

# CHAPTER 12

## ✓ STABILIZERS, ELEVATORS, & RUDDER ASSEMBLY

### IMPORTANT NOTES - READ PRIOR TO ASSEMBLY

	Identification of Velcro Parts	12-1
	Position Of Velcro Ends On Covers For Assembly	12-1
	Assembly of Tube Connector 1" with Metal Thread Insert (TC-1 with T1-1)	12-1
	Installation Of Tube Connectors / Inserts Into Tail Tubes	12-1
	Compensation For Slack In Tail Coverings	12-1
SECTION 1	<b>VERTICAL STABILIZER</b>	
2,3,4	Vertical Stabilizer Assembly	12-
	Vertical Stabilizer Assembly Parts List	12-5
	Figure VS-1	12-6
	Figure VS-2	12-7
SECTION 2	<b>HORIZONTAL STABILIZERS ASSEMBLY</b>	
	Horizontal Stabilizers Assembly	12-8,9
	Horizontal Stabilizers Assembly Parts List	12-10
	Figure HS-2	12-11
	Figure VS-2	12-12
SECTION 3	<b>ELEVATORS ASSEMBLY</b>	
	Elevators Assembly	12-13,14
	Elevators Assembly Parts List	12-15
	Figure E-1	12-16
	Figure R-2	12-17
SECTION 4	<b>RUDDER ASSEMBLY</b>	
	Rudder Assembly	12-18,19
	Rudder Assembly Parts List	12-20
	Figure R-1	12-21
	Figure R-2	12-22



## ✓ Chapter XX SECTION 1 SPRAYING ACRYLIC URETHANE "MONTANA PRODUCTS CRYSTAL CLEAR PAINT.

***WARNING! This is very a dangerous product and procedure.*** Please follow all safety precautions and use the correct equipment.      **PREPARING YOUR WING COVERING FOR PAINT.**

1. Do not use any Silicone spray while assembling the aircraft. This will cause the paint to "Fish eye". Water works the best to help slip on the coverings while assembling the Flaps and Ailerons.
2. If possible it is easiest to to paint on the flat, rather than vertical. 2 X 4 fixtures or angle iron sawhorses can be built to support the wings and tails . This is best done with the Ailerons, flaps and tails assembled. This keeps the paint from getting in the Velcro at the gap seals.
3. Tape off any exposed tubing and hardware (hinge bolts etc...).
4. Wipe down the covering with reducer or Lacquer thinner. Clean any stained areas.
5. Follow the instructions on the Montana can for instructions on reducing and application pressures etc.
6. Three coats are required for a glossy finish and adequate UV protection.
7. First coat: Apply a "medium" tack coat. Don't try to fill the pores of the fabric. Allow 4-8 hours for this to dry. This seals the fabric so the second and third coat stay on top of the fabric. This gives the best finish and prevents the fabric from being glued to the airframe.
8. Second coat: Apply a "wet" coat. Again, don't try to fill the pores or spray it on so thick that you get sags and runs. Allow approximately 16 hours drying time before wet sanding with 600 grit wet/dry sand paper. Avoid sanding over the stitched areas. Wet sanding removes any fibers that might be sticking up out of the material and dust that may be stuck to the paint. Only use enough water to keep the paper from filling up. When done wet sanding wipe down the covering with a clean, dry, lint free cloth.
9. Third and final coat: After the second coat you will see some areas start to gloss. The third and final coat will fill the rest of the areas and give glossy finish. Let this coat dry overnight. Remove the tape being careful not to peel the paint off with the tape. Mount the wings and tails on the aircraft and readjust the hinge bolts. Use the adjustment procedure used in the assembly manual.



## Chapter 12

### Stabilizers, Elevators, & Rudder Assembly

***Important! Read This Before Assembling the Tails!***

#### IDENTIFICATION OF VELCRO PARTS

**FUZZY = PILE    PLASTIC SCRATCHY = HOOK**

The fabric coverings for all the stabilizer surfaces are all the same size, BUT THEY ARE NOT INTERCHANGEABLE. The Velcro gap seals are different so be certain to assemble the correct covering and frame combination.

#### NOTE POSITION OF VELCRO GAP SEAL PARTS FOR COVERING

RIGHT HORIZONTAL STABILIZER	=	PILE UP
LEFT HORIZONTAL STABILIZER	=	PILE UP
RIGHT ELEVATOR	=	HOOK DOWN
LEFT ELEVATOR	=	HOOK DOWN
VERTICAL STABILIZER	=	PILE FACES LEFT
RUDDER	=	HOOK FACES RIGHT

**TC-1 = TUBE CONNECTOR 1"**

**T1-1 = METAL INSERT**

The T1-1 metal inserts need to be inserted into TC-1 Tube Connectors before the tail surfaces are assembled.

- a) Place the metal insert, threaded side out, in to the tube connector, TC-1 as shown in HS-1, lower left.
- b) Align T1-1 insert hole with the U shaped cut out on TC-1 tube connector. This assembly will hence be referred to as "tube connector / insert".

#### **INSTALLING TUBE CONNECTOR with INSERTS INTO THE BASE TUBE, LEADING EDGE AND ELEVATOR/RUDDER TRAILING EDGE TUBES**

- a) Insert tube connector / insert into the corresponding tail tube, aligning the pre-drilled holes.
- b) Clean out the holes with a 3/16" drill so that the 1 1/4" solid rivet (part #A187R1250A) slides through easily. Install rivet. Do not force, twist or hammer the rivets, as they are very soft and may seize if forced.
- c) When rivet is completely through, cut off all but 1/8" of rivet. Gently peen the end with a light hammer.

**THESE PROCEDURES ARE REPEATED FOR ALL INDICATED TAIL SURFACES,  
AND ARE ASSUMED TO BE COMPLETED WHEREVER INSTRUCTIONS STATE:**

**"INSERT CONNECTOR TUBE / INSERT INTO [CORRESPONDING TAIL TUBE]"**

#### **COMPENSATION FOR SLACK IN THE TAIL COVERINGS**

When any of the tail coverings are completely on and there is slack in any of the contact area - remove the covering and add some foam padding to the area. Automotive weather-stripping for Truck Caps or packing foam held in place with clear tape works well.

# ✓ CHAPTER 12

## STABILIZERS, ELEVATORS, & RUDDER ASSEMBLY

---

### Section 1

#### Vertical Stabilizer

#### Figures VS-1 & VS-2

1. Figure VS-1     ATTACHING LEADING EDGE TO SPAR TUBE
  - a) Insert vertical stabilizer spar post (23) into spar tube (2), aligning holes as shown (inserted at manufacturer, but may be jarred loose during shipping). Attach plate nut (25) to the center of spar tube (2) by carefully positioning plate nut over center hole as shown. Temporarily thread eye bolt (10) through spar tube into plate nut. Verify that plate nut is vertical and flush against tube. Attach with pop-rivets (26). Repeat this procedure with plate nut over indicated lower hole of spar tube / vertical stabilizer spar post. Remove eyebolts before installing covering.
  - b) Insert tube connector / insert (18) into leading edge tube(1). Position the leading edge tube (1) and the spar tube (2) on a clean, flat surface. Note the plate nuts on the spar tube (2) faces in toward the leading edge tube (1).
  - c) Attach the leading edge tube (1) to the spar tube (2) by threading eyebolt (3) through spar tube into connector / insert on leading edge tube. Securely tighten the eyebolt.
  
2. Figure VS-2     INSTALLING THE VERTICAL STABILIZER COVERING
  - a) Slide the vertical stabilizer covering (4) over the spar tube (2), as shown in position A. **REMEMBER THAT THE VELCRO PILE FACES LEFT ON THE VERTICAL STABILIZER.**
  - b) Slide the stabilizer covering up the spar tube until it stops, as shown in position B.
  - c) Work the stabilizer covering around the corner until the covering is positioned as marked by C.
  - d) Slide the compression strut (5) in through hole of stabilizer covering until the front end of the compression strut contacts, and is held in place, by the nut attached to the leading edge tube. Refer to position D.
  - e) Slide the covering down over the leading edge and spar tubes until the compression strut contacts, and is held in place, by the plate nut on the spar tube, as shown in position E.

## ✓ Chapter 12 SECTION 1 VERTICAL STABILIZER

3. **Figure VS-1 INSERTING TUBE CONNECTOR / INSERTS INTO BASE TUBE**  
Insert two tube connector / inserts (18) into each both ends of the base tube (6).
4. **Figure VS-2 INSTALLING BASE TUBE**  
Insert the base tube (6) into the bottom of the stabilizer covering. Refer to position E.
5. **Figure VS-2 COMPLETING COVERING**  
Use several pieces of strong rope to make a tourniquet, as shown. Use a hammer handle or any short piece of wood to insert through the loops in the rope. Draw the base tube down by prying the handle down until the stabilizer covering is tight and the base tube holes align with attachment holes in the leading edge and spar tubes.
6. **Figure VS-1 CONNECTING LEADING EDGE TUBE TO THE BASE TUBE**  
Attach the leading edge tube (1) to the base tube (6), by placing washer (9) on bolt (7) and inserting through bottom hole of spar tube (2) and into tube connector / insert in the base tube. Securely tighten. Repeat on opposite end, going through spar tube and into base tube.
7. **Figure VS-1 INSTALLING EYEBOLT TO SPAR TUBE**
  - a) Through the covering, locate the hole in the spar tube (2) that is approximately 9 1/2" up from the bottom. This is the hole for the bottom hinge on the rudder. Use a hot-knife or soldering iron to open the covering to insert the eyebolt (10). Install eyebolt through spar tube (2) into plate nut (25). Securely tighten.
  - b) Through the covering, locate the hole approximately 23 1/2" down the spar tube (2) trailing edge and burn the hole for the second eyebolt hinge at this location. Insert the eyebolt (10) into the plate nut (25) attached at this location. Securely tighten.
8. **Figure VS-1 ATTACHING BENT TANGS TO SPAR TUBE**
  - a) Through the covering, locate the two holes approximately 24" down the side of the spar tube, burn two holes on each side to attach bent tangs (14).
  - b) Attach the two bent tangs (14) to the spar tube by positioning bent tangs as shown. Insert bolts (13) through each hole of the bent tang, the covered spar tube (2), and the second bent tang. Secure tightly with locknuts (15).

**Note:** If you don't have enough work space to attach the vertical tail to the boom, the attachment work can be done at the final assembly for flight.

## ✓ Chapter 12 SECTION 1 VERTICAL STABILIZER

### 9. Figure VS-1 ATTACHING VERTICAL STABILIZER TO BOOM

To attach the vertical stabilizer to the boom, insert the stabilizer spar(23) through the vertical hole at the rear of the boom. First verify that there are no large scratches or burrs on the edge of the stabilizer spar and that the spar inserts easily. If difficult, remove the stabilizer spar and address any burrs or edges with a file or emery cloth. Lubricate the stabilizer spar with wax.

- b) Attach the vertical stabilizer plates (24) to the leading edge tube (1), by placing top hole of the vertical stabilizer plate on bolt (17). Add washer (20), and insert through bottom holes of leading edge tube (1). Add a second washer (2), the second vertical stabilizer plate and locknut (11). Snugly tighten locknut to allow vertical stabilizer plates to conform to the boom before riveting.

NOTE THAT THE WASHERS GO ON THE INSIDE OF THE PLATE FOR LATER ADJUSTMENT OF THE VERTICAL STABILIZER FOR TRIM.

- c) Position the vertical stabilizer plates (24) on the boom as shown. Drill 3/16" holes through the six existing holes on the vertical stabilizer plates, and into the boom. Attach with pop-rivets (12). Drill with caution to make certain the stabilizer is centered on the boom. Stop during the drilling to ensure that the drill hasn't walked off the mark.
- d) Attach the tail skid (19) to the end of the vertical stabilizer spar post (23). Verify that the vertical stabilizer spar post is pushed in fully through the boom. Fully insert tail skid (19) into vertical stabilizer spar post. Using the two holes in tail skid (19) as a guide, drill a 3/16" diameter hole in the vertical stabilizer spar post. Attach the tail skid by placing washer (22) on bolt (8). Insert through tail skid (19) and vertical stabilizer spar post (23). Secure with the locknut.



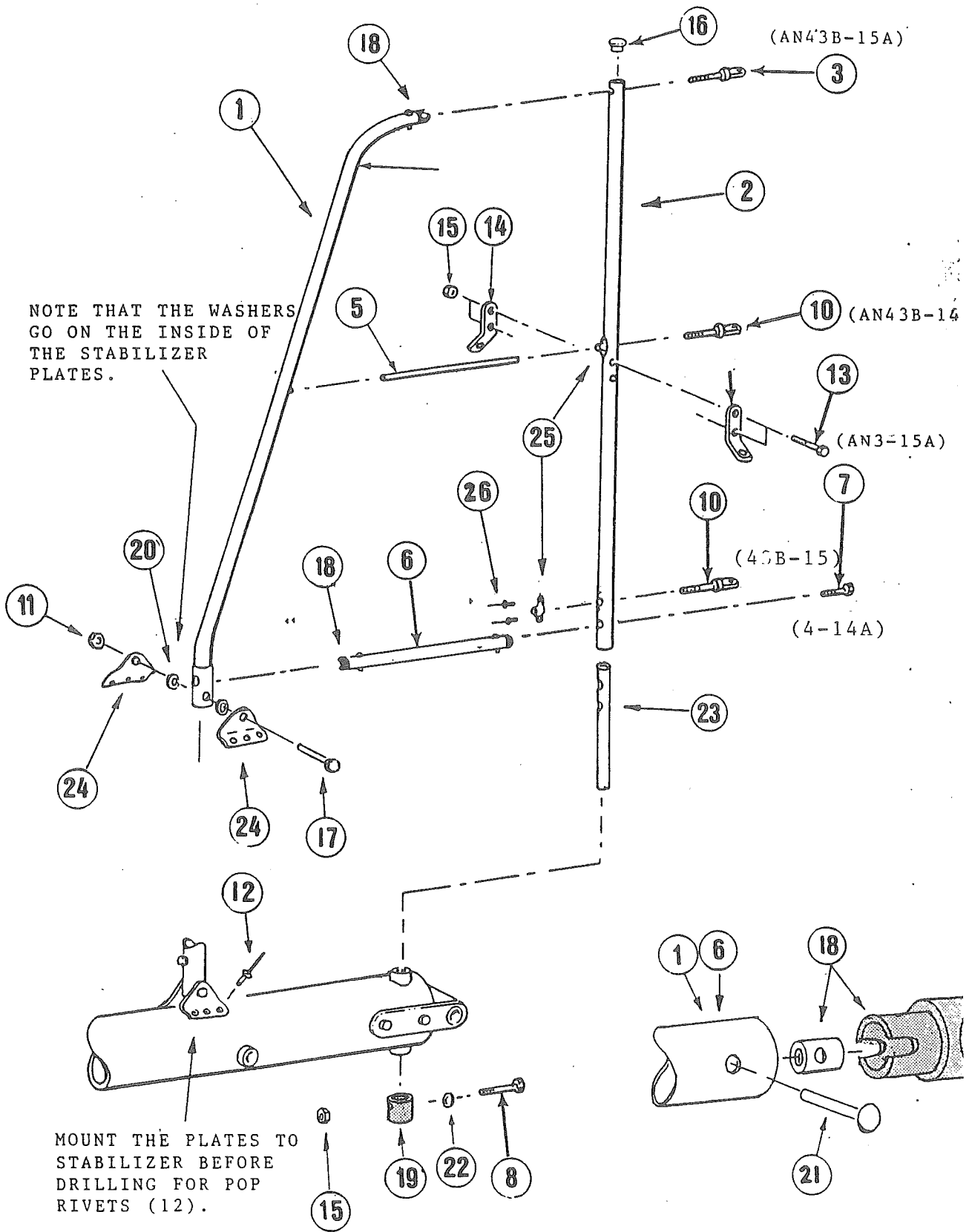
✓ Chapter 12 SECTION 1 VERTICAL STABILIZER

Vertical Stabilizer Parts List  
 Figures VS-1 & VS-2

INDEX#	PART #	QTY	DESCRIPTION
1.	T-320-3	1	LEADING EDGE TUBE
2.	T-107-5	1	SPAR TUBE
3.	AN43B-15A	1	1/4" EYEBOLT
4.	SC-141	1	VERTICAL STABILIZER COVERING
5.	T-320-11	1	COMPRESSION STRUT
6.	T-320-7	1	BASE TUBE
7.	AN4-15A	2	1/4" BOLT
8.	AN3-15A	1	3/16" BOLT
9.	AN960-416L	1	1/4" THIN WASHER
10.	AN43B-14A	2	1/4" EYEBOLT
11.	AN365-428	1	1/4" LOCKNUT
12.	SS64	6	3/16"X 1/4" POP-RIVET
13.	AN3-15A	2	3/16" BOLT
14.	T-38	2	BENT TANG
15.	AN365 1032	3	3/16" LOCKNUT
16.	EC-4	1	PLASTIC END CAP
17.	AN4-16A	1	1/4" BOLT
18.	TC-1	3	TUBE CONNECTOR 1"
	T1-1	3	METAL THREADED INSERT
19.	T-10	1	TAIL SKID
20.	AN960-416	2	1/4" WASHER
21.	A187R1250A	3	3/16" RIVET 1 1/4" LONG
22.	AN960-10	1	3/16" WASHER
23.	T-107-15	1	VERTICAL STABILIZER SPAR POST
24.	B-330	2	VERTICAL STABILIZER PLATE
25.	MS21047-4	2	1/4" PLATE NUT
26.	SS32	4	3/32 POP-RIVET

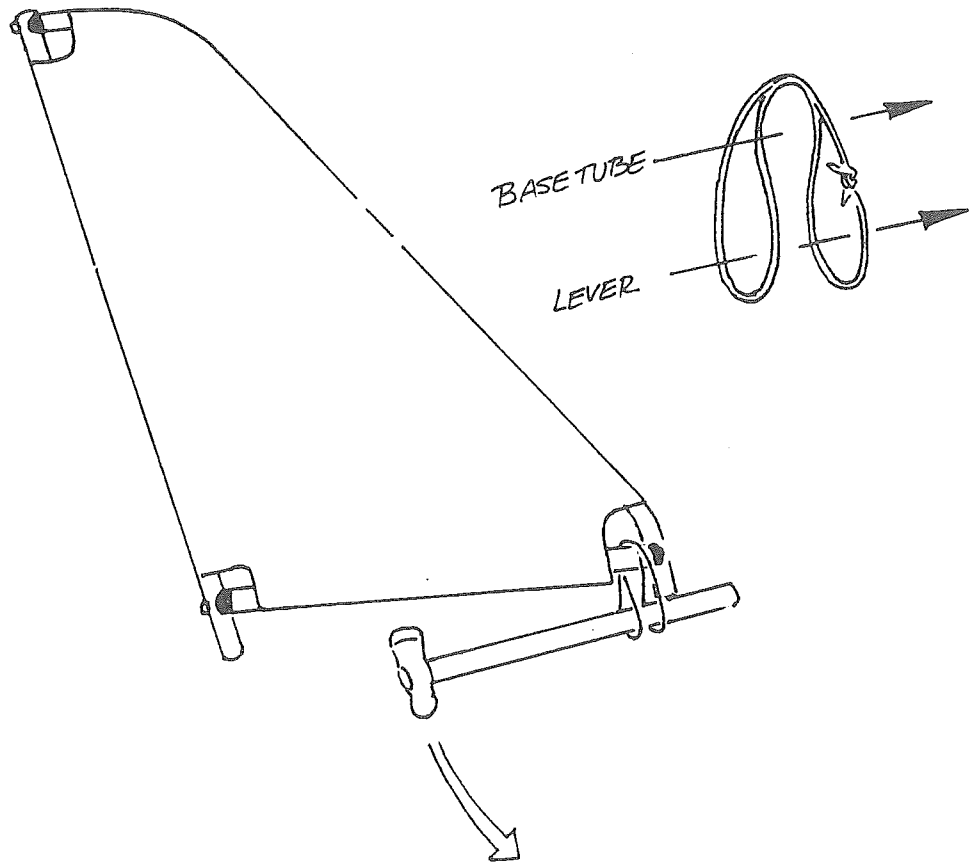
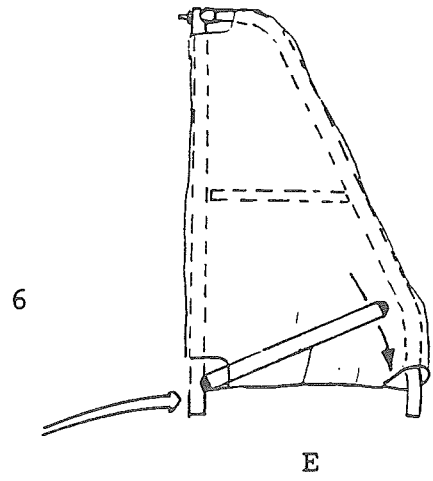
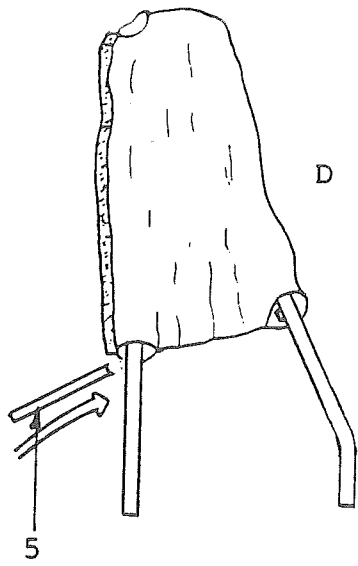
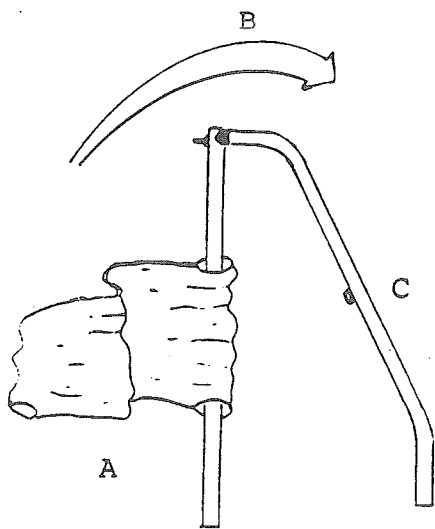
5.





VS-1





VS2



✓ **Chapter 12**  
**Section 2**  
**Horizontal Stabilizer**  
**Figures HS-1 & VS-2**

1. Figure HS-1

Attach plate nut (25) to double holed end of spar tube (2) by carefully positioning plate nut over hole as shown. Be certain that the plate nut is on the same side of the spar tube (2) as the pre-installed riveted nut for the compression strut (5). Temporarily thread eye bolt (10) through spar tube into plate nut. Verify that plate nut is vertical and flush against tube. Attach with pop-rivets (8). Remove eyebolt before installing cover.

2. Insert tube connector / insert into the leading edge tube(1). Position the leading edge tube (1) and the spar tube (2) on a clean, flat surface. Note the plate nut on the spar tube (2) faces in toward the leading edge tube (1).

3. Attach the leading edge tube (1) to the spar tube (2) by threading eyebolt (3) through spar tube into connector / insert on leading edge tube. Securely tighten the eyebolt.

4. Figure VS-2 - Installing the Horizontal Stabilizer Covering

a) Slide the horizontal stabilizer covering (4) over the spar tube (2), as shown in position A. **REMEMBER THAT THE VELCRO PILE FACES UP ON THE HORIZONTAL STABILIZER.**

b) Slide the stabilizer covering up the spar tube until it stops, as shown in position B.

c) Work the stabilizer covering around the corner until the covering is positioned as marked by C.

d) Slide the compression strut (5) in through hole of stabilizer covering until the front end of the compression strut contacts, and is held in place, by the nut attached to the leading edge tube. Refer to position D.

Slide the covering down over the leading edge and spar tubes until the compression strut contacts, and is held in place, by the plate nut on the spar tube, as shown in position E.

5. Figure HS-2

Insert two tube connector / inserts (18) into each both ends of the base tube (6).

## ✓ Chapter 12

6. Figure VS-2 Insert the base tube (6) into the bottom of the stabilizer covering. Refer to position E.
7. Use previously made tourniquet, as shown. Use a hammer handle or any short piece of wood to insert through the loops in the rope. Draw the base tube down by prying the handle down until the stabilizer covering is tight and the base tube holes align with attachment holes in the leading edge and spar tubes.
8. Figure HS-1  
Attach the leading edge tube (1) to the base tube (6), by inserting bolt (7) through bottom hole of leading edge tube (1) and into tube connector / insert in the base tube. Securely tighten. Repeat on opposite end, going through spar tube (2) and into base tube (6).
9. Install the end cap (22) into the top end of the spar tube (2).
10. Through the covering, locate the hole in the spar tube (2) that is approximately 25 3/4" from the end of the spar tube. Use a hot-knife or soldering iron to open the covering on each side. Insert eye bolt (11) through hole. Add washer (12) and secure with locknut (13).

Repeat entire procedure on the second horizontal stabilizer.

11. Through the covering, locate the hole in the spar tube (2) that is just above the base attachment and burn open the hole. Insert eyebolt (9) through spar tube, threading it into the nut plate. Repeat this procedure on the second horizontal stabilizer.
12. First verify that there are no large scratches or burrs on the edge of the leading edge spar and that the spar inserts easily. If difficult during insertion occurs, remove the leading edge spar and address any burrs or edges with a file or emery cloth. Lubricate the leading edge spar lightly with silicone, WD-40 or light grade oil to facilitate insertion.

Note: If you don't have enough work space to attach the tails to the boom, the attachment work can be done at the final assembly for flight.

To attach the horizontal stabilizer to the boom, insert the leading edge spar (1) through the hole on the side of the rear of the boom. Insert the spar tube (2) into the previously installed vertical stabilizer plate, as shown. Repeat this procedure for second horizontal stabilizer.

13. Locate the end holes on the two tail jury struts (16) and clean out the holes with a 3/16" drill. Install a jury strut fitting (17) onto each end of a tail jury strut. Pop-riquet



## ✓ Chapter 12

each jury strut fitting to the tail jury struts, using pop-rivets (18) Cut off end of rivet so that only 1/8" is protruding. Gently peen over end of rivet with hammer.

14. Attach top of first tail jury strut (16) to previously installed bent tang by sliding the slotted end of the tail jury strut onto the first bent tang. Insert clevis pin (20) through holes. Secure with safety ring (21).

Attach bottom of first tail jury strut (16) to previously installed eyebolt (11) by placing slotted end of tail jury strut over eyebolt. Insert bolt (19) as shown. Add washer (12), and secure with locknut (13). Repeat entire procedure with second tail jury strut (16).

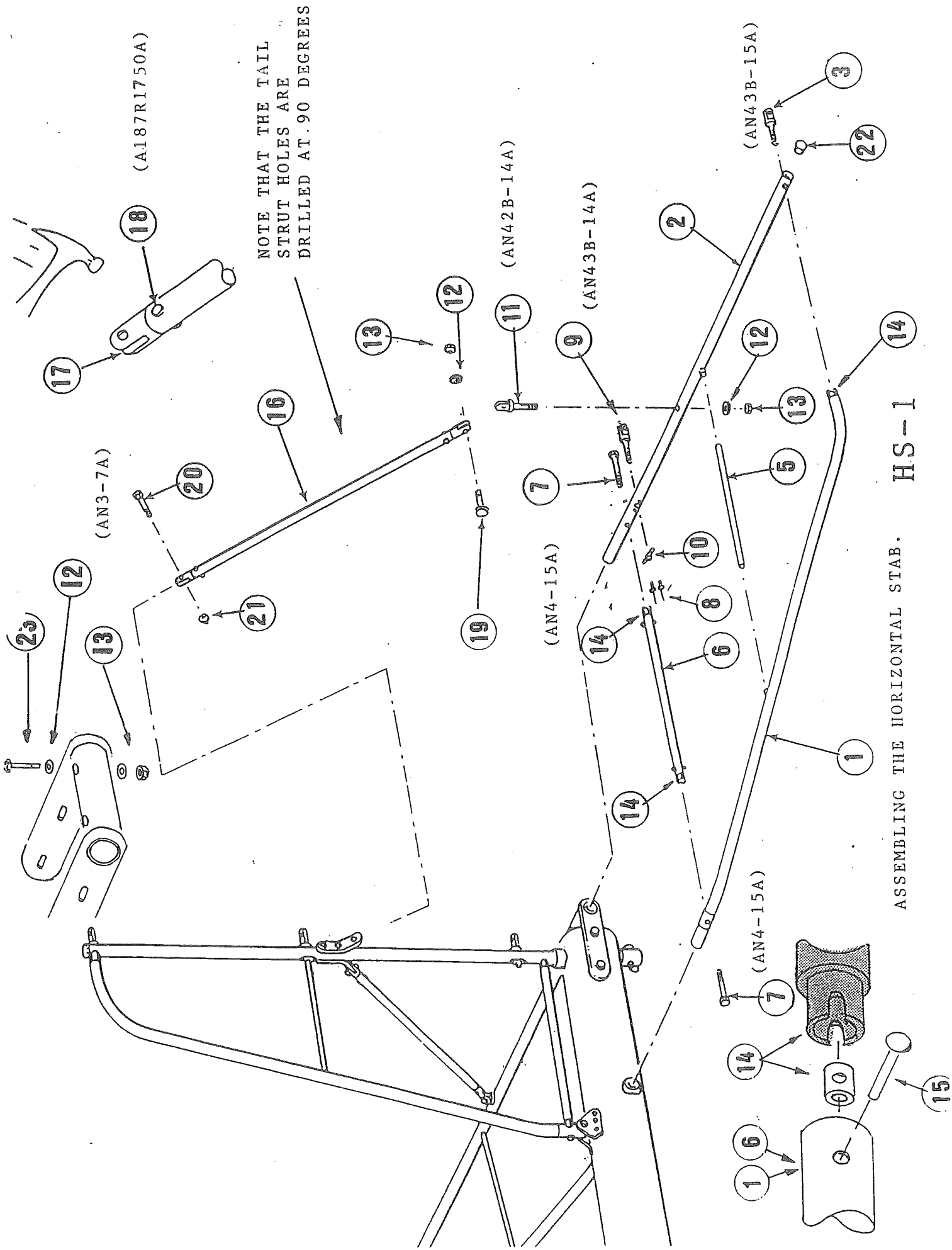
After completing the final assembly of the stabilizers. Drill out the stabilizer spars using the pre-drilled holes in the T-123 stabilizer carry through as a drill guide, make certain that the holes in the T-123 are vertical, drill out the two 3/16" holes and insert bolts (23) through washers (12) and secure with locknut (13).

### Horizontal Stabilizer Parts List

Figures HS-1 & VS-2

INDEX#	PART #	QTY	DESCRIPTION
1.	T-279-3	2	LEADING EDGE TUBE
2.	T-106-5	2	SPAR TUBE
3.	AN43B-15A	2	1/4" EYEBOLT
4.	SC-365-1	2	HORIZONTAL STABILIZER COVER
5.	T-279-11	2	COMPRESSION STRUT
6.	T-279-7	2	BASE TUBE
7.	AN4-15A	2	1/4" BOLT
8.	SS32	4	3/32" POP-RIVET
9.	AN43B-14A	2	1/4" EYEBOLT
10.	MS21047-4	2	1/4" PLATE NUT
11.	AN42B-14A	2	3/16" EYEBOLT
12.	AN960-10	8	3/16" WASHER
13.	AN365-1032	4	3/16" LOCKNUT
14.	TC-1	6	TUBE CONNECTOR 1"
	T1-1	6	METAL THREADED INSERT
15.	A187R1250A	6	3/16" X 1 1/4" LONG RIVET
16.	T-124	2	TAIL JURY STRUT
17.	W-25	4	JURY STRUT FITTING
18.	A187R0750A	4	3/16" X 7/8" LONG RIVET
19.	AN3-7A	2	3/16" BOLT
20.	AN393-21	2	CLEVIS PIN
21.	CS-152	2	SAFETY RING
22.	EC-4	2	PLASTIC END CAP
23.	AN3-17A	2	3/16" BOLT





NOTE THAT THE TAIL STRUT HOLES ARE DRILLED AT 90 DEGREES

(A187R1750A)

(AN3-7A)

(AN42B-14A)

(AN43B-14A)

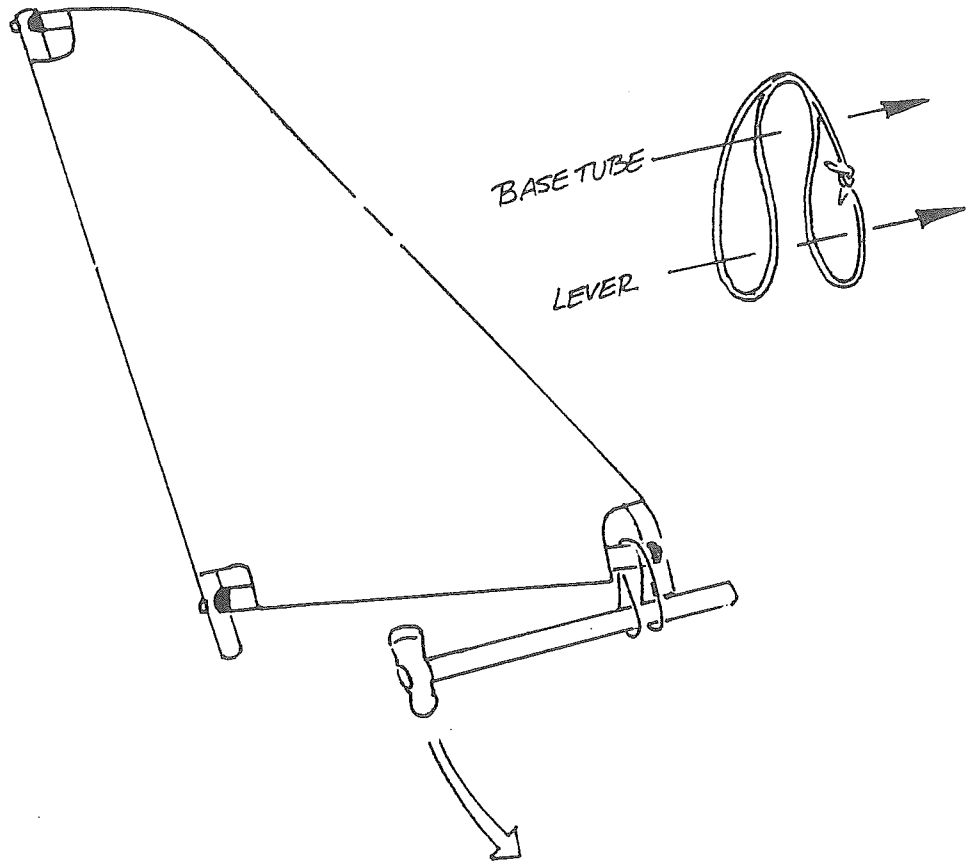
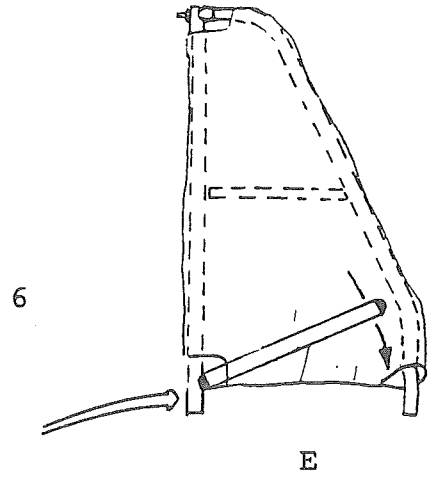
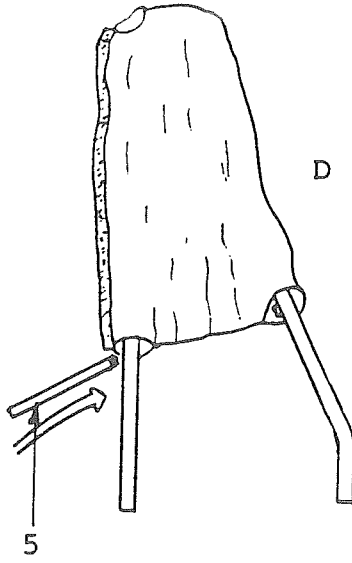
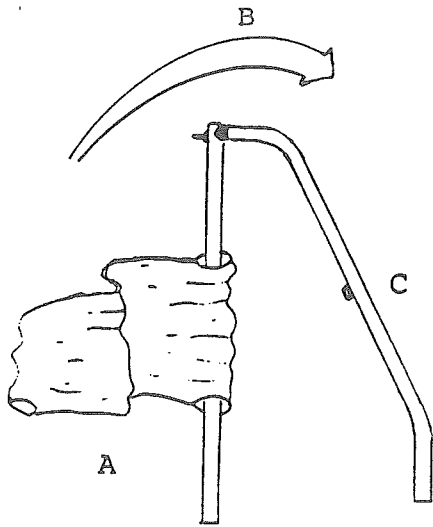
(AN4-15A)

(AN43B-15A)

ASSEMBLING THE HORIZONTAL STAB.

HS-1





VS2



# ✓ Chapter 12

## Section 3

### Elevators Assembly

#### Figures E-1 & R2

NOTE: If planning to install the optional trim system, drill out a 3/16" hole through the left elevator tube (1) 1" from the end of the inside bend of the tube. Refer to Chapter 16 / Section 2 - step 5 / Figure TQ-2 for details. Install the 3/16" plate nut that is supplied in the trim kit. Remember to drill a hole to accept the eyebolt that will be inserted into the plate nut. Also, be certain to hot knife the hole in the cover at appropriate location after assembly.

1. Figure R-2

- a) Insert first elevator trailing edge tube (1) into the elevator covering (2) as shown in position A.
- b) Insert compression strut (4) under elevator covering (2) and position one end of the compression strut (4) on pre-installed nut attached to the elevator trailing edge tube (1) as shown in position B.

2. Figure E-1

Locate the bushing on the main spar tube (3). One end of the main spar tube to that bushing measures approximately 23-1/2". THIS SIDE MUST BE INSERTED FIRST INTO THE ELEVATOR COVERING (SEE BELOW) OR IMPROPER ASSEMBLY WILL RESULT.

Figure R-2

Insert the top of the main spar tube (3) into the elevator covering as shown in position C. Position the end of the compression strut (4) on the pre-installed nut attached to the main spar tube (3). Push the main spar tube into the elevator covering until the compression strut is ALMOST perpendicular to the main spar tube.

3. Figure E-1

- a) Insert the end of the elevator trailing edge tube (1) into center hole of torque fitting (11).
- b) Install end of the main spar tube (3) into end of same torque fitting.

4. Figure E-1

Locate the hole on the outside edge of the main spar tube (3). Insert a securely tightened eyebolt (5) through the main spar tube into the tube connector / insert.

5. Figures R-2 & E-1

As performed in Sections 1 & 2, use previously made tourniquet to pull the covering and torque fitting assembly tight. When the covering is tight, drill a 3/16" hole through the elevator trailing edge tube (1) using the torque fitting (11) as a guide. Attach elevator trailing edge tube and torque fitting by using two pop-rivets (12), as shown in Figure E-1.

## ✓ Chapter 12

Figure E-1

6. Install the end caps (13) and (10) into ends of elevator trailing edge (3) and main spar (1) tubes.

7. Figure E-1

Through the covering, locate hole on the outside edge of the main spar tube (3). Burn a hole to insert eyebolt (6) through the main spar tube. Secure with locknut (17). Attach the elevator control arm (15) onto the right elevator torque fitting (11) on one side. Insert bolts (14) through holes as shown. Add washers (16) and secure tightly with locknut (17).

8. Figure below

Slide on the dual elevator horn (20) to the left side of the elevator control arm (15) as shown below. Attach the left side elevator to the control arm assembly using bolt (21) washers (16) and locknut (17).

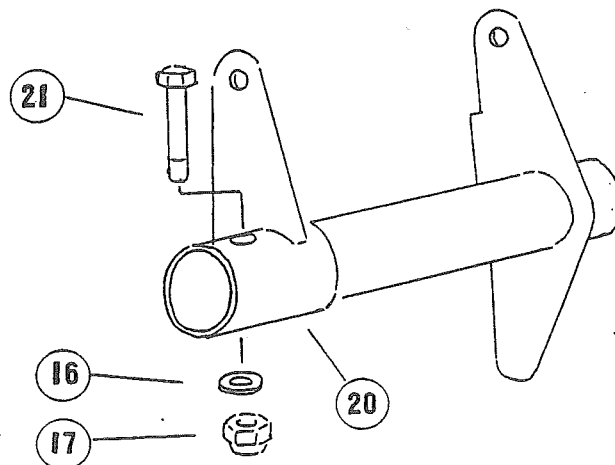
9. Repeat Steps 1-8 to assemble other elevator.

**REMINER: IF PLATE NUT FOR OPTIONAL TRIM SYSTEM HAS BEEN INSTALLED, BE CERTAIN TO BURN A HOLE IN THE APPROPRIATE LOCATION TO RECEIVE THE BOLT INTO THE PLATE NUT.**

10. Attach first elevator to horizontal stabilizer eyebolt. Place the elevator eyebolts to the horizontal stabilizer eyebolts (6) & (5), with THE ELEVATOR EYEBOLTS TO THE INSIDE. Slide bolts (7) through each set of eyebolts, using washers, *if necessary* (-see note below). Add castle nuts (8). Adjust castle nuts so that there is no slop, allowing for freedom of movement. Secure the castle nuts with cotter pins (9). Repeat procedure for second elevator.

*NOTE: A combination of thin and / or thick washers may be used here to eliminate any space between the two eyebolts, if necessary. If there is no space, then washers are not used.*

14.



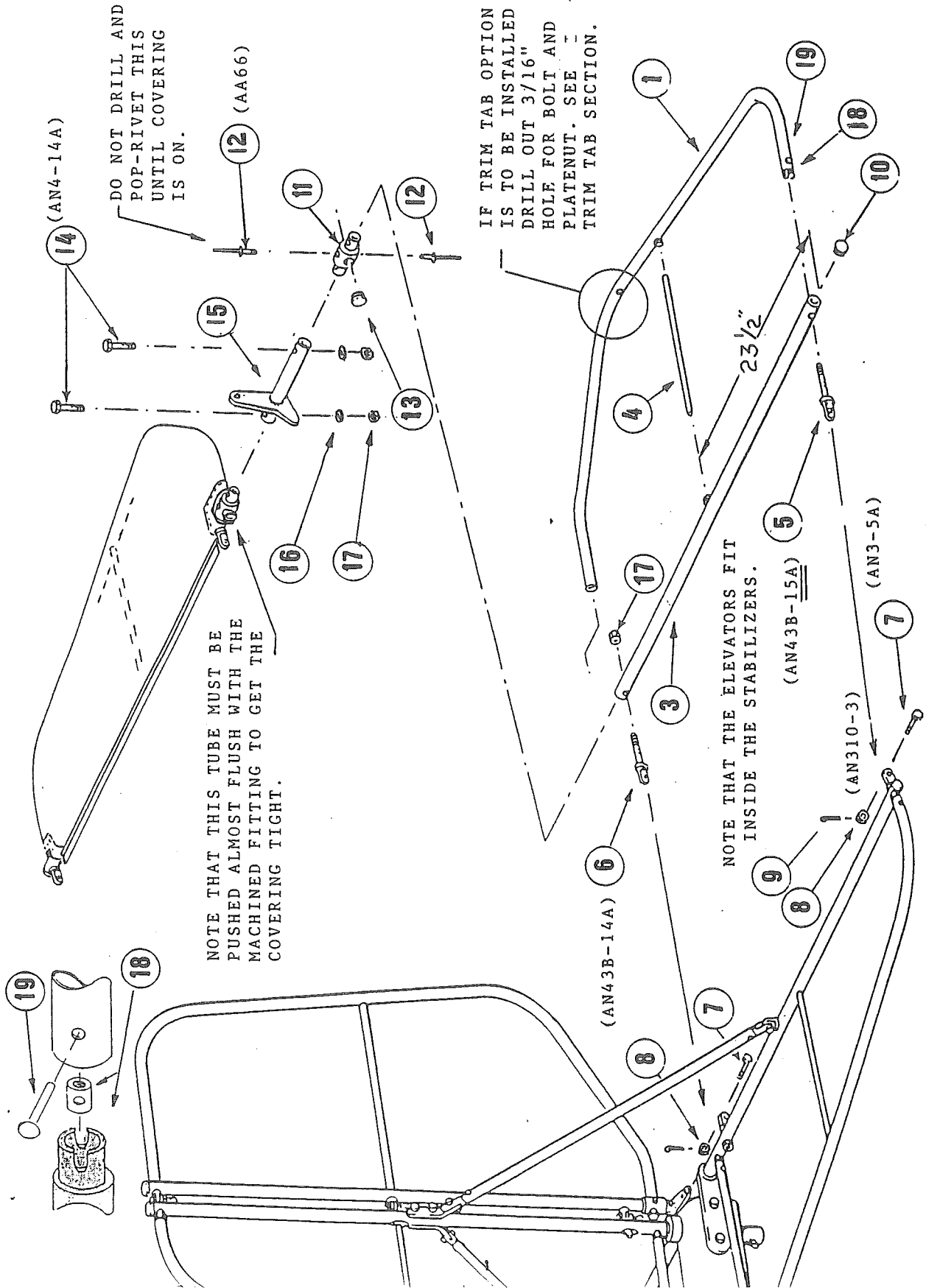


✓ Chapter 12  
Section 3  
Elevator Parts List  
Figures E-1 & R-2

INDEX#	PART #	QTY	DESCRIPTION
1.	T-108-5	2	ELEVATOR TRAILING EDGE
2.	EVC1	2	ELEVATOR COVERING
3.	T-108-3	2	MAIN SPAR TUBE
4.	T-108-7	2	COMPRESSION STRUT
5.	AN43B-15A	2	1/4" EYEBOLT
6.	AN43B-14A	2	1/4" EYEBOLT
7.	AN3-5	4	3/16" BOLT
8.	AN310-3	4	3/16" CASTLE NUT
9.	AN380-2-2	4	1/2" COTTER PIN
10.	EC-4	2	PLASTIC END CAP
11.	T-23	2	TORQUE FITTING
12.	AA66	4	3/16" X 1/2" ALUMINUM POP-RIVET
13.	EC-1	2	PLASTIC END CAP
14.	AN4-14A (ISA)	2	1/4" BOLT
15.	T-7	1	ELEVATOR CONTROL ARM
16.	AN960-416	2	1/4" WASHER
17.	AN365-428	4	1/4" LOCKNUT
18.	TC-1 W/INSERT	2	TUBE CONNECTION 1" W/INSERT
19.	A187R1250A	2	3/16" X 1 1/4" LONG RIVET
20.	T-7-3	1	DUAL ELEVATOR HORN
21.	AN4-15A	1	1/4" BOLT

15.





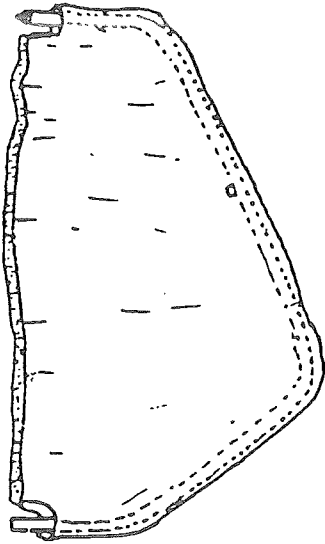
DO NOT DRILL AND  
POP-RIVET THIS  
UNTIL COVERING  
IS ON.

NOTE THAT THIS TUBE MUST BE  
PUSHED ALMOST FLUSH WITH THE  
MACHINED FITTING TO GET THE  
COVERING TIGHT.

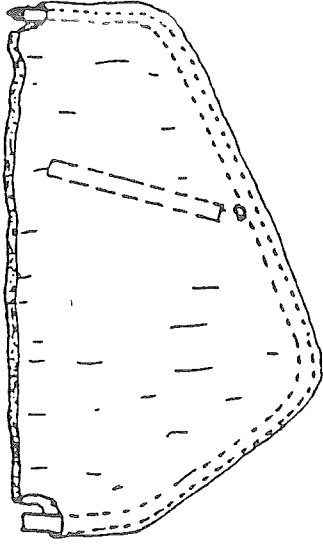
IF TRIM TAB OPTION  
IS TO BE INSTALLED  
DRILL OUT 3/16"  
HOLE FOR BOLT AND  
PLATENUT. SEE  
TRIM TAB SECTION.

NOTE THAT THE ELEVATORS FIT  
INSIDE THE STABILIZERS.

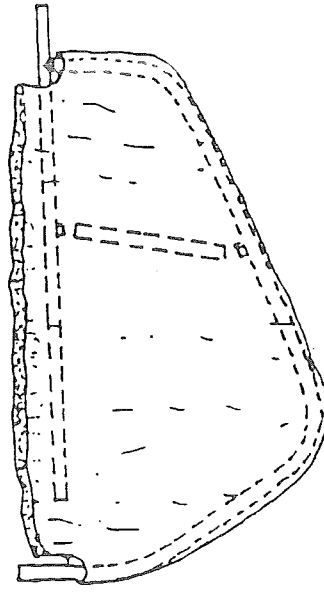




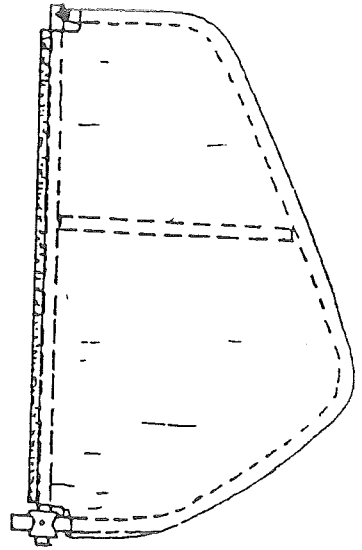
A



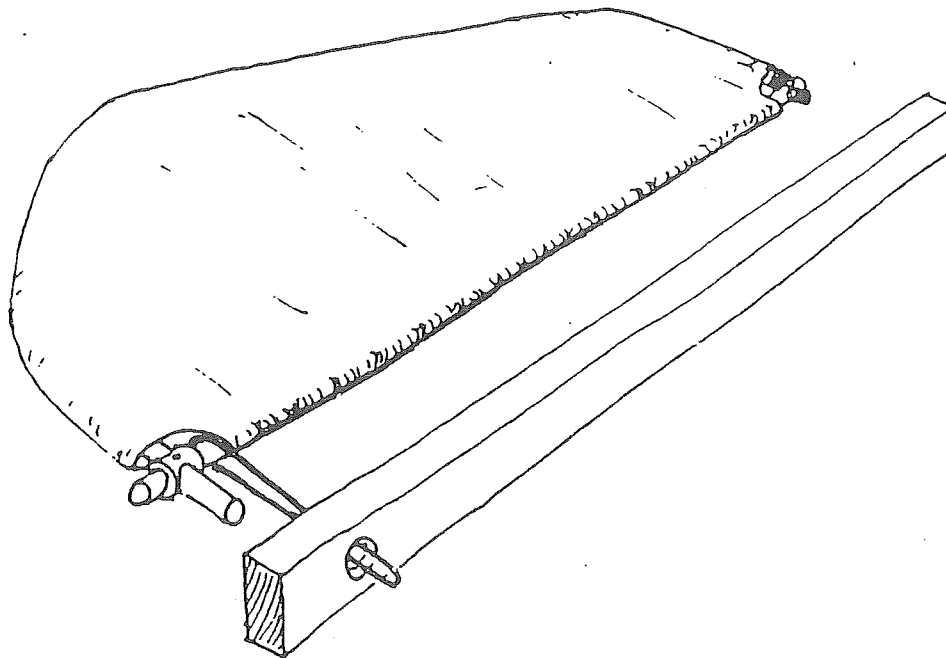
B



C



C



R2



## ✓ Chapter 12

### Section 4 Rudder Assembly Figures R-1 & R-2

1. Figure R-1  
Attach plate nut (5) to the center of rudder spar tube (3) by carefully positioning plate nut over center hole as shown. Temporarily thread eye bolt (10) through spar tube into plate nut. Verify that plate nut is vertical and flush against tube. Attach with pop-rivets (6). Remove eyebolt before installing covering.
  
2. Figure R-1  
Insert tube connector / insert (7) into top of trailing edge tube(1).
  
3. Figure R-2
  - a) Insert trailing edge tube (1) into the elevator covering (2) as shown in position A
  
  - b) Insert compression strut (4) under rudder covering (2) and position one end of the compression strut (4) on pre-installed nut attached to the trailing edge tube (1) as shown in position B.
  
4. Locate plate nut attached to main spar tube (3). One end of the main spar tube to that plate nut measures approximately 23 1/2". THIS SIDE MUST BE INSERTED FIRST INTO THE RUDDER COVERING (SEE BELOW) OR IMPROPER ASSEMBLY WILL RESULT.

#### Figure R-2

Insert the top of the main spar tube (3) into the rudder covering as shown in position C. Position the end of the compression strut (4) on the pre-installed nut attached to the main spar tube (3). Push the main spar tube into the elevator covering until the compression strut is ALMOST perpendicular to the main spar tube.

5. Figure R-1
  - a) Insert the end of the elevator trailing edge tube (1) into center hole of torque fitting (11).
  
  - b) Install end of the main spar tube (3) into end of same torque fitting.

## ✓ Chapter 12

6. Figure R-1  
Locate hole on the outside edge of the main spar tube (3). Insert a securely tightened eyebolt (10) through the main spar tube into the tube connector / insert.
7. Figures R-1 & R-2  
As performed in Sections 1 & 2 & 3, use previously made tourniquet to pull the covering and torque fitting assembly tight. When the covering is tight, drill a 3/16" hole through the trailing edge tube (1) using the torque fitting (11) as a guide. Attach elevator trailing edge tube and torque fitting by using two pop-rivets (12), as shown in Figure R-1.
8. Figure R-1  
Install end caps (19) and (20) into ends of elevator trailing edge (1) and main spar (3) tubes.
9. Figure R-1  
Position the rudder control horn (17) on end of the torque fitting (15). Note that proper position of rudder control horn is angled forward. Insert bolt (18) through holes and tightly secure with locknut (14).
10. Figure R-1  
Through the covering, locate hole approximately 23 1/2" from the top of the main spar tube (3). Burn a hole to insert eyebolt (6) through the main spar tube into the plate nut and tighten securely.
11. Locate hole at bottom of main spar tube (3) and insert eyebolt through it. Secure with locknut (14).
12. Figure R-1  
Attach rudder to vertical stabilizer eyebolt. Place three rudder eyebolts (10), (13) & (13) to three vertical stabilizer eyebolts, with rudder eyebolts on top, and a washer (21) in between each. Slide bolts (9) through each set of eyebolts. Add castle nuts (11). Adjust castle nuts so that there is no slop, allowing for freedom of movement. Secure the castle nuts with cotter pins (12).



## ✓ Chapter 12

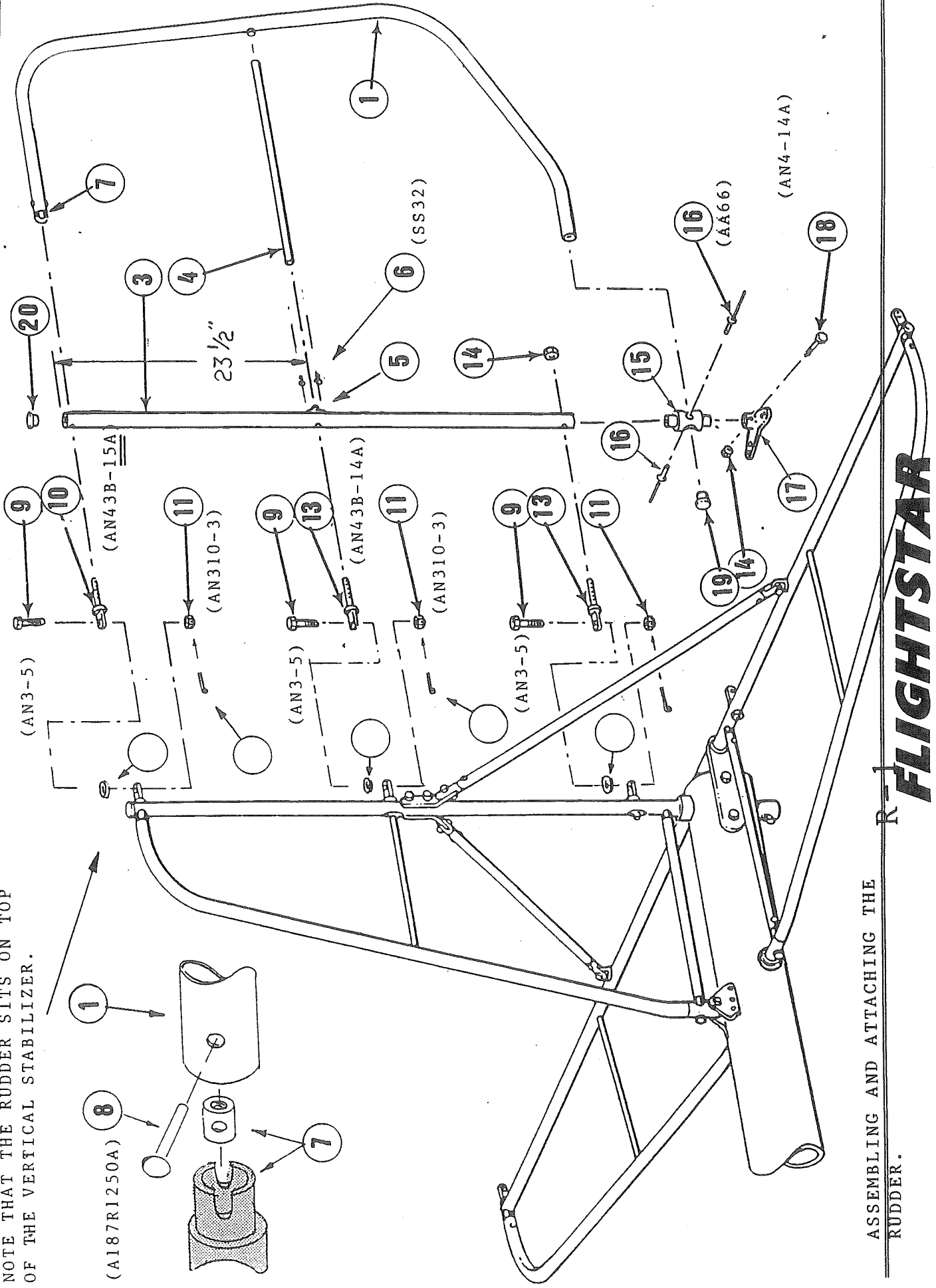
### Section 4 Rudder Parts List Figures R-1 & R-2

INDEX#	PART #	QTY	DESCRIPTION
1.	T-109-5	1	TRAILING EDGE TUBE
2.	RC1	1	RUDDER COVERING
3.	T-109-3	1	MAIN SPAR TUBE
4.	T-109-7	1	COMPRESSION STRUT
5.	MS21047-4	1	1/4" PLATE NUT
6.	SS32	2	3/32" POP-RIVET
7.	TC-1	1	TUBE CONNECTOR 1"
	T1-1	1	METAL THREADED INSERT
8.	A187R1250A	1	3/16" X 1 1/4" RIVET
9.	AN3-5	3	3/16" BOLT DRILLED
10.	AN43B-15A	1	1/4" EYEBOLT
11.	AN310-3	3	3/16" CASTLE NUT
12.	AN380-2-2	3	1/2" COTTER PIN
13.	AN43B-14A	2	1/4" EYEBOLT
14.	AN365-428	1	1/4" LOCKNUT
15.	T-23	1	TORQUE FITTING
16.	AA66	2	3/16" X 1/2" POP-RIVET
17.	T-209	1	RUDDER CONTROL HORN
18.	AN4-14A	1	1/4" BOLT
19.	EC-1	1	PLASTIC END CAP
20.	EC-4	1	PLASTIC END CAP
21.	AN960-10	3	3/16" WASHER



**FLIGHTSTAR II & IISL - Assembly Manual**

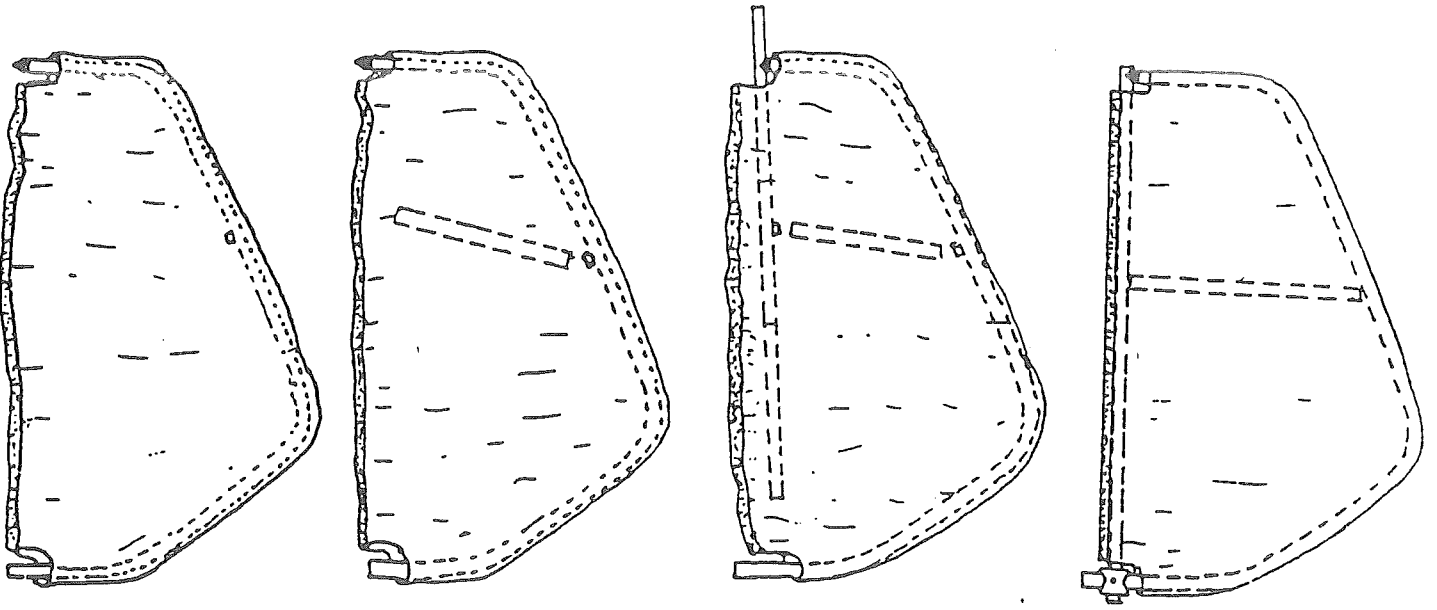
NOTE THAT THE RUDDER SITS ON TOP OF THE VERTICAL STABILIZER.



ASSEMBLING AND ATTACHING THE RUDDER.

R-1  
**FLIGHTSTAR**



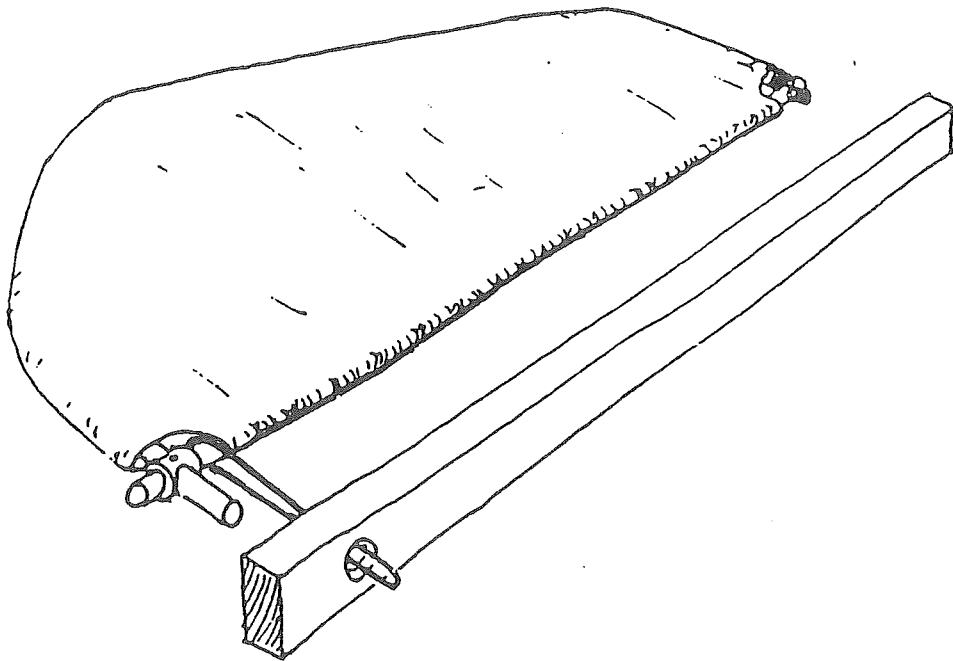


A

B

C

C



R2

