

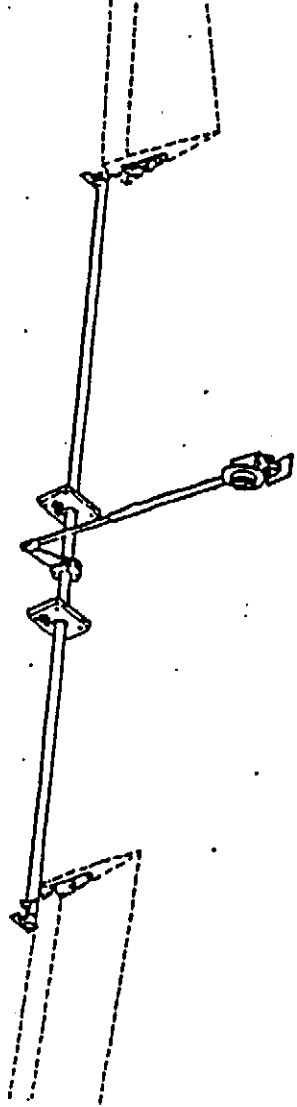
INS-OB-FLAP

LANCAIR 320 MK-II  
FLAP ASSEMBLY  
(SUPPLEMENT F)

# INS·MKII

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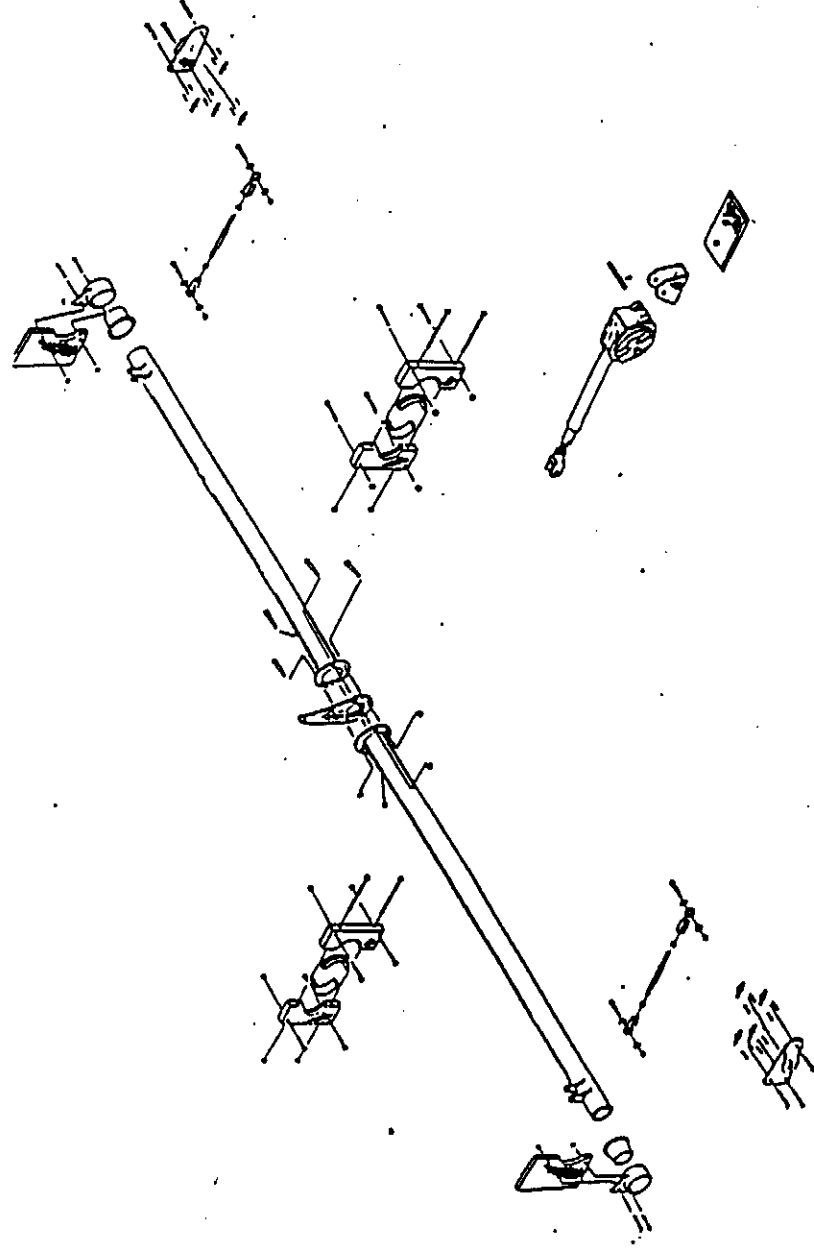


PART NO: INS-OB-FLAP  
 DESC: INSTRUCTIONS OUTBACK FLA  
 BIN: J1D  
 QUANTITY: 1  
 OB-GR

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# 1. INTRODUCTION

The Lancair 320 MK-II flap system operates through a torque tube assembly and is actually quite simple to install. It is different from the original flap actuating system due to the need for space when installing the larger 500 x 5 main landing gear system, but this flap system can be installed with the smaller tire system as well.



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## 2. DRAWING LIST

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### 3. SPECIAL PARTS, TOOLS, SUPPLIES

#### PARTS:

- 6 AN3-6A bolts
- 6 AN3-7A bolts
- 12 AN3-10A bolts
- 4 AN3-27A bolts
- 4 MS24694-S52 machine screws
- 24 AN365-1032 lock nuts
- 24 AN960-10 washers
- 8 K-1000-3 anchor nuts
- 4 AN426A-5 rivets
- 12 AN426A-6 rivets
- 4 F35-14 rod end bearings
- 4 AN316-5 check nuts
- 2 5/16" dia. x 3.25" L. - threaded push rods
- 2 pcs 3"x3" - 1/8" phenolic
- 1 pc 2.25" x 4" - 1/4" phenolic
  
- 1 L. Torque tube weldment (FM1064)
- 1 R. Torque tube weldment (FM1063)
- 1 Flap control horn - aluminum
- 2 Bushing block sets, inbd (FM1060-1)
- 2 Bushing block weldments, outbd (FM1061-01)
- 2 Bushings, inbd - nylon (FM1060-02)
- 2 Bushings, outbd - nylon (FM1061-02)
- 2 Flap actuator bracket weldments (FM1062)
- 1 Flap motor attach bracket - aluminum (FL6)
- 1 Flap motor with clevis end & micro switch assembly
- 2 Flap relays

#### TOOLS:

- Rivet squeezer
- Rotary cutter
- band saw

#### SUPPLIES:

- 1/4" Clark foam or 2ply x 1/4" x 2ply prepreg
- fiberglass cloth
- epoxy, flox, micro

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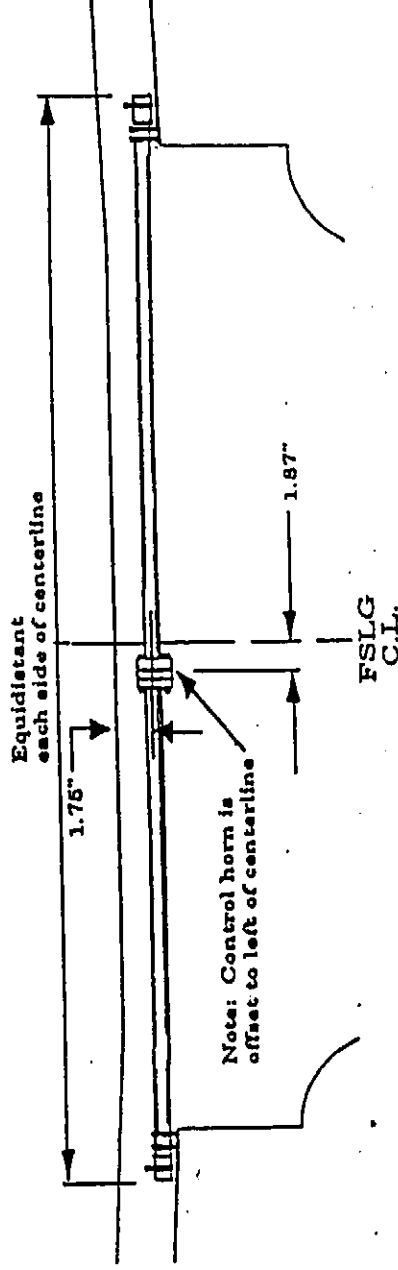
## 4. PROCEDURE

### A. TORQUE TUBE INSTALLATION

- A1. Position the Flap torque tube assembly in the aircraft. See fig. f-a-1. To accurately locate the assembly as well as the position of the inbd flap itself, temporarily assemble the two long torque tubes with the center control horn and lay it in the plane.
- The short torque tube is on the left side.
  - The flap motor control horn will be left of centerline.
  - The outbd ends should be positioned equidistant each side of centerline.
  - The tube locates 1.75" aft of the aft spar web.

### Flap System Positioning

Fig. f-a-1



- A2. Slide the outbd torque tube bushings onto the torque tube. See Fig. f-a-2. This will locate the position for the phenolic webs which will be glassed into position and used to attach the bushings. Place 4 layers of Duct tape (or equivalent) on the inbd face of the bushing flanges. This will allow room for the upcoming 4 BID attachment. Slip the bushing on until the nylon shoulder bumps against the outbd ear on the torque tube. The phenolic web will install just inbd of the bushing flange.

See blueprint F-BP-1 for vertical alignment of the torque tube in the fuselage.

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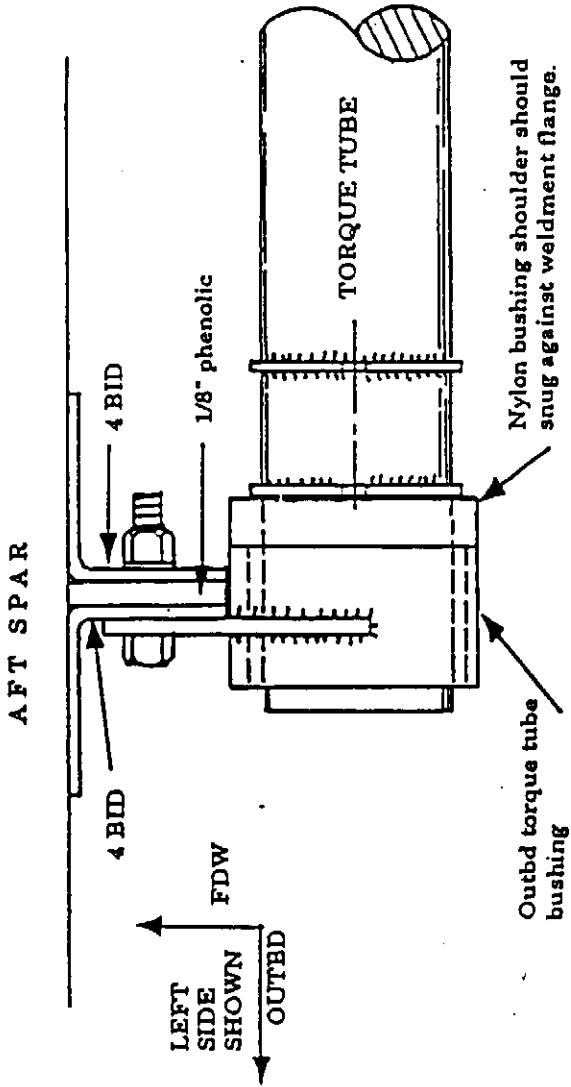
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A3. Cut and fit the phenolic webs. See fig. f-a-2 & f-a-3 & Blueprint F-BP-1. Use 1/8" phenolic. Epoxy/flox them into permanent position.

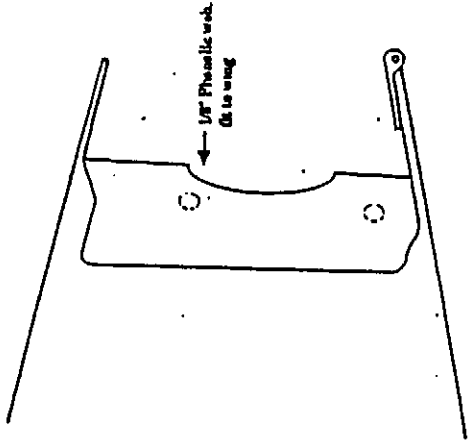
Flap outbd attach bushings  
plan view

Fig. f-a-2



Flap outbd attach, phenolic web

JFig. f-a-3



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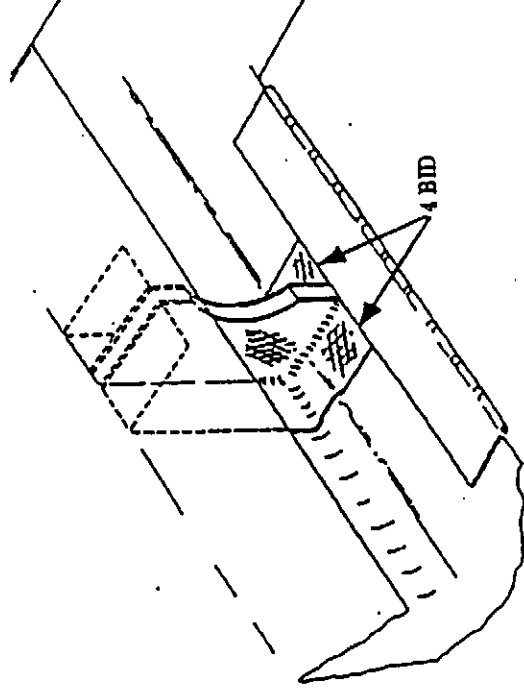
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- A4. Add 4 BID to each side of the phenolic webs. See fig. f-a-4. The bid must cover the phenolic and wrap at least 2" onto the aft wing spar. Also wrap 1" onto the upper wing skin and onto the lower wing skin by 3/8" or up to the edge of where the piano hinge will attach. Do not apply BID onto the hinge area.

### Flap outbd attach web, BID

f-a-4



- A5. Drill for the two attach bolts on the outbd bushing flanges. See fig. f-a-2. These are AN3-7A bolts. Remove the duct tape from the bushing flanges and use the part as a drill guide for the 3/16" bolts.
- A6. Attaching the outbd bushings: When you finally snug up the two bolts for each bushing, it is advisable to use the following procedure to insure against a possible bind of the bushing on the torque tube.
- a.) place a thin epoxy/flox pad between bushing flange and the phenolic web. Use release tape on the flange thus adhering the flox onto the web.
  - b.) Gently snug up the two AN3 bolts just enough to set the bushing flange in position. Be sure that the bushing does not generate a bind on the torque tube. Clean up any squeezed out epoxy/flox and allow to cure.
- This will then insure that when the bolts are tightened up, the bushing will remain properly aligned around the torque tube and therefore not cause any binding.

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A7. Cut out the baggage area control tunnel side panels. See fig. f-a-5, and blueprint F-BP-1. The blueprint will serve as a beginning pattern. Fit to your particular installation. Make special note of the area where the 6 BID pad will be added and the odd shaped cut out which allows access of the torque tube flanged ends through the tunnel.

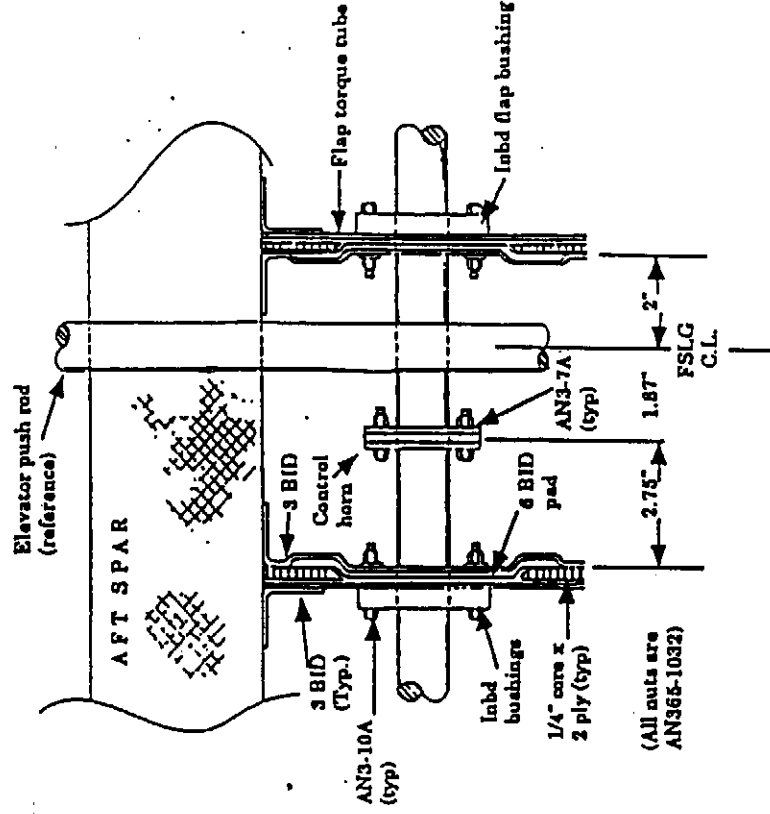
Add the 6 BID pads to the cut out area per the blueprint prior to installation in the aircraft.

To install the tunnels sides, simply disassemble the torque tubes and slide them outbd enough to provide access room for placing the tunnel side panels in position. Use epoxy/micro to initially attach them to the belly pan.

Note: The tunnel sides must be square to the torque tubes. This is important since the inbd bearing blocks will bolt to the tunnel sides and the bushing runs square through the bearing block. If you are a little out of square, an epoxy/flox pad will be required to square it up and relieve any binding.

### Flap tunnel dimensions

fig. f-a-5



A8. Add the 3 BID attach tapes to the tunnel side panels. Clean and prep as usual. Cut the necessary clearance hole in the seat back for the control horn/clevis to pass. Apply the 3 BID along both inside and outside of each panel. Also up along the aft spar web and seat back.

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A9. Cut the inbd bushing nylon sleeves. These bushings must be split into two pieces so that they can be placed around the inbd section of the torque tubes. Simply cut them into two halves with a band saw using a fine blade.

A10. Bolt the torque tubes & center control horn back into position. The torque tubes can be slid through the tunnel sides using the large hole at the aft side of the slot, as shown on blueprint F-BP-1, and then moved forward into position.

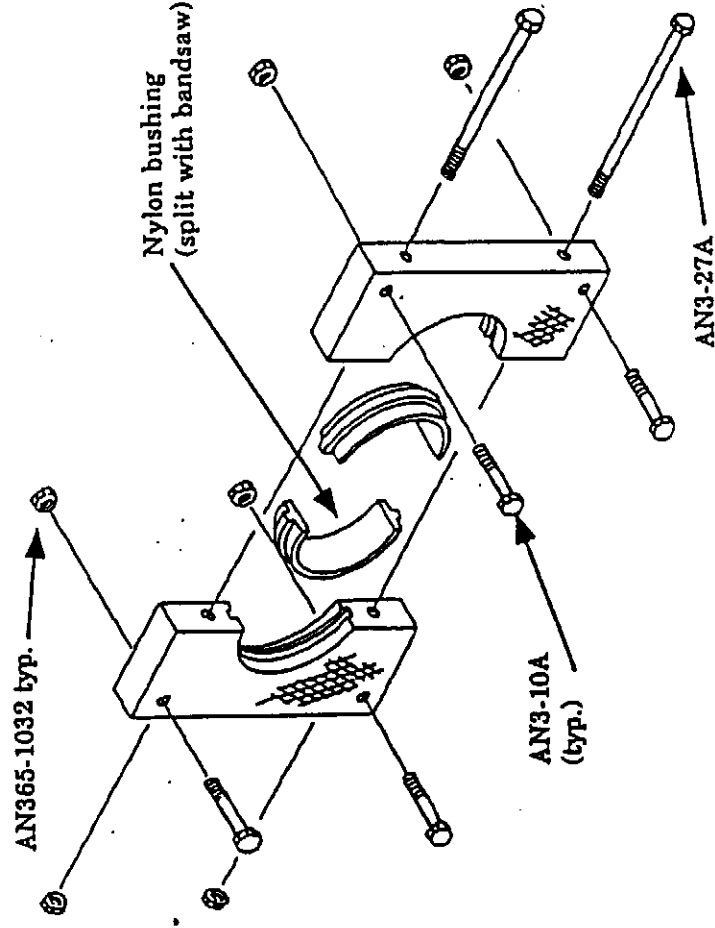
A11. Reattach the two outbd bushings, thus locating the entire torque tube assembly in proper working position.

A12. Position the inbd bushing blocks around the torque tubes. See fig. f-a-6. These blocks bolt to the outbd. sides of the tunnel side panels. Bolt the two halves of each bearing block together with the long AN3-27A bolts.

Clamp the bushing blocks in position and rotate the torque tube assembly through its working arc - about 70°s of rotation. The assembly should rotate without excess friction. Adjust if necessary with flox pads under bushing blocks.

### Flap inbd bushings

Fig. f-a-6



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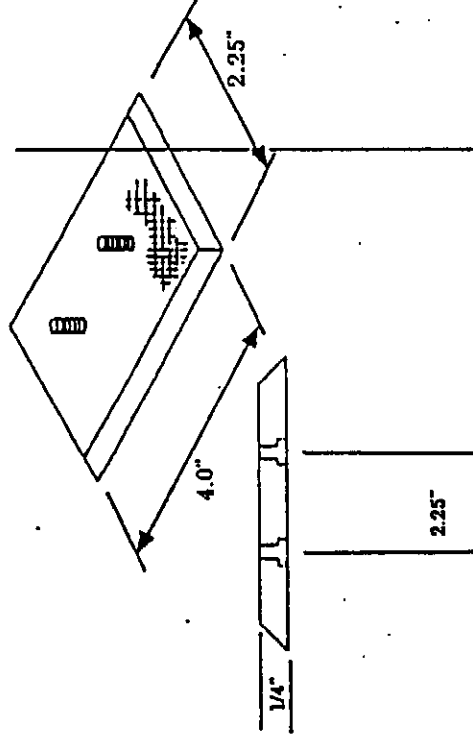
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A13: Drill for the four AN3-10A attach bolts on each inbd. bearing block. When you set the bushing block bolts through the tunnel side panels, check that the bushing does not bind up on the torque tube. If so, then you'll need to gently snug up bolts with an epoxy/flox release to establish a square surface on the tunnel side walls.

A14. Fabricate the flap motor attach pad. See fig. f-a-7 & blueprint F-BP-1.  
1/4" thick phenolic.  
2" wide x 4" long  
Bevel the sides and pot in position two AN3-7A bolts (to form studs) using epoxy/flox as a potting compound.

### Flap motor attach plate

Fig. f-a-7



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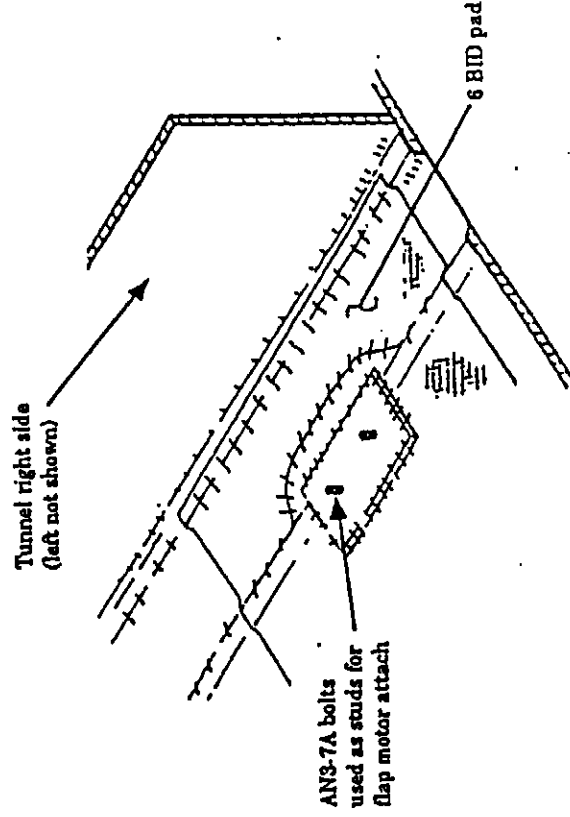
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A15. Install flap motor attach pad. See fig. f-a-8 & blueprint F-BP-1. When setting the phenolic pad, check that the flap motor will align properly with the control horn. This will require the pad to be level (in a left to right orientation) as well as properly spanwise aligned. Use epoxy/flox to set this pad.

Attach with 6 BID extending 3.5" fwd and aft onto belly pan and approx. 1.5" up onto the left tunnel side wall and at least 3" to the right of the phenolic pad. Cover the studs with tape to keep epoxy off the threads.

### Flap motor attach BID

Fig. f-a-8



A16. Attach the flap motor attach bracket onto the pad.  
See fig. f-a-9 and blueprint F-BP-1.

A17. Install the flap motor. Install the clevis pin at the back of the motor by removing the ring clip from the motor's left side. Be sure that the clip is fully repositioned after installation.

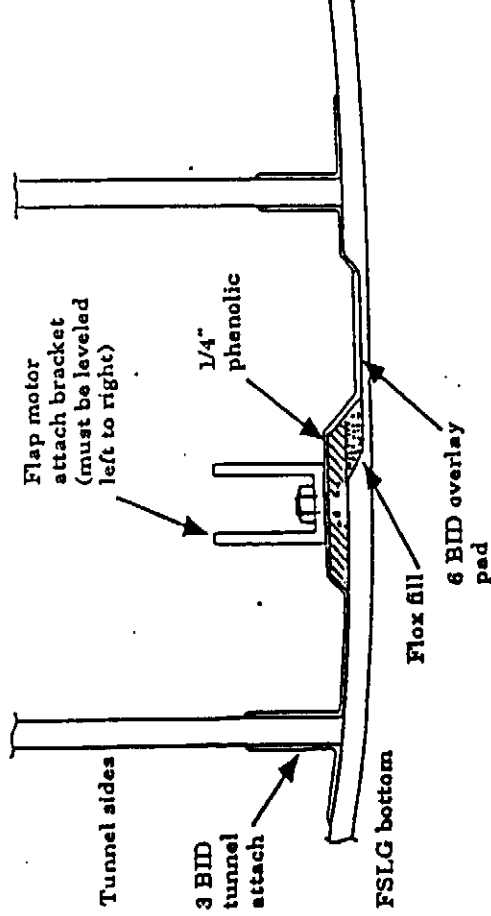
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## Flap motor attach bracket

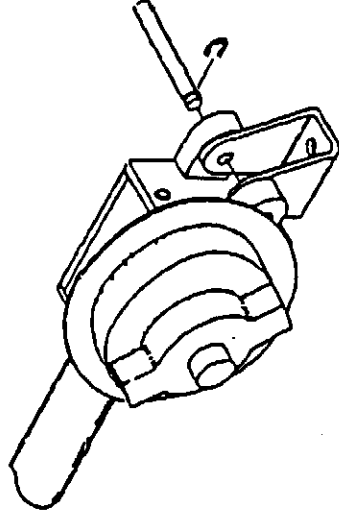
Fig. f-a-9



A18. Attach flap motor to center torque tube control horn. See fig. f-a-11. The clevis threads onto the motor shaft with the pin slipping through the control horn. You can run the motor actuating shaft in and out by rotating the end. Adjust so that the travel range available is from a near vertical position coming near but not contacting the aft spar. Final adjustments will be made later.

## Flap motor clevis pin

Fig. f-a-10



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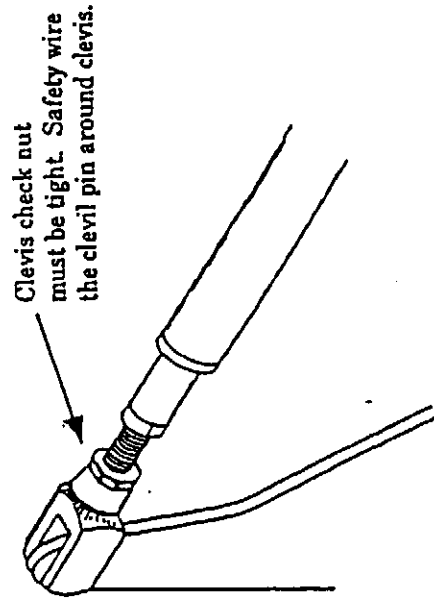
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## Flap motor control horn

Fig. f-a-11

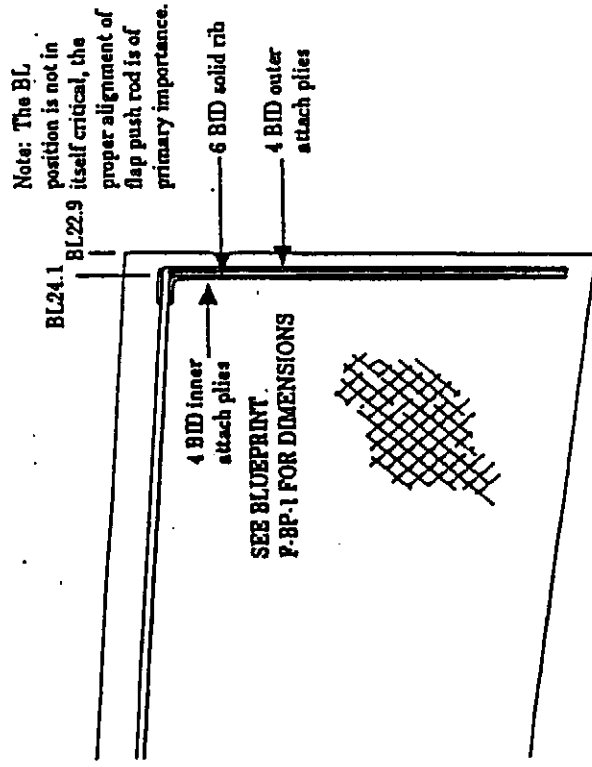


## B. FLAP CONNECTION

The flaps connect to the torque tube assembly by means of a short push rod at each end of the torque tube. The push rod attaches to a fitting installed on the inbd. end rib of each flap.

### Flap inbd rib

Fig. f-b-1



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1. Locate the inbd flap rib position. See fig. f-b-1, blueprint F-BP-1. Make the inbd flap ribs from a 6 BID solid glass panel. Lay up the 6 BID on a table top, allow to cure and cut the rib from this piece. Flex into position. Note that the rib position will generate an approximate 2° outward angle of the push rod when installed. This helps provide clearances and is correct.

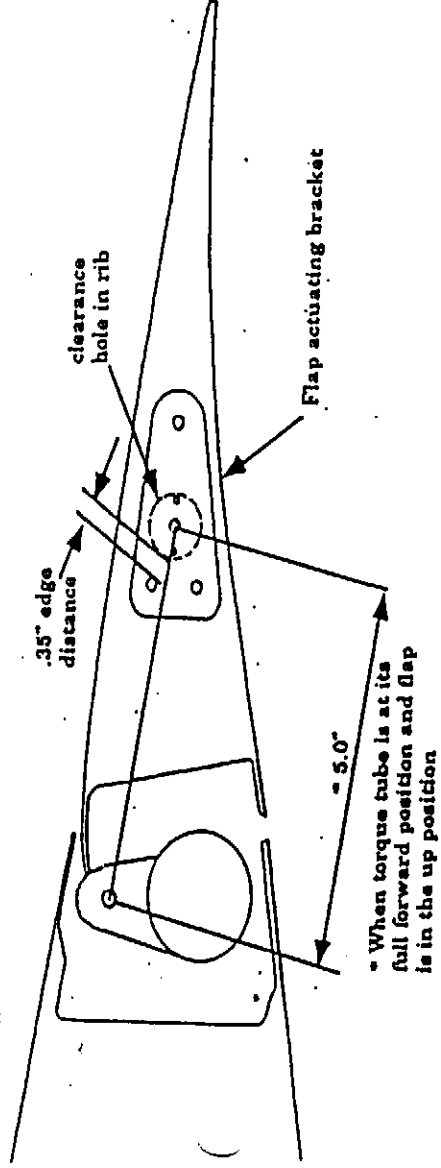
2. Place the inner 4 BID against rib and onto lower flap skin. Cover the end rib completely and lap at least 1.5" onto the flap lower skin and the flap spar web.

3. Locate the position for the flap actuating bracket on the flap rib. See fig. f-b-2, blueprint F-BP-1. With the bracket positioned on the rib, mark out its outline and accurately locate the center 3/16" through-hole which will attach the rod end bolt.

Note: The actuating bracket will have an anchor nut installed onto the back side of it and clearance will therefore be required in the flap end rib for the anchor nut and the two small rivets which hold it in place.

### Flap actuating bracket position

Fig. f-b-2

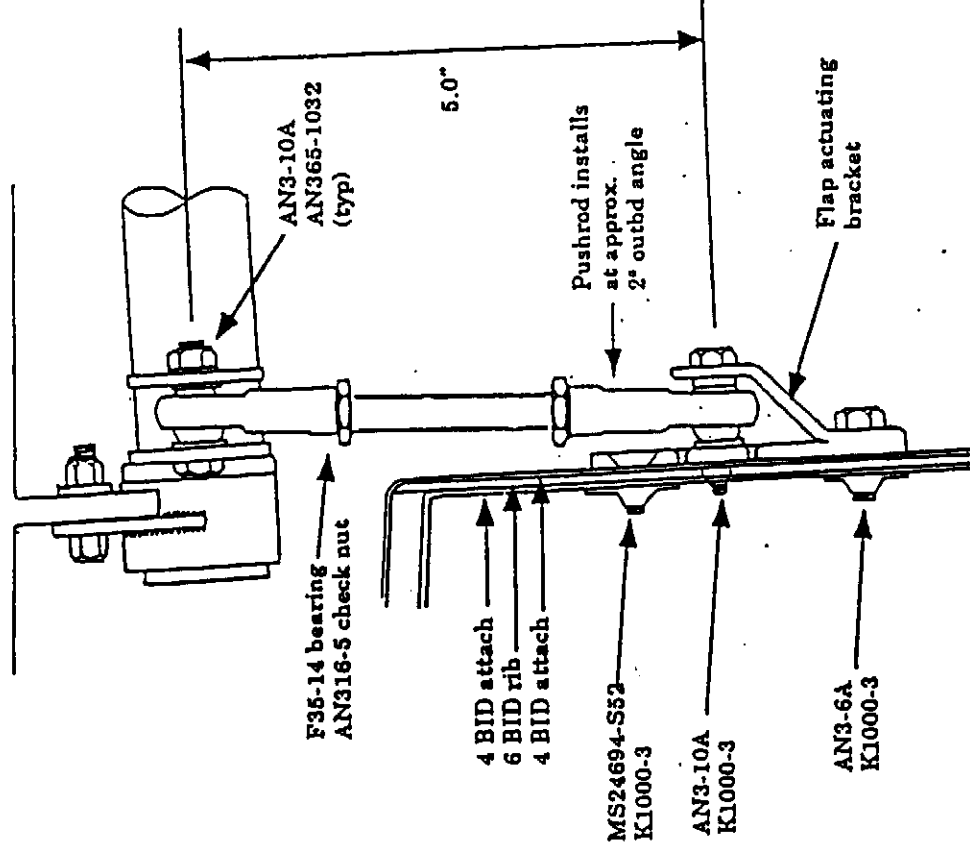


4. Drill a clearance hole in the flap end rib. See fig. f-b-2. This is for the above noted anchor nut clearance. Drill a 7/8" hole to clear the anchor nut and rivets. Be careful since edge distance (.35") must be maintained around the three 3/16" bracket attach bolts. (If desired, you can simply use a rotary cutter with a small bit to carefully open the access area required for the anchor nut. This will leave much more "meat" in the rib.)

5. Attach the anchor nut in the flap actuating bracket. See fig. f-b-3.  
Use a K-1000-3 anchor nut with AN426A-5 rivets.

### Flap actuating bracket attach

Fig. f-b-3



6. Attach the flap actuating bracket onto the flap end rib. Drill for the AN3-6A bolt and two machine screws using the actuating bracket as a drill guide. Then set the three K1000-3 anchor nuts to the rib.
7. Assemble the short flap pushrods. See fig. f-b-4. To correctly size these push rods:
- Run the flap motor out until the center control horn just clears the aft spar web. The control horn will protrude through the seat back. A cover will be made for that later. This will be the flaps UP position.
  - Attach the push rods to the flaps and adjust to achieve the flaps UP position.

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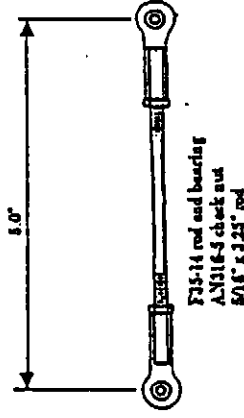
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Note: The rod end bearings will need one washer on each side to fit properly inside the connecting ears on both the torque tube and the flap actuating brackets. This provides necessary potential clearance for the rod end bearings. It is often handy to bond these in position on the brackets using either instant glue or paste adhesive. This makes assembly easier.

## Flap push rod assembly

Fig. f-b-4



8. Final 4 BID on flap rib: The inbd flap rib will require a final 4 BID applied after the top flap skin is bonded in position. This 4 BID will extend over both the upper and lower flap skin and across the entire rib face and around the front of the spar web.

Note: To prevent epoxy from entering into the anchor nuts, put a dab of clay or equivalent into the holes prior to adding the 4 BID. After the 4 BID cures, use a rotary cutter with a ball end to carefully remove the 4 BID locally around the bracket attachment and clearance holes.

## C. BAGGAGE AREA CLOSEOUTS AROUND FLAP SYSTEM

You will need to cover the center tunnel area and the torque tubes so as to isolate them from the baggage area. See fig. f-c-1.

- C1. Use 2 BID per side prepreg or equiv. to form the cover over the center tunnel. Also

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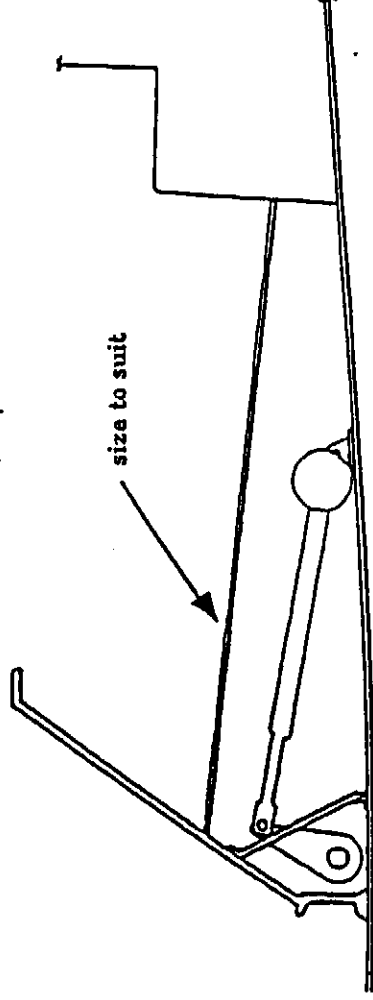
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required is a cover over the torque tubes. A fwd slanted panel works well to isolate these tubes. Also, a small cover will be required on the front of the seat back where the flap control horn protrudes. A block of foam, carved to shape and covered with 2 BID is sufficient as this area is tucked down into the corner upholstery area.

## Flaps/baggage area closeouts

Fig. f-c-1



### D. FLAP ADJUSTMENTS

- D1. The flaps should be adjusted so as to be symmetrical. Use the short push rods to adjust as necessary. Be sure to set the check nuts when completed.
- D2. Set the flap micro switch stops per standard plans. See chapters 10 & 18 of the 320FB manual.

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