

FEDERAL AVIATION AGENCY
MAJOR REPAIR AND ALTERATION
 (Airframe, Powerplant, Propeller, or Appliance)

Form Approved
 Budget Bureau No. 04-R060.1
 FOR FAA USE ONLY
 OFFICE IDENTIFICATION

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form.

1. AIRCRAFT	MAKE PIPER	MODEL PA-22-160
	SERIAL NO. 22-6244	NATIONALITY AND REGISTRATION MARK U.S. N9186D
2. OWNER	NAME (As shown on registration certificate) WILLIAM L. HAVENER	ADDRESS (As shown on registration certificate) 1409 6th AVE STERLING, IL 61081

3. FOR FAA USE ONLY

The data identified herein complies with the applicable airworthiness requirements and is approved for the above described aircraft, subject to conformity inspection by a person authorized in FAR 43.7.

11-6-92 Robert Luma
 Date: 11-6-92 FAA Inspector, DPA FSDO

4. UNIT IDENTIFICATION				5. TYPE	
UNIT	MAKE	MODEL	SERIAL NO.	REPAIR	ALTERATION
AIRFRAME	***** (As described in item 1 above) *****				X
POWERPLANT					
PROPELLER					
APPLIANCE	TYPE				
	MANUFACTURER				

6. CONFORMITY STATEMENT

A. AGENCY'S NAME AND ADDRESS ELWOOD VERNE CURRY 102 E 2nd ST P.O. BOX 308 LEAF RIVER, ILLINOIS 61047	B. KIND OF AGENCY <input checked="" type="checkbox"/> U.S. CERTIFICATED MECHANIC <input type="checkbox"/> FOREIGN CERTIFICATED MECHANIC <input type="checkbox"/> CERTIFICATED REPAIR STATION <input type="checkbox"/> MANUFACTURER	C. CERTIFICATE NO. A&P 1101117
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D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

DATE OCTOBER 31, 1992	SIGNATURE OF AUTHORIZED INDIVIDUAL <i>Elwood Verne Curry</i>
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7. APPROVAL FOR RETURN TO SERVICE

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Agency and is APPROVED REJECTED

BY	FAA FLT. STANDARDS INSPECTOR	MANUFACTURER	X	INSPECTION AUTHORIZATION	OTHER (Specify)
	FAA DESIGNEE	REPAIR STATION		CANADIAN DEPARTMENT OF TRANSPORT INSPECTOR OF AIRCRAFT	
DATE OF APPROVAL OR REJECTION OCT. 31, 1992		CERTIFICATE OR DESIGNATION NO. I.A. 1101117		SIGNATURE OF AUTHORIZED INDIVIDUAL <i>Elwood Verne Curry</i>	

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. DESCRIPTION OF WORK ACCOMPLISHED (If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

1. MODIFIED FIBERGLASS NOSEWHEEL FAIRING, PIPER PART NUMBER 15082-00, FROM A ONE PIECE UNIT TO A TWO PIECE ASSEMBLY FOR EASE OF INSTALLATION ON, AND REMOVAL FROM, THE AIRCRAFT. MODIFICATION ELIMINATES NEED TO REMOVE NOSEWHEEL FROM FORK TO ACCOMPLISH INSTALLATION OR REMOVAL OF FAIRING.

MODIFICATION: MADE EPOXY/FIBERGLASS REENFORCED VERTICAL SEPARATION JOINT 3 INCHES AHEAD OF BULKHEAD, WITH LAID UP EPOXY/FIBERGLASS INTERNAL FLANGE ON FRONT PORTION OF THE FAIRING.

BONDED TEN EQUALLY SPACED ANCHOR NUTS (AN366F1032A) TO INSIDE OF FLANGE TO ACCEPT (AN507C-1032R10) MACHINE SCREWS WHICH HOLD REAR PORTION OF FAIRING IN PLACE.

NO CHANGES TO ORIGINAL MOUNTING HARDWARE AND ATTACHMENT POINTS.

BONDED FIVE AN366F1032A ANCHOR NUTS TO INSIDE OF FAIRING AT SCREW HOLE LOCATIONS FOR TOP OPENING TRIM PLATE TO ACCEPT AN526-1032R12 SCREWS.

SEE ATTACHED DRAWING.

2. WEIGHT CHANGE RESULTING FROM MODIFICATION IS PLUS (+) 1.1 POUND.
3. ATTACHED DRAWING FORMS PART OF THIS DESCRIPTION OF WORK ACCOMPLISHED.

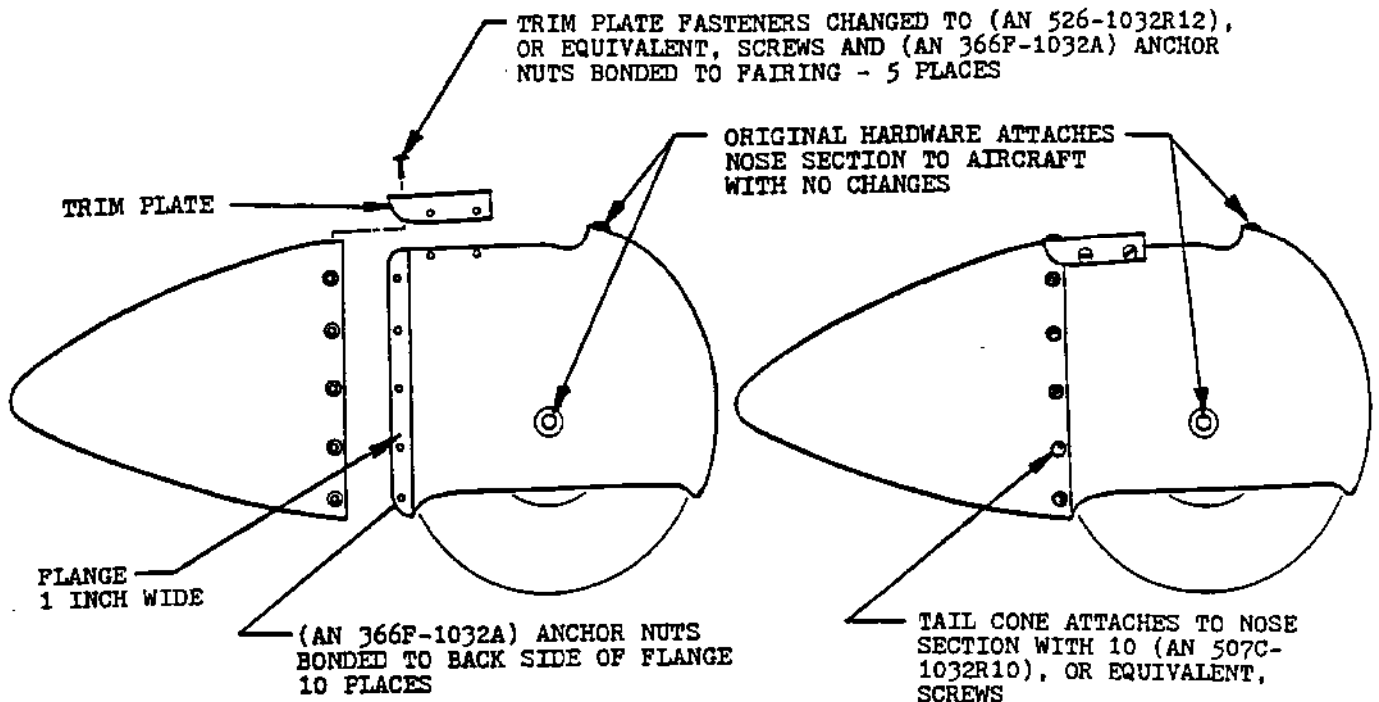
IS
ONE ADDITIONAL SHEETS ~~ATTACHED~~

PA-22 N9186D
Ser. 22-6244

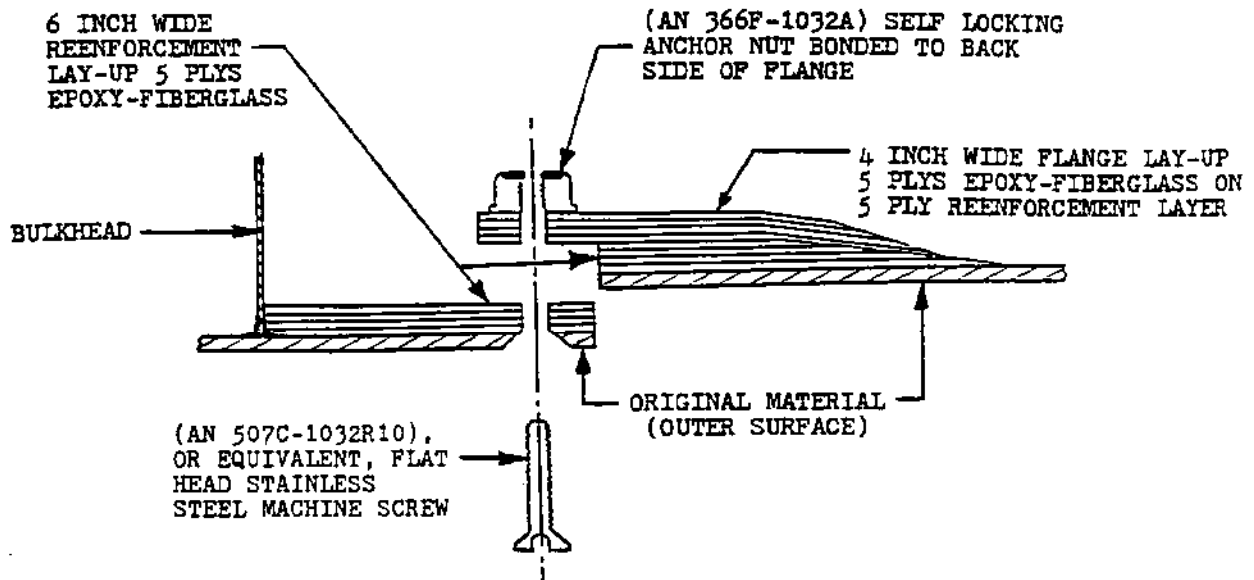
TITLE **MODIFIED NOSE WHEEL FAIRING**

FIRST MADE FOR PIPER PART NO. 15082-00

FAIRING MODIFIED FROM SINGLE UNIT TO TWO PART ASSEMBLY



TYPICAL CROSS SECTION THROUGH A FASTENER LOCATION SHOWING REINFORCEMENT AND FLANGE LAY-UPS



FIBERGLASS CLOTH - PPG 10 OZ. BI-DIRECTIONAL 18 THREADS PER INCH, OR EQUIVALENT

LAMINATING/BONDING RESIN - FOLLOWING, OR EQUIVALENT, RESIN SYSTEM -

EQUAL PARTS BY VOLUME: RESIN - SHELL EPON 828

ACTIVATOR - GEN. MILLS VERSAMIDE 140

DATE WORK

OCT 31 1992

2

NOSE WHEEL FAIRING MODIFICATION

FOR

PIPER PART NO. 15082-00

INSTRUCTION FOR MODIFYING
SINGLE PIECE UNIT INTO TWO PART ASSEMBLY

BY

WILLIAM L. HAVENER
1409 - 6th AVENUE
STERLING, ILLINOIS 61081-2541

DISCLAIMER

NOTE - The procedure described in this instruction is offered only as a guide. It describes, to the best of the author's ability, how the original work was done. The author makes no claim or guarantee of the suitability, safety or acceptability of any wheel fairing modified by following this procedure, and may not be held liable for the results obtained.

INTRODUCTION

Performing this modification includes some procedures which will make it necessary to completely re-paint the fairing. Before getting any materials or starting any work, carefully read the procedure all the way through until it is thoroughly understood.

Although the actual labor hours on this project are not great, plan on taking a week or more to complete it. Most of the time involved will be spent waiting for epoxy resin to cure.

If you have no experience doing fiberglass/epoxy lay ups, you would be ahead to seek the help of someone who does have that kind of experience. The next best thing would be to read up on it as much as possible and then do some practice lay ups before starting on your fairing.

MATERIALS REQUIRED

1. Approx. one square yard 10 oz. 18 thread per inch fiberglass cloth.
2. Approx. one pint of a suitable epoxy resin and activator.
3. Fifteen AN366F-1032A self locking anchor nuts.
4. Ten AN507C-1032R10 stainless steel flat head machine screws.
5. Five AN526-1032R12 machine screws.

ADDITIONAL MATERIALS REQUIRED

The following materials are also used to perform the modification as it is described here.

1. Two pieces $2\frac{1}{4}$ by $6\frac{1}{4}$.025 - .030 scrap aluminum sheet.
2. One dozen small wood scraps ($\frac{1}{4}$ in. plywood or lath, etc.)
3. One dozen $\frac{1}{2}$ - 1 inch long 5-40 machine screws and nuts.
4. One dozen $\frac{1}{8}$ inch aluminum pop rivets.
5. One dozen $\frac{1}{2}$ - 1 inch long 8-32 machine screws and nuts.
6. One kit Twin Weld, Lock Tite or similar two part paste epoxy adhesive.
7. One small container Bondo, White Knight or similar auto body filler.
8. Masking tape ($\frac{3}{4}$ inch or wider).
9. Mold release (grease).
10. (Optional) One tube Duro, or similar, sandable spot putty.

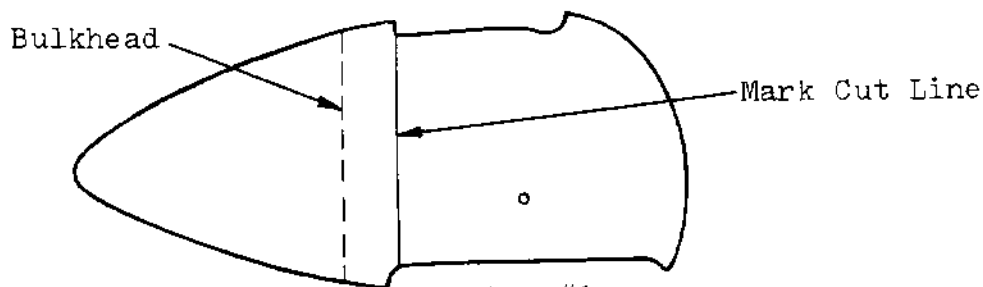
PROCEDURE

- 1.- If the fairing has been previously mounted on the aircraft, scrub it thoroughly inside and out with detergent and water. It must be absolutely clean and dry.
- 2.- Weigh the fairing, without hardware and trim plate, on an accurate scale, and record the weight for later use in calculating the weight change resulting from the modification.
- 3.- Roughen the inside of the fairing, where the epoxy/fiberglass reinforcement laminations are to go, with coarse sand paper. This should include all the area from the bulkhead to about seven inches ahead of it.
- 4.- Lay up five plies of epoxy/fiberglass on the inside of the fairing from the top opening to the wheel opening -- both sides. (This will be time consuming because you should wait for each layer applied to cure enough so that it will not move when you apply the next layer.) The first layer of glass cloth should be six to seven inches wide. Each successive layer can be $\frac{1}{2}$ to 1 inch narrower, but EVERY layer should butt against the bulkhead. The finished lay up should add at least $\frac{1}{8}$ inch to the wall thickness of the fairing. If necessary, add more layers to achieve that thickness.
- 5.- After the reinforcement lay up done in step 4 is sufficiently cured, trim away any excess that protrudes into the top and wheel openings and smooth the edges with a file or sandpaper.

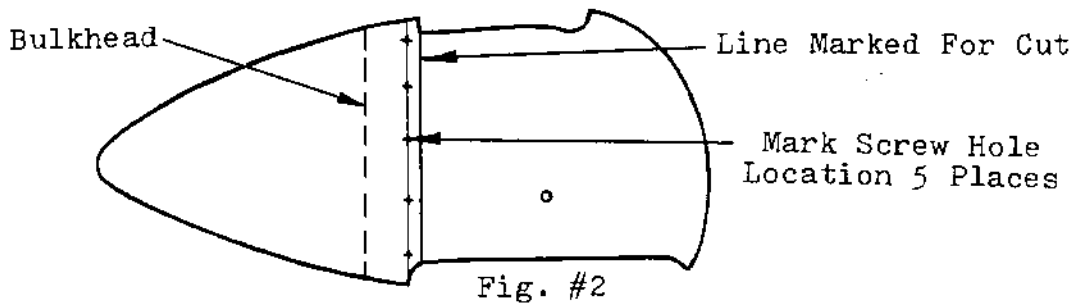
NOTE - Before cutting the fairing, a suitable way to hold the separated pieces in perfect alignment while the internal flange is built up on the front portion must be devised. Steps 6 through 18 describe one way.

All measurements and marks referred to in steps 6, 7 & 8 are made on the OUTER surface of the fairing. Also, the fixturing parts referred to in steps 9 & 10 and steps 13 & 14 are mounted on the OUTER surface of the fairing.

- 6.- Measure and mark a straight line from the rear of the top opening down to the wheel opening, on each side of the fairing, about $2\frac{1}{2}$ inches ahead of the bulkhead. This is the line on which the separating cut will later be made. See Fig. #1.



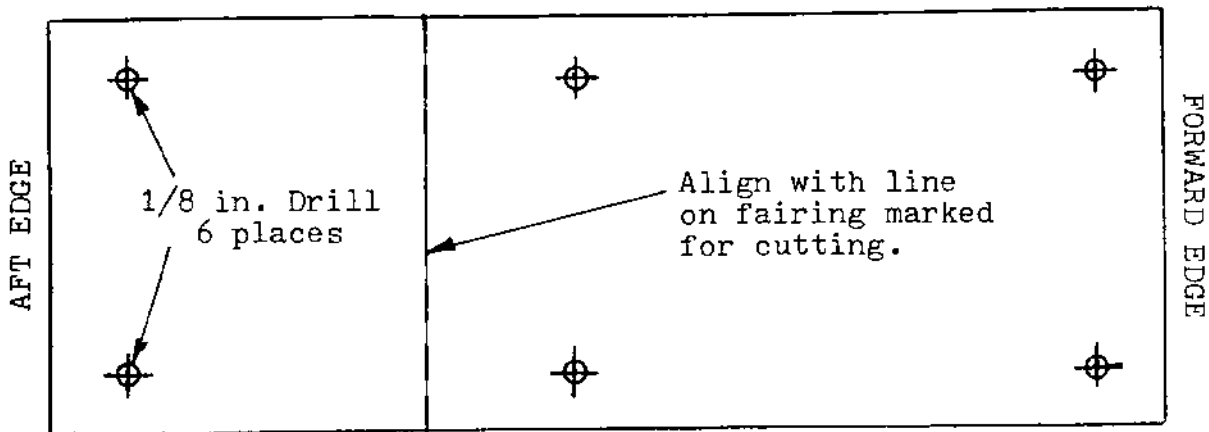
- 7.- Measure and mark another line parallel to the one done in step 6 one half inch to the rear. This line is for locating the attachment screw hole placements.
- 8.- Starting at the trim plate attachment screw hole in the top center of the fairing, measure down the REAR line $2\frac{1}{2}$ inches, on each side, and mark the location for the top attachment screw holes. Then, on each side, measure up 1 inch from the wheel opening and mark the location for the bottom attachment screw holes. Mark another location, on the line, midway between the top and bottom locations. Do it again half way between the marks already made. This should give you five equally spaced screw hole locations, on each side of the fairing, about three inches apart. See Fig. #2.



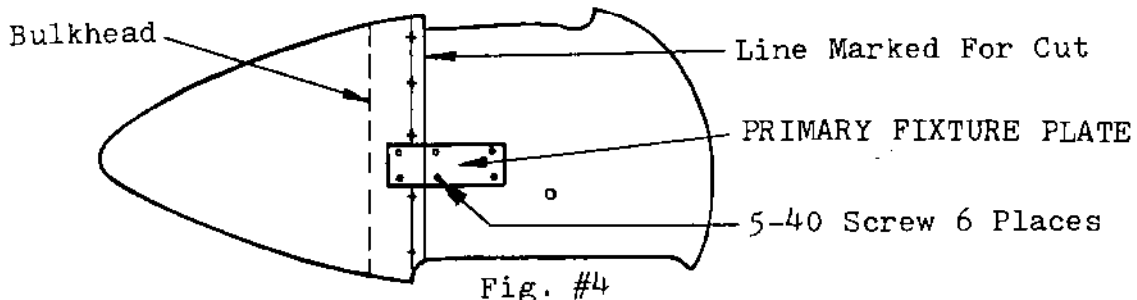
NOTE - You are now ready to apply Primary Fixturing which will require drilling holes in the side of the fairing. These holes will later be filled and will not be evident in the finished product.

The Primary Fixture parts are two pieces of scrap sheet aluminum $2\frac{1}{4}$ inches wide and about 6 inches long. They should be at least .025 in. thick. See Fig. #3.

PRIMARY FIXTURE (2 Req.) FULL SIZE PATTERN



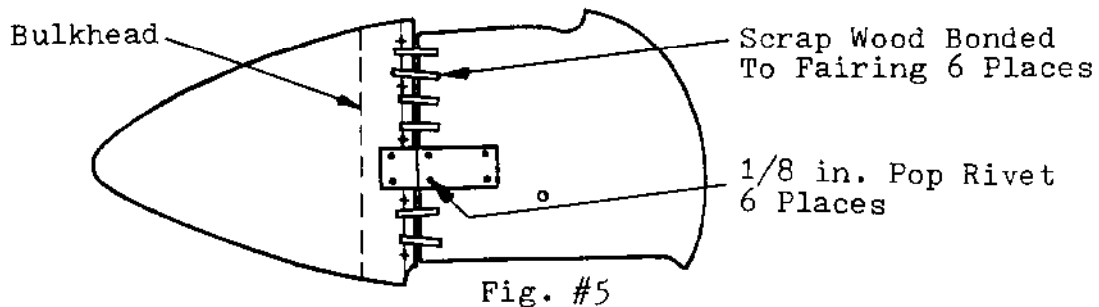
- 9.- Place one of the Primary Fixture pieces, lengthwise fore and aft, on one side of the fairing between the second and third screw hole locations from the bottom. Two inches of the piece should extend aft of the line marked to be cut. Drill a hole (1/8 in. drill) through one of the marked locations on the forward end of the piece, drilling all the way through the wall of the fairing. Insert a 5-40 screw through the hole and tighten a nut on it snug. Do the same, one at a time, at the five remaining fixture hole locations. See Fig. #4.



- 10.- Turn the fairing over and repeat step 9 using the other Primary Fixture piece. The Primary Fixture locations are now established.
- 11.- Remove the screws and nuts and Fixture pieces and put them aside for later use.
- 12.- Using a hacksaw blade or other fine toothed saw, carefully cut the fairing in two on the line marked for cutting. See Figs. #1 & #2.
- 13.- After cutting the fairing, lightly sand the cut edges smooth using a sanding block held perpendicular to the edge.
- 14.- Re-assemble the two parts, as shown in Fig. #4, using the two Primary Fixture plates and 5-40 screws and nuts. Tighten the nuts and check alignment of the two fairing parts. At this point the ends of the cut (at the top and wheel openings) may not be flush. This will be corrected later.
- 15.- If alignment looks ok, remove one 5-40 screw and nut from a Fixture plate, and install, FROM THE INSIDE, a 1/8 in. aluminum pop rivet. Do the same, one at a time, with the remaining eleven screws and nuts. The pop rivets will later be drilled out and the holes filled.

NOTE - You are now ready to apply the secondary fixturing parts. These are the small pieces of scrap wood, such as plywood, etc.

- 16.- On one side of the fairing, hold the ends of the cut, as described in step 14, in flush alignment with snap clothes pins, small "C" clamps or other suitable devices. Then epoxy the small wooden pieces in place, as shown in Fig. #5, using the two part paste epoxy. (5 minute epoxy may work OK here, but be careful, it doesn't have the strength of the other types.) The wood must bridge the cut and bond securely to both parts of the fairing. DO NOT let any of the epoxy get into the cut. See Fig. #5.



- 17.- After the epoxy has cured, turn the fairing over and repeat step 16.
- 18.- Allow the fixturing epoxy to cure thoroughly before proceeding further.

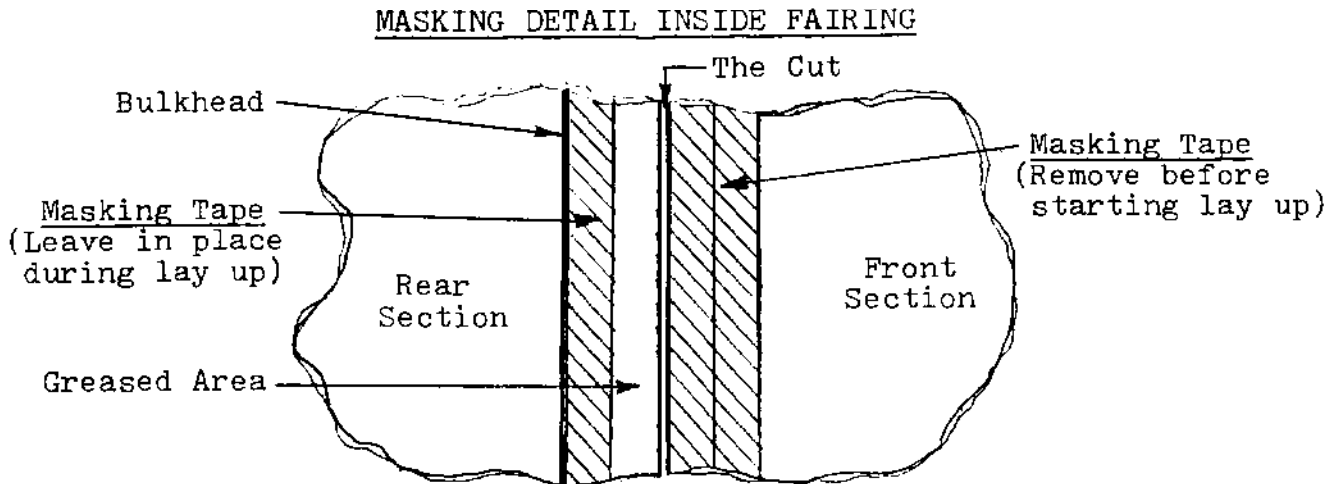
NOTE - After the fixturing epoxy has cured, the INSIDE of the fairing may be prepared for the internal flange lay ups. This will require some $3/4$ or 1 inch masking tape and some mold release. DO NOT use any kind of silicone grease or spray as mold release.

With just one exception, all the work described in steps 19 through 27 is to be done on the INSIDE of the fairing. Step 22 is the exception, and is self explanatory. Do one side of the fairing at a time. Refer to Fig. #6.

- 19.- Scuff sand the inner surface of the FRONT portion of the fairing from the cut to about 5 inches forward. Wipe clean of all sanding debris.
20. - Mask, with tape, the FRONT portion of the fairing, from the cut to 1 or 2 inches ahead of it. The masking must come to the very edge of the cut but must not overlap it. The masking must also run the full length of the cut.
21. - Mask the REAR portion of the fairing so a 1 inch wide area from the cut, rearward, is left uncovered for the full length of the cut.
- 22.- On the OUTSIDE of the fairing, cover the exposed portions of the cut with masking tape.

23.- Apply mold release grease to the exposed fairing area between the masked areas. Be sure none of the greased area is left un-coated and that the grease is worked into, and fills, the cut. Except for filling the cut, a thin film is all that is needed.

24.- Remove the masking tape from the FRONT section of the fairing, ONLY, being careful to avoid getting grease on the area being un-covered.



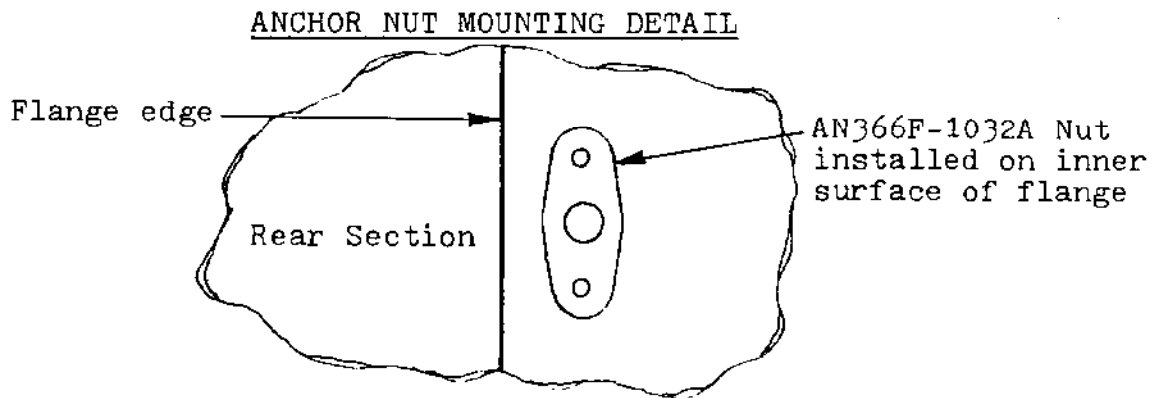
25.- Apply the first fiberglass/epoxy layer (ply) of the flange lay up. This ply should run the full length of the cut, overlapping it, and should just cover the one inch wide greased strip aft of the cut. The total width of this first ply should be about $4\frac{1}{2}$ inches. Each succeeding ply can be $\frac{1}{2}$ to $\frac{3}{4}$ inch narrower than the preceding one, but EVERY one must lie even, at the REAR edge, with the first ply.

26.- Continue, as each preceding ply becomes tacky to firm, to apply another until a total of five plies has been laid up. Be sure the rear edge of each ply is even with the preceding one.

27.- When the fifth ply has become firm, turn the fairing over and repeat steps 19 through 26 on the other inner side.

28.- After the flange lay up has cured, and before removing the fixturing parts, drill pilot holes through the fairing and flange at the previously marked attachment screw locations, using a #19 drill. Be careful to drill each hole perpendicular to the surface.

- 29.- Remove the fixturing parts by cutting away the wooden pieces with a knife or wood chisel, and drilling out the pop rivets.
- 30.- Separate the two fairing sections and thoroughly clean off the mold release grease with a suitable solvent and detergent and water.
- 31.- Measure the flange thickness. It should be at least 1/8 inch thick. If not, add more fiberglass/epoxy plys to achieve that thickness.
- 32.- Trim and smooth the rear edge of the flange, if necessary.
- 33.- Re-assemble the fairing using 8-32 screws in the attachment screw holes. Tighten nuts snug on the screws.
- 34.- Remove one of the 8-32 screws and nuts and enlarge the hole with a #9 drill. Countersink the hole until a AN507C-1032R10 flat head machine screw fits flush with the fairing surface.
- 35.- Tighten a AN366F-1032A self locking anchor nut on the flat head machine screw installed in step 34, keeping the tabs of the nut oriented parallel to the flange edge. See Fig. #7.



- 36.- Repeat steps 34 & 35 at the remaining nine attachment screw hole locations.
- 37.- Mix a small batch of two part epoxy paste adhesive according to the manufacturer's instructions.
- 38.- Loosen one of the AN366F-1032A anchor nuts enough so that you can work a small amount of the epoxy paste under the tabs of the nut. Then re-tighten the screw, retaining the nut orientation shown in Fig. #7. Do not get epoxy on the threads of the nut or screw.
- 39.- Repeat step 38 at the remaining anchor nut locations.

- 40.- Apply more paste epoxy at every anchor nut, completely covering the tabs and forming a fillet at the sides.
- 41.- Allow the epoxy adhesive to cure hard before trying to remove the screws.
- 42.- If the trim plate for the top opening of the fairing had previously been installed using Tinnermans and sheet metal screws, you can convert that to AN366F-1032A nuts and AN526-1032R12 screws using the method described in steps 38 through 41.
- 43.- After all the epoxy is cured, dis-assemble the fairing.
- 44.- Enlarge the holes in the sides of the fairing, used to mount the Primary Fixture plates, with a drill one or two sizes larger than the original. Some may be covered by the epoxy/fiberglass plies you laid up. Drill all the way through these. Then countersink each hole a small amount on both the inside and outside of the fairing.
- 45.- Using Bondo or similar body filler, completely fill and plug the holes described in step 44.
- 46.- After the body filler has cured; file, grind and sand, as necessary, the fairing to prepare it for painting.
- 47.- Re-finish the fairing, as desired.
- 48.- Re-weigh the assembled fairing. Calculate the weight change and complete the necessary aircraft paperwork covering the modification.

RE-INSTALLING THE FAIRING ON THE AIRCRAFT

1. - Slide the front portion of the dis-assembled fairing over the nose wheel and fork and attach it using the original mounting hardware.
2. - Re-assemble the rear portion of the fairing to the front portion using the flat head machine screws.
3. - Re-install the top opening trim plate.
4. - Make appropriate log book entry.