTION YOU HAVE ANY QUESTION OR DOUBT ABOUT A CONSTRUCTION PROCEDURE, DO NOT CONTINUE UNTIL YOU HAVE OBTAINED THE NECESSARY INFORMATION OR SKILL. IF YOU ARE NOT KNOWLEDGEABLE IN FIBERGLASS OR OTHER REQUIRED CONSTRUCTION TECHNIQUES OR TOOLS, OBTAIN THAT KNOWLEDGE BEFORE STARTING CONSTRUCTION.

NO CHANGE TO THE AIRCRAFT DESIGN OR SPECIFIED CONSTRUCTION PROCEDURES IS PERMITTED. SUCH CHANGES MAY ADVERSELY EFFECT THE AIRCRAFT'S STRUCTURAL INTEGRITY OR AIR WORTHINESS.

FAILURE TO FOLLOW THIS WARNING AND OTHERS IN THIS MANUAL COULD RESULT IN COMPONENT FAILURE AND LOSS OF AIRCRAFT CONTROL CAUSING SERIOUS INJURY OR DEATH.

NOTE

If during the reading of this assembly manual you become confused or uncertain as to what the directions mean, go back to the material just prior to where you became confused and look for a word or symbol that you did not fully understand. Look up that word in the "Terms and Definitions" section of the manual and get it cleared up. If it is not in that section, use another technical source or ordinary dictionary to get it defined. If still in doubt, call us at Neico Aviation.

WARNING

Failure to clear up such misunderstandings could result in improper and unsafe construction.