



**aero-trim, inc.**

1130 102 Street  
BAY HARBOR, FL. 33154

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT  
OR  
PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL  
SUPPLEMENT FOR:

REG. NO. \_\_\_\_\_  
SER. NO. \_\_\_\_\_

This Supplement must be attached to the applicable FAA Approved Airplane Flight Manual (AFM) or "Pilot's Operating Handbook and FAA Approved Airplane Flight Manual" (POH/AFM) when the Aero-Trim Model 400 Electric Aileron and Rudder Trim Systems are installed in accordance with STC . The information contained herein supplements or supersedes the information of the basic AFM or POH/AFM only in those areas listed herein. For limitations, procedures, and performance information not contained in this Supplement, consult the basic AFM or POH/AFM.

**GENERAL.** Aileron and Rudder Trim Tabs are controlled by two separate systems, each having its own Indicator, Servo and Trim Tab. One indicator is labeled AILERON TRIM; the other indicator is labeled RUDDER TRIM. Each has its own control switch located in the dial face.

Servo units located in the Aileron and Rudder move the Trim Tabs to the desired position. The Servos free-wheel at the extremes of travel in either direction.

**LIMITATIONS.** No change.

**NORMAL PROCEDURES**

**FOR AILERON TRIM.** Depressing the switch to the LWD position lowers the Left wing. When the switch is depressed to RWD, the opposite action occurs. The switch returns to the center-off position when released.

**FOR RUDDER TRIM.** Depressing the switch to the L position causes the airplane to yaw left, and depressing to R causes right yaw. The switch returns to a center-off position when released.

**EMERGENCY PROCEDURES.** None. Extreme tab positions are easily overridden manually. Power is removed by pulling the circuit breaker.

**PERFORMANCE.** No change.

FAA APPROVED

Chief, Engineering and  
Manufacturing Branch  
Southern Region

DATE \_\_\_\_\_

Above is the FAA approved MASTER COPY from which all POH supplements are made. All POHs are identical and impart the same information except for your airplane registration and serial number fill-in and the make and model for applicability. Certified copies of the original signed POH are available for \$5.00 each with a SASE.

## STC LIST

SA129150 Cessna 140A  
SA129250 Cessna 150, A, B, C, D, E, F, G, H, J, K, L, M, A150K, A150L, A150N, 152, A152  
SA129350 Cessna 170A, 170B  
SA129450 Cessna 172, A, B, C, D, E, F, G, H, I, K, L, M, N, P  
SA129550 Cessna 172RG, P172D, R172E, R172F, R172G, R172H, R172J, R172K, 175, A, B, C  
SA114050 Cessna 177, 177A, 177B  
SA113250 Cessna 177RG  
SA129650 Cessna 180, A, B, C, D, E, F, G, H, J, K  
SA129750 Cessna 182, A, B, C, D, E, F, G, H, J, K, L, M, N, P, Q, R, R182, T182, TR182  
SA129850 Cessna 185, A, B, C, D, E, A185B, A185F  
SA115750 Cessna 206  
SA101950 Cessna 210  
SA117050 Cessna 336  
SA116650 Cessna 337, A, B, C, D, E, F, G, H, T337B, C, D, E, F, G, H  
SA104450 Piper PA23-160, PA23, PA23-235, 250  
SA104550 Piper PA24-180, 250, 260  
SA121650 Piper PA28-140, 150, 160, 180, 235, PA28S-160, 180, PA28-R180, PA28-R200  
SA104650 Piper PA28-151, 161, 181, RT-201, RT-201T, 28R-201T, 28-R201, 28-236  
SA109050 Piper PA30, 39  
SA102650 Piper PA32-260, 300, R-300, S300, RT300, 300T  
SA189250 Piper PA32-301, 301T, R-301, R301T  
SA121750 Piper PA34-200, 200T  
SA111150 Mooney M20B, C, D, E, F, G, J, K  
SA120450 Mooney M22  
SA168050 Beech 19A, B19, M19, 23, A23, A23A, A23-19, A23-24, B23, A24, A24R, B24R, C24R  
SA121050 Beech V-tails 35, A35, B35, C35, D35, E35, F35, G35, 35R  
SA121150 Beech V-tails H35, J35, K35, M35, N35, P35, Q35, V35, V35A, V35B  
SA183650 Beech Straight tails 35-33, 35-A33, 35-B33, 35-C33, 35-G33A, E33, E33A, E33J  
rudder trim E33A, E33C, F33, F33A, F33C, G33, 36, A36, A36TC, B36TC  
SA113350 Gulfstream American AA-5, AA5A, AA5B  
SA124550 Rockwell Commander 112, 112B, 112TC, 112TCA, 114, 114A  
SA128850 Ercz 415C, 415CD  
SA128750 Ercz, Forney, Alen Ercz 415D, E, G, ForneyF-1, F-1A, Men A-2, A2-A  
SA121950 Navien A, B, C, D, E, F, G, H, for both Aileron and Rudder  
SA130550 Aerostar 600, 601, 601P, 602P, Piper PA60-600, 601, 601P, 602P  
SA114250 Lake LA-4, 4A, 4-200 for both aileron and rudder  
SA207150 Piper PA24-400  
SA215150 Maule M-4, -5, -6, -7, and MX-7 Series  
SA233050 Mooney Rudder trim M20B, C, D, F, G, J, K, L

Certified copies of STCs or POHs are \$5.00 ea. with a SASE

### HOW TO TRIM YOUR AIRPLANE FOR MAXIMUM PERFORMANCE

Carry something hefty but useful like a survival kit as far aft in your baggage compartment as possible to give your plane a slight aft CG loading. This aft loading will force you to trim your nose down more than usual thereby flattening your angle of attack and reducing drag.

Immediately after climb-out, when you relax your engine, adjust the rudder trim and center the ball best you can. Release the controls and level the wings with your new aileron trim. Recenter the ball if necessary and releve the wings. Note the rudder trim indication for future reference.

NOW engage the autopilot. At least once an hour, if you want to fly airline style, disengage your autopilot and releve the wings to compensate for inflight changes. Re-engage autopilot. You will note also that your autopilot or wing leveler will no longer fly you sideways.

**REMEMBER:** Always trim your airplane BEFORE engaging the autopilot.

Avoid excessive fuel valve turning as valves wear out with use and can stop the fuel supply to your engine. A trimmed airplane performs to its potential. The better you trim the more performance you'll get.

Happy flying!





BAY HARBOR, FL. 33154

## AERO-TRIM INSTALLATION INSTRUCTIONS

Please read entire instruction before proceeding with the installation.

Notice: All work must be done in a neat workmanlike manner per FAR 43.13.

**WARNING: THIS SYSTEM IS FOR 12/14 VOLT OPERATION ONLY.**

For 24/28 volt airplanes, you must use Aero-Trim voltage adapter 417-11 which is available at no cost PROVIDING you send a self addressed, stamped envelope.

The following parts are not included in the AeroTrim package and are to be supplied by the installer as required:

- ▶ 20, 3/32 dia. aluminum "pop-rivets", USN ADJ2ABS. Hardware store quality.
- ▶ Electrical crimp connectors for 22 ga. wire. Closed-end are best. Quick disconnects or plugs are convenient and acceptable but cost more.
- ▶ Pullable circuit breaker, panel mounted fuse or inline fuse. Either must be 1 amp. The inline fuse must be accessible to the pilot.
- ▶ Instrument mounting screws #6-32x1.
- ▶ Grommets AN931-3-5
- ▶ Clamps for wire cable AN742D3.
- ▶ Hook-up wire, 22 ga. stranded-as needed.

Cut out label and fasten  
next to circuit breaker  
or fuse.

**AIR TRIM**

**CAUTION: THE SERVO IS PRE-CENTERED AT THE FACTORY. DO NOT OPERATE UNTIL TAB IS CENTERED AND CLAMPED TO THE PUSH ROD. See FIG. 1.**

*REBALANCE AIRCRAFT IF NECESSARY*

### INSTALLATION TIME

This installation is extremely simple and should take only 2 to 4 hours using a helper. Some airplanes will take longer.

### SERVO INSTALLATION

Layout and cut the 2x6 slot in the bottom skin of the left aileron or in the right skin of the rudder per the appropriate installation drawing.

An AeroTrim adds only 1 1/2 to 2 ounces to the trailing edge which is much less than a single thin coat of paint. Hundreds of installations have proven that this light weight is easily absorbed inside the balance tolerance envelope on most all airplanes. However, Aerostars and Beech Bonanzas (allegedly only), have almost no tolerances and must be checked and rebalanced per mfrs. spec if necessary.

1. Layout and cut the 2x6 slot in the bottom skin of the left aileron or in the right skin of the rudder per the appropriate installation drawing.
2. Drill or enlarge to 1/4" dia. any holes required per the drawing for routing the wire from aileron into the wing. Drill larger holes for grommets if grommets are needed.
3. Insert the servo inside the slot. Make it a free fit to prevent dust cover damage. Pick up the punch marks and drill thru' with a 3/32 drill only. DO NOT drill for 1/8 rivets, they are not allowed.
4. Hold servo temporarily in place with a few #4 sheet metal screws or clamps. The 3/32 pop-rivets install as the LAST thing. Other methods of fastening are also approved such as nut plates, rivnuts, doublers, etc., if the extra cost is acceptable.
5. Remove and discard all existing ground adjustable tabs.

### TRIM TAB INSTALLATION

6. Insert the push rod thru' the bug screw and slide the tab assy. along the push rod to the trailing edge of the aileron or rudder. Note how the push rod is bent 90 degrees to the trailing edge for airplanes with tapered ailerons. See FIG. 2.
7. Position the tab assy. spanwise along the trailing edge until the push rod projects from the fairing in a straight manner, parallel to the edge of the servo and not angled to one side.



8. Fasten tab always using 3/32 dia. pop-rivets. Hard rivets will deform the tab and prevent free movement.
9. Manually adjust the angle of the tab while on the push rod until it neutral or parallel to the chord centerline of the aileron or rudder. See FIG. 2. Adjustment tolerance is 1 to 1½ degrees up above centerline; zero degrees below.
10. Tighten bug nut to about 15 in. lbs. or until the push rods just starts to deform into the shoulder washer. Use a support device around the screw or the push rod will bend. See FIG. 3 for a simple tool. Over-tightening will break the screw.
11. Trim off excess push rod about 1/8" past the bug screw. File cut end smooth.

#### **ELECTRIC CABLE ROUTING**

12. Pass the wire from the aileron thru' the wing or from the rudder thru' the fuselage into the cabin and behind the instrument panel. It is not always necessary to remove seats and floor boards as a little creative push and pull will move a lot of cable.
13. Arrange and clamp the cable making certain it will not interfere with control surface movement and is free to follow a path of operation without getting kinked, cut, abraded or damaged. If possible, slip a length of spaghetti over any exposed portions of cable.
14. Drop the servo and insert the cable inside the aileron or rudder from the leading edge. Pull in enough cable to make a connection to the servo.
15. Connect servo to cable color to color. Closed-end connectors are the most reliable because the wires must be first twisted together before crimping. Soldering of course is always the best method.
16. Reinstall servo with screws only. Still, no rivets yet.

#### **INDICATOR INSTALLATION**

17. Select or cut out any standard 2½" dia. hole in the panel that is within easy sight and reach of the pilot. The Indicator can be bracketed, put inside pedestals, side panels, overhead or floor. A std. convenience radius is 22" from the pilots yoke.
18. Install the Indicator with #6 screws. Tap the corner mounting holes with a 6-32 tap and screw directly into the Indicator.

#### **ELECTRICAL WIRE-UP**

19. Connect the Indicator to the cable color to color. Combine both green wires from the cable and the Indicator and connect to a good clean ground. Connect the BROWN wire to the buss thru' a circuit breaker or fuse. Remember: GREEN to Ground; BROWN to Buss. See FIG 4.

#### **SYSTEM CHECK OUT**

20. Turn Master switch ON. The pointer will erect to a mid-dial position.
21. Actuate the system by pressing the rocker switch. The tab will, if adjusted properly per step 10 and FIG. 3, travel about 45 degrees each way from chord centerline.
22. After you are satisfied with system operation, you can now secure the servo with the 3/32 pop-rivets. Paint to match the plane, attach warning label and lubricate tab hinge line.
23. Insert AFM or POH supplement to the flight manual. Since the entire system weighs less than one pound, no weight and balance entry is required. Your log note will be: Installed AeroTrim per STC \_\_\_\_\_.

NOTE: The dust cover on the servo is made from the thinnest material possible to keep it lightweight. The cover may crack if handled roughly. Cracks however will not impair performance and can be repaired with Scotch Tape.

This AeroTrim system is fully certified and approved by the FAA and is manufactured by AeroTrim, Inc. under strict FAA-PMA regulations.





FIG. 2

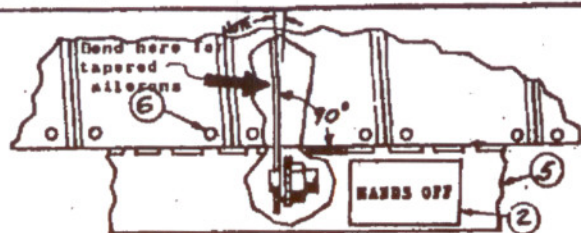
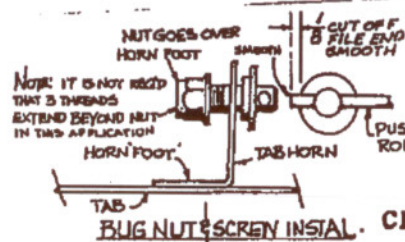
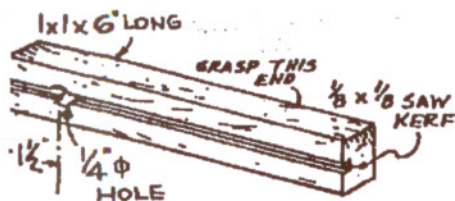
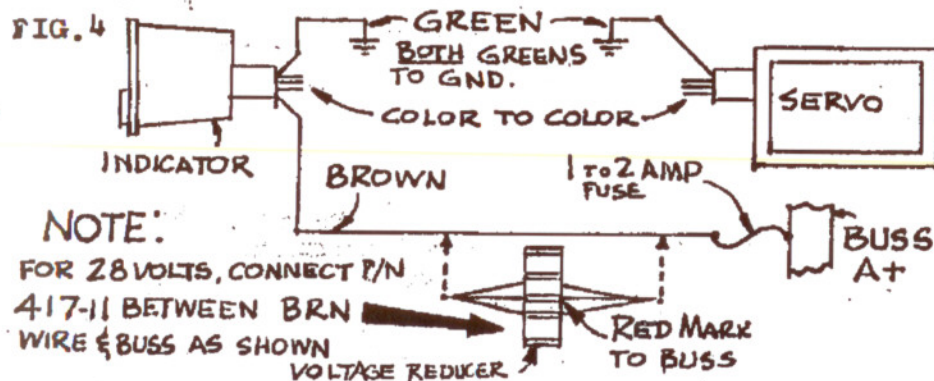


FIG. 3



CESSNA 140A, 150, 152, 170, 172, 172RG, 175, 180, 182, 182RG, 185.

FIG. 4



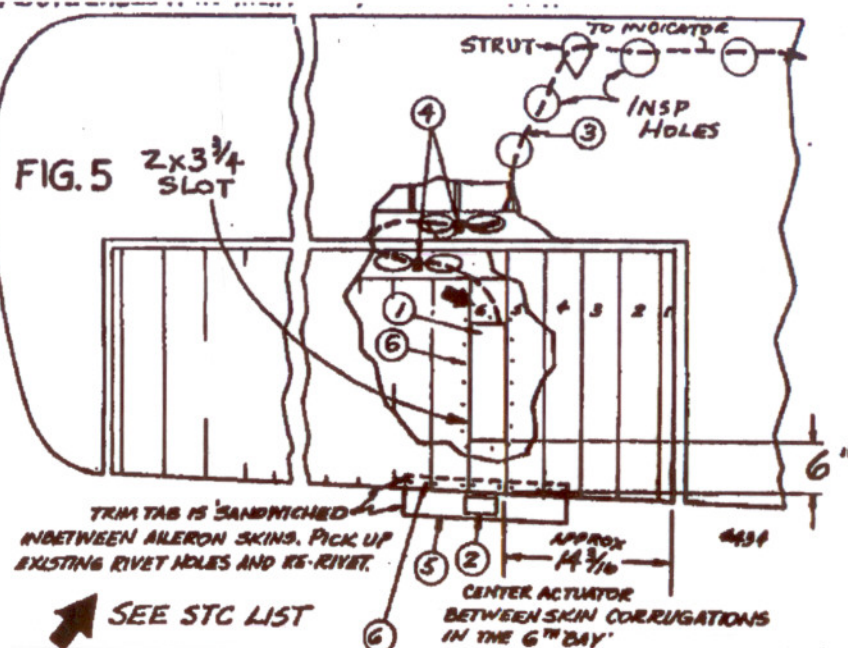
# GENERAL INDEX FOR ALL INSTALLATIONS

Item	Description
1	Servo Assy.
2	Hands-off placard
3	Electrical cable
4	Cable clamp AN742D3 or equal. As req'd.
5	Trim tab assy.
6	Common aluminum 3/32 dia. pop-rivet USN AD32ABS.

USE NO CHERRY RIVETS IN TAB OR SERVO.

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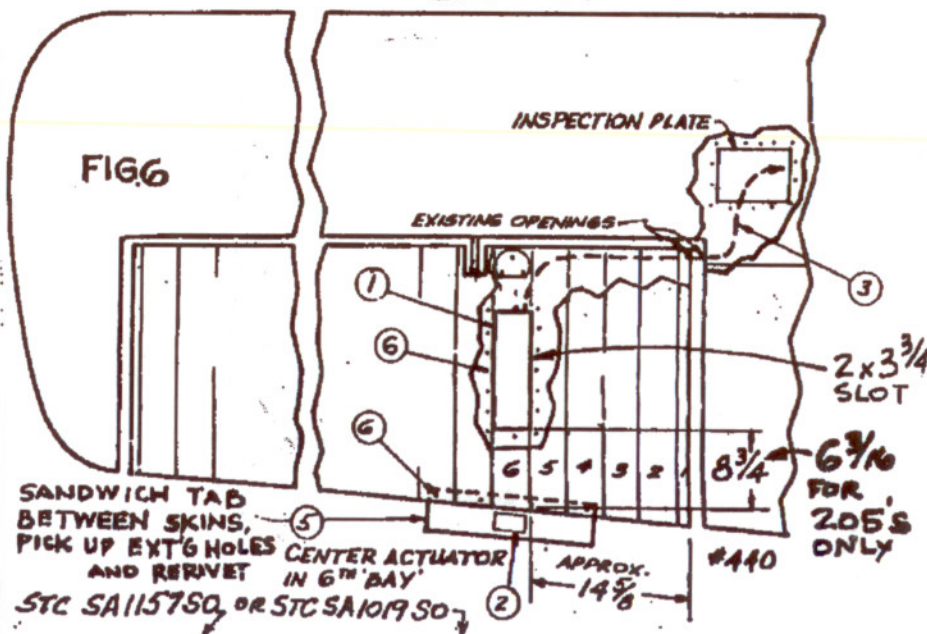
FIG. 5 2x3 3/4 SLOT



SEE STC LIST

NOTE: FOR 205s, ROUTE WIRE BEST WAY.

FIG. 6



CESSNA 206 and Cessna 210s with ribbed ailerons  
ALSO CESSNA 205 (A FIXED GEAR 210 WITH RIBBED AILERONS)



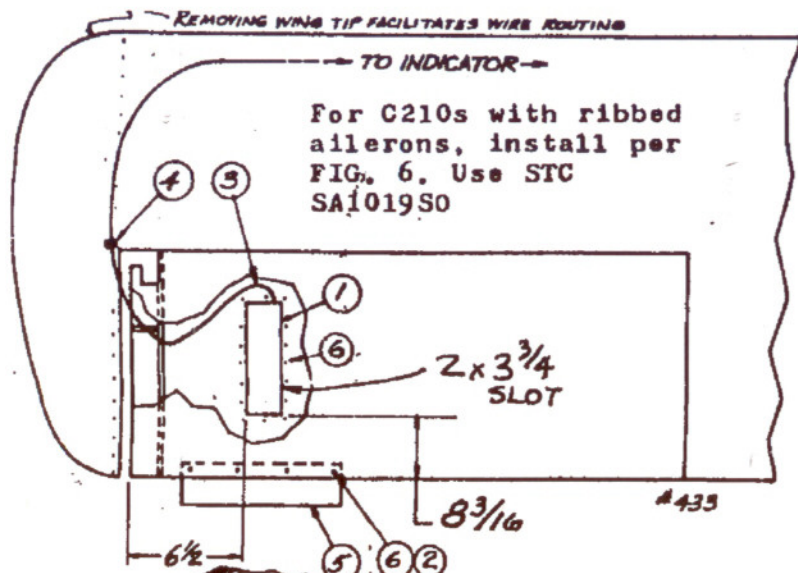
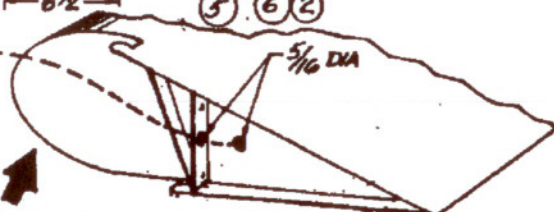
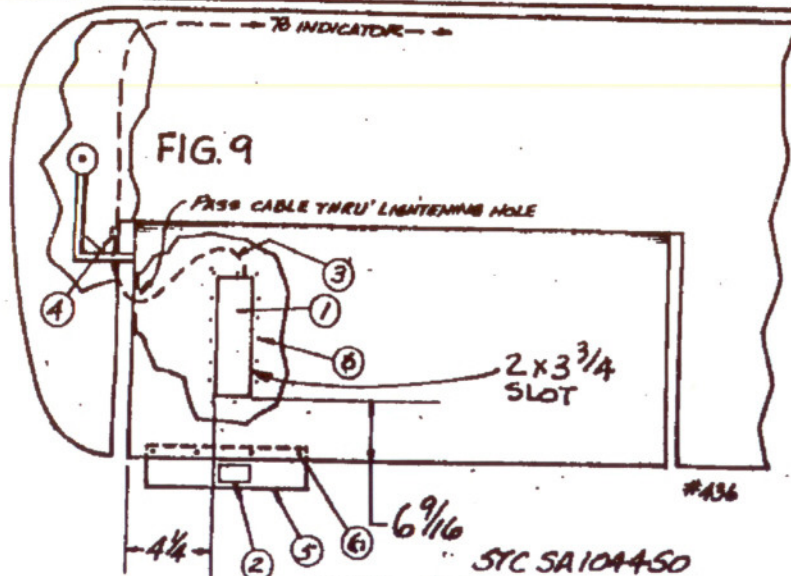


FIG. 7



CESSNA 210 and C177 C177RG smooth ailerons only



PIPER PA23 Apache, Aztec

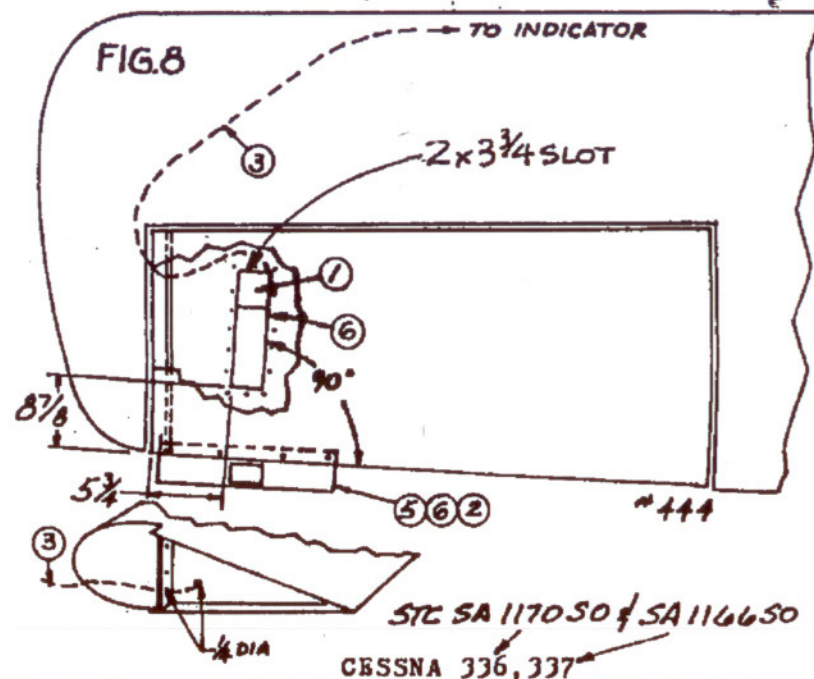
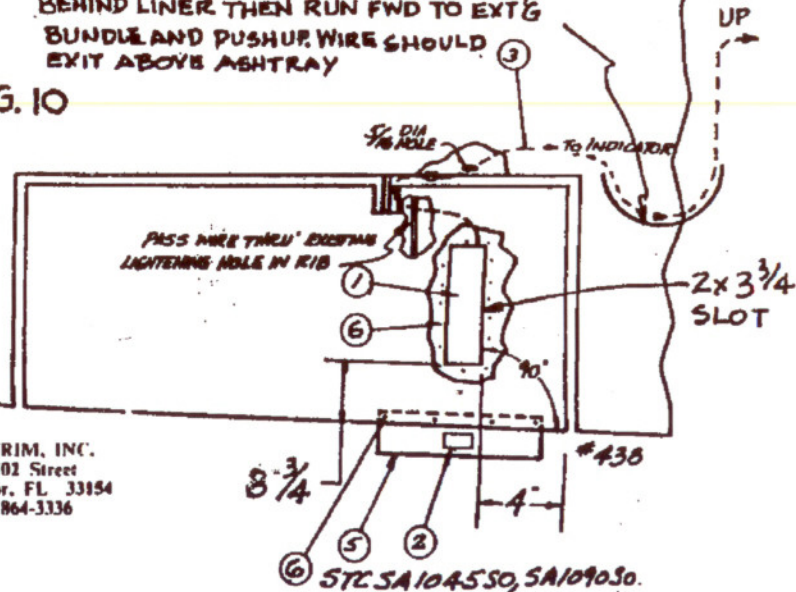


FIG. 10

REMOVE WHEEL WELL LINER AND TUCK WIRE BEHIND LINER THEN RUN FWD TO EXTG BUNDLE AND PUSH UP. WIRE SHOULD EXIT ABOVE ASHTRAY



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PIPER PA24 Comanche, PIPER PA30, 39 Twin Comanche

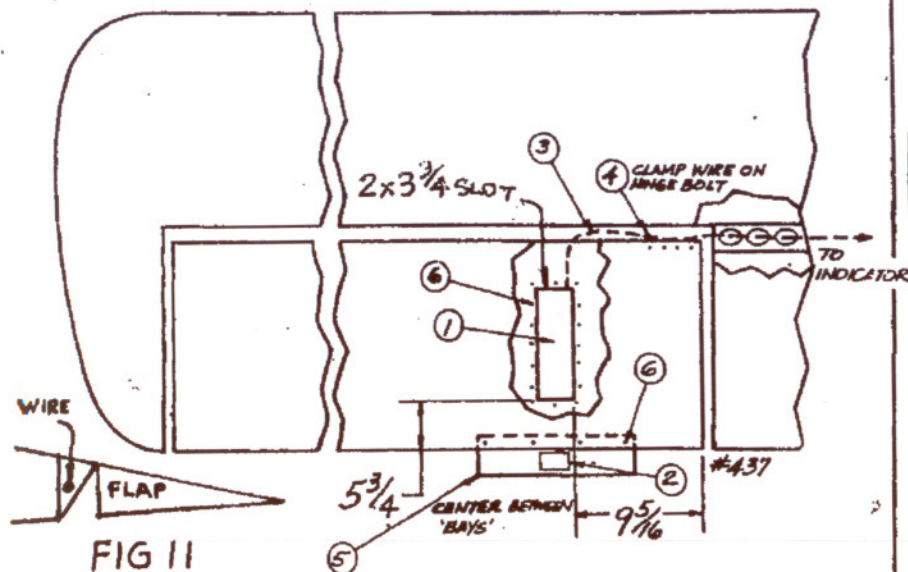


FIG 11

STC SA121650

PIPER PA28 Cherokee } Straight wings  
STC SA102650 PIPER PA32 Lance }

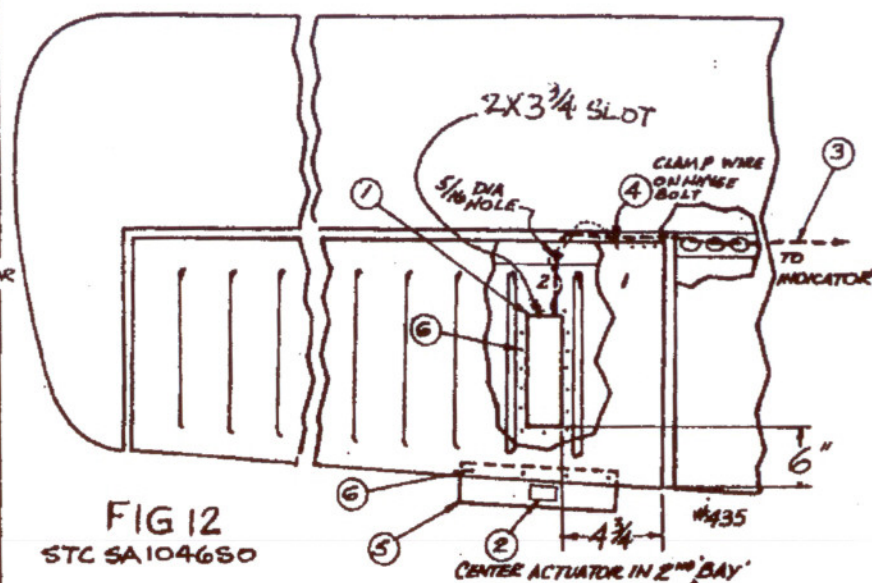


FIG 12

STC SA104650

PIPER PA28 Arrow etc. Tapered Wings

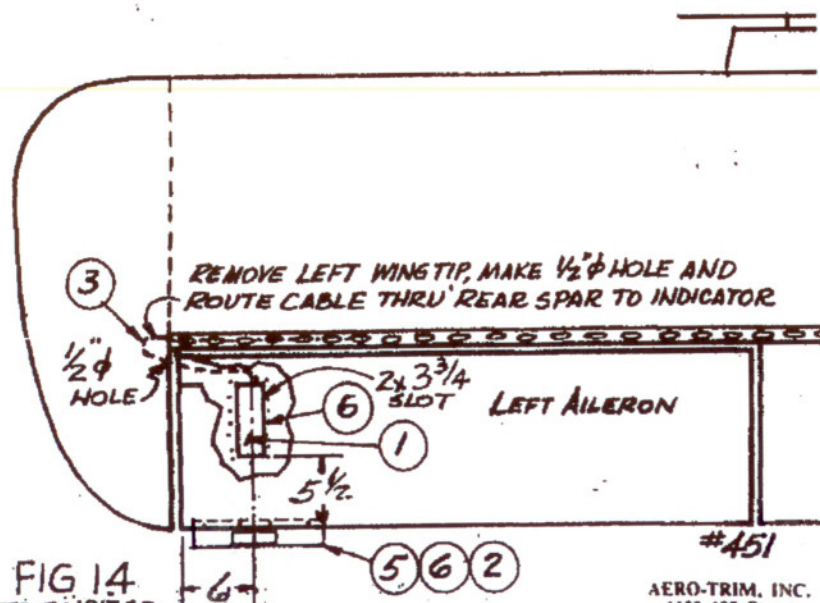


FIG 14  
STC SA121750

PIPER PA34 Seneca

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IF REQ'D, DEPENDING ON MODEL, LOOP WIRE BETWEEN  
AILERON AND REAR SPAR. SO WIRE IS IN TORSION AS  
AILERON MOVES.

CUT ONE SLOT  
ONLY OPPOSITE  
THE INSR PLATE WITH  
THE SCREWS AS IT  
WILL BE REMOVED  
TO ROUTE WIRE.  
REMOVE LEADING  
EDGE PLATES:  
IF SCREWED ON,  
REMOVE EVERY OTHER  
ONE. IF RIVETED,  
ONLY ONE OR TWO  
AS REQ'D. TO  
SAVE WORK.

SANDWICH TAB IN BETWEEN SKINS.  
LOCATE TAB TO PICK UP EXISTING  
RIVET PATTERN THAT WILL PLACE THE  
END RIVETS EQUIDISTANT FROM EACH  
END. POP-RIVET ONLY. NO HARD  
RIVETS.

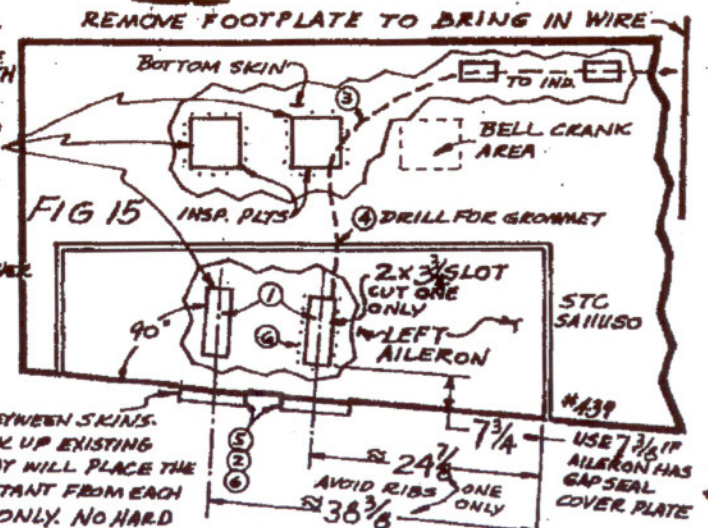


FIG 15

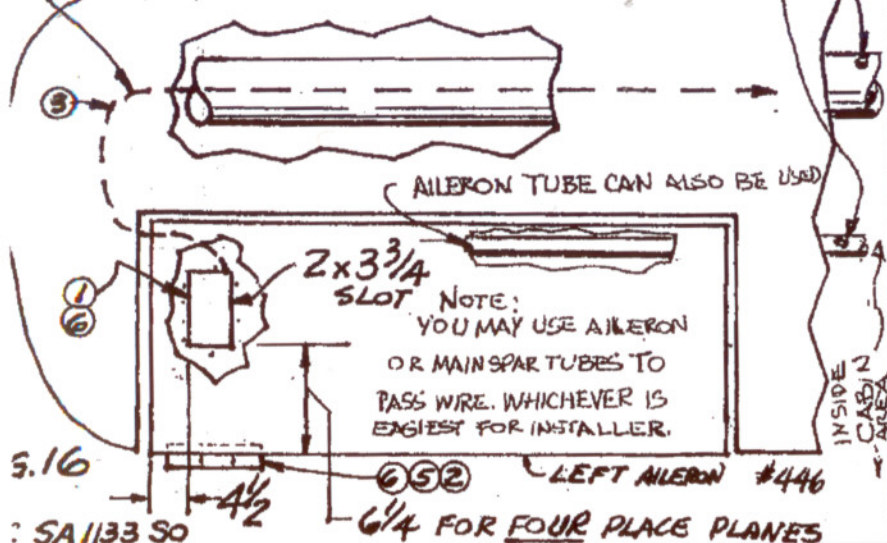
STC SA111550

#439

MOONEY M20,22 (all models with metal wings)



REMOVE WING TIP, PASS WIRE THRU END OF  
AILERON AROUND TIP AND INSIDE MAIN SPAR TO INDICATOR  
DRILL 1/16" HOLE IN SPAR MIDSHIP TO EXIT WIRE



SA 1133 SO  
GULFSTREAM AMERICAN AND AEROSPACE (AMERICAN GENERAL)  
AA-5, -5A, -5B, AG-5B

Easiest and most rapid means of routing wire is to remove the wing tip and pass wire down leading edge of wing through the wheel well laced to the exist's wire bundle and into cabin to indicator.  
Center cut-out hole in the 4th "bay" as shown. Hole dim. 2"x6".

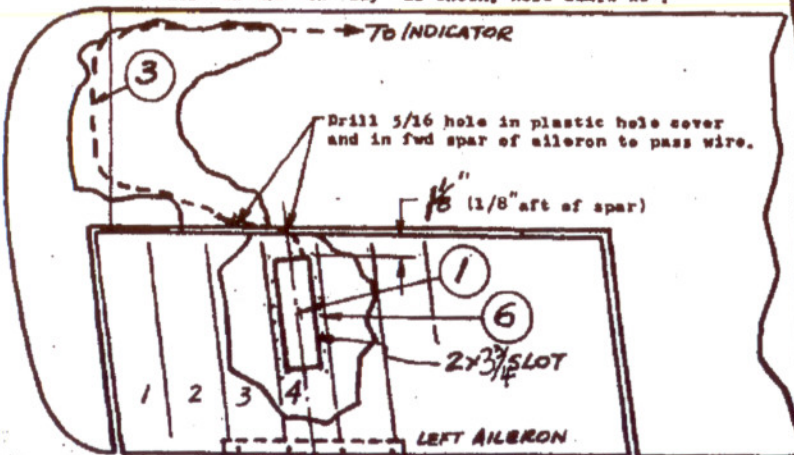


FIG. 18  
6  
APPROX 14 1/2  
Center in 4th bay.  
STC SA 1245 SO  
ROCKWELL-COMMANDER 112, 112B, 112TC, 112TCA, 114, 114A

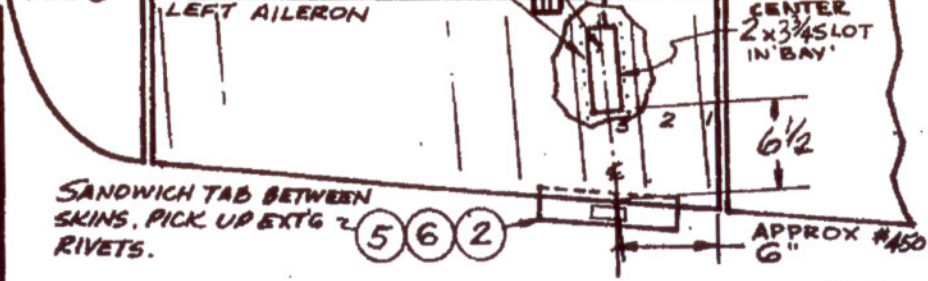
### STRAIGHT TAIL RUDDER INSTALLATION



BEECHCRAFT Straight tail models 33, 36 RUDDER TRIM ONLY  
FIG. 17 STC SA 1836 SO No RUDDER TRIM FOR V-TAILS

NOTE: THE SERVO OVERSPANS THE CORRUGATIONS IN BONANEE AILERONS A SLIGHT AMOUNT. INSTALLER HAS THREE CHOICES: 1. REMOVE ABOUT 3/64 MATERIAL FROM EACH SIDE OF THE SERVO BASE PLATE. 2. FAIR IN WITH EPOXY PUTTY. 3. LEAVE AS IS AS IT IS NOT VERY OBVIOUS.

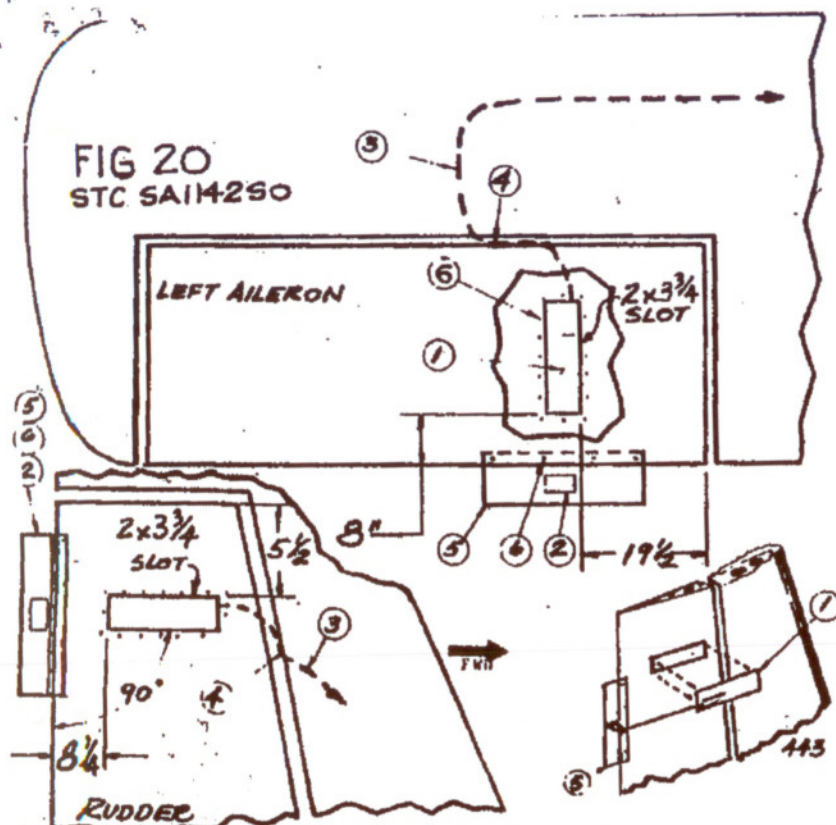
### AILERON TAB FOR BOTH V-TAIL & STRAIGHT TAILS



BEECHCRAFT For Aileron Trim Only V-TAILS  
FIG. 19  
AERO-TRIM, INC.  
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(305) 864-3336  
STC SA 1210 SO -AILERON TRIM  
STC SA 1211 SO -AILERON TRIM  
STRAIGHT TAILS  
No RUDDER TRIM FOR V-TAILS



FIG 20  
STC SAI14250



LAKE AMPHIBIANS Aileron and/or Rudder Trim

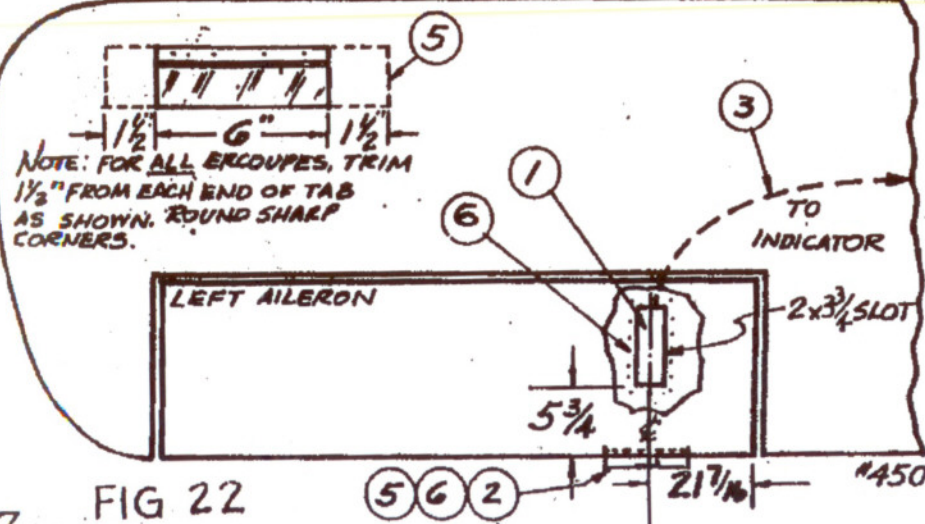


FIG 22

ERCOPE, FORNEY, ALON  
STC SA12875A  
SA 12875A

The installer will note how one rib is removed to provide a flat surface for the servo. The slot size and doubler detail and servo installation is identical on both aileron and rudder. Route wire best and most rapid way.

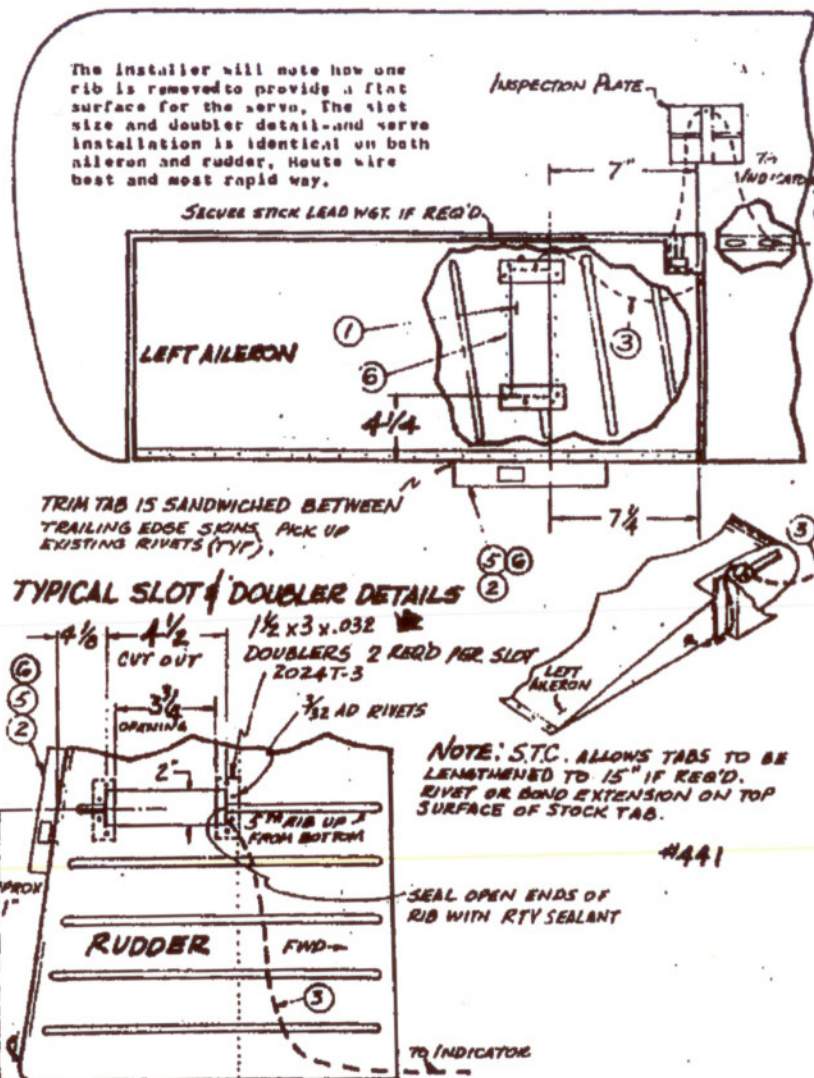


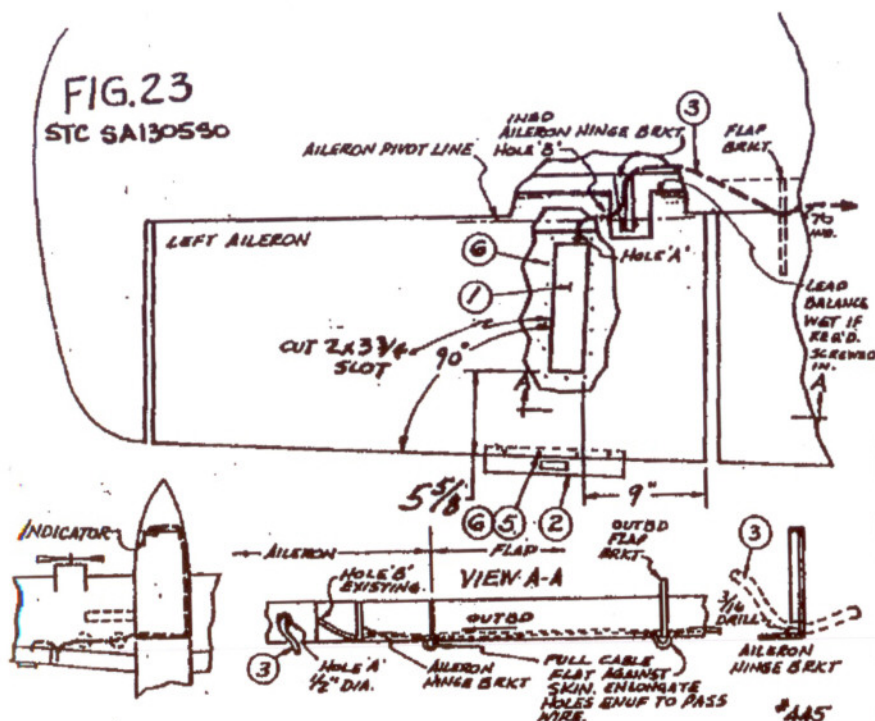
FIG. 21

NAVION Aileron and/or Rudder Trim  
STC SA121950

AERO-TRIM, INC.  
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(305) 864-3336



FIG.23  
STC SA130590



Run the cable from the panel down the right side of the cabin underneath the trim panel to the aft bulkhead behind the rear seats. Pass the cable across the bulkhead under the trim down into the wheel-well. Remove bolt from hydro cylinder to lower gear door. Tie cable to existing wire bundle and then thru' 2 inspection holes, out into the wing.

Elongate holes around the flap brkt. and sheet metal joints as shown in View A-A. Pull cable tight to flush up to skin. Hole "B" is on pivot line. Hole "A" is enlarged enuf to fish wire.

ABROSTAR

AERO-TRIM, INC.  
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#452

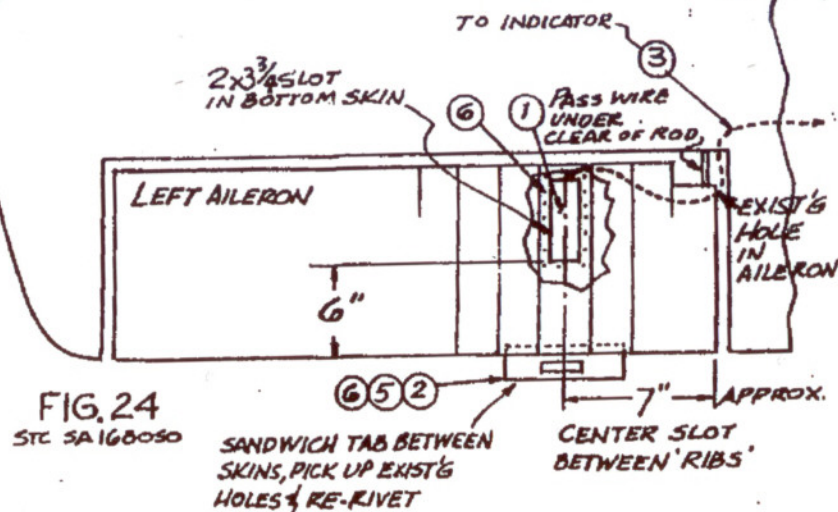


FIG.24  
STC SA160050

BEECH models 19, 23, 24.

#453

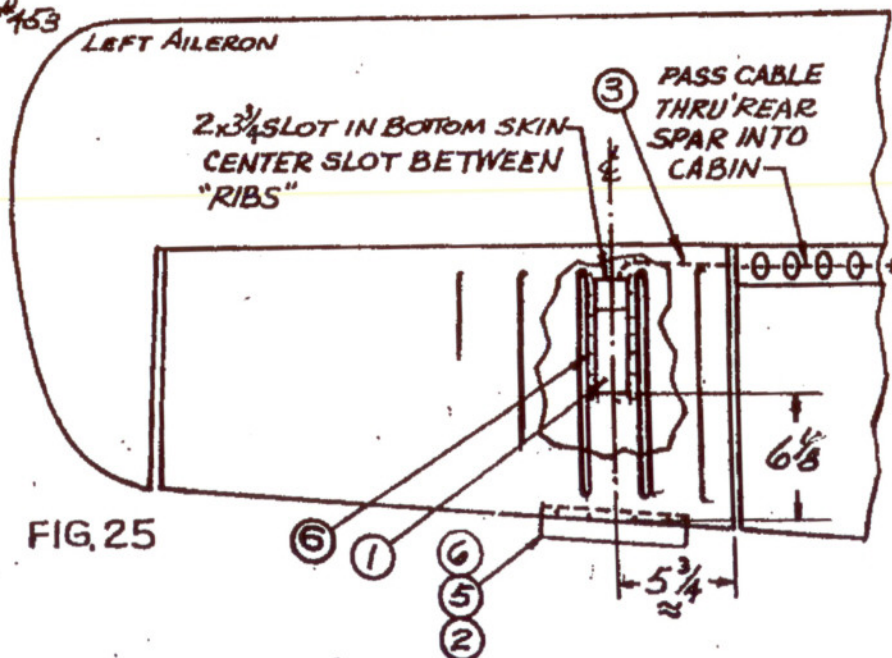


FIG.25

PIPER PA32-301, 32-301T, 32R-301, 32R-301T, SA1892.50  
PIPER PA-44-180, -180T STC SA2884.50



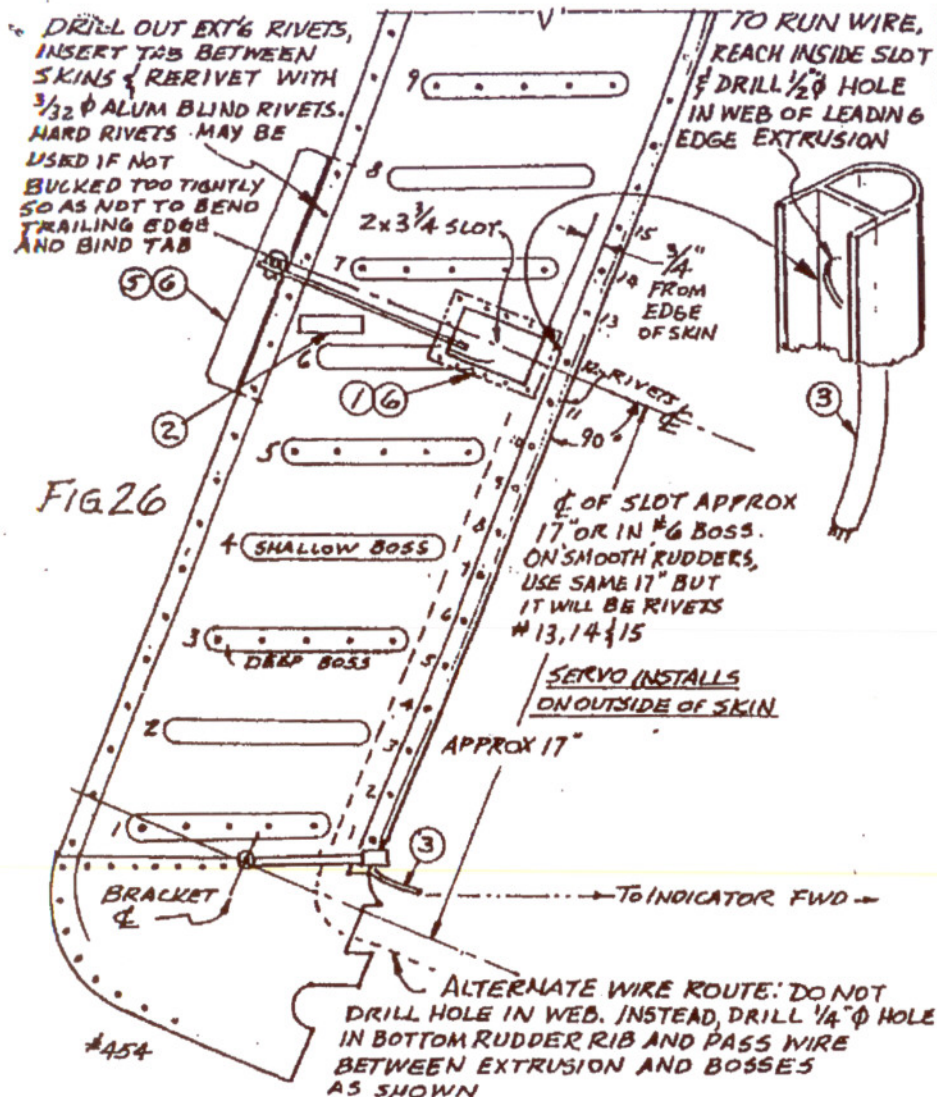


FIG.26

THIS TEMPLATE MUST BE MADE AND USED FOR PROPER INSTALLATION

STC SA2330 SO

MOONEY-Rudder Trim Only

VERO-TRIM, INC.  
1130 102 Street  
Bay Harbor, FL 33154  
(305) 864-3336

MAKE THIS CARDBOARD TEMPLATE AND POSITION IN SLOT AREA TO CONFIRM SLOT CUTOUT BEFORE CUTTING SKIN. ALL CORNERS MUST BE INSIDE FLAT AREA AS SHOWN

2 $\frac{3}{8}$ "

2"

3 $\frac{3}{4}$ "

4 $\frac{7}{16}$ "

FIG.27

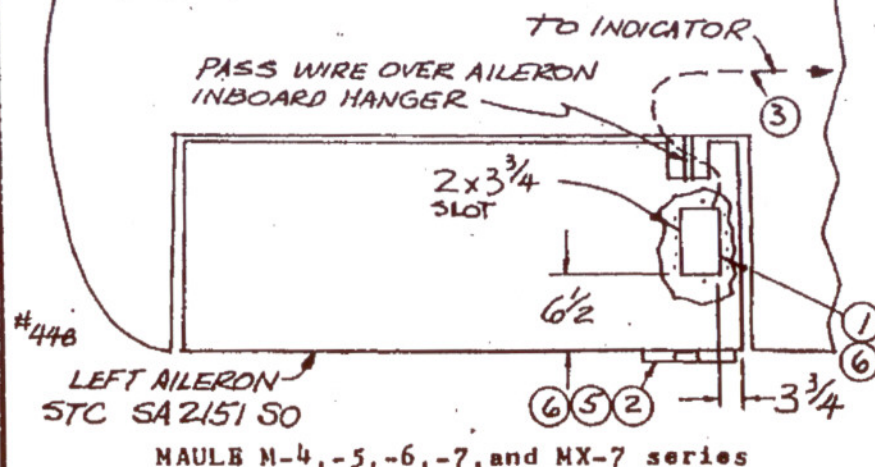
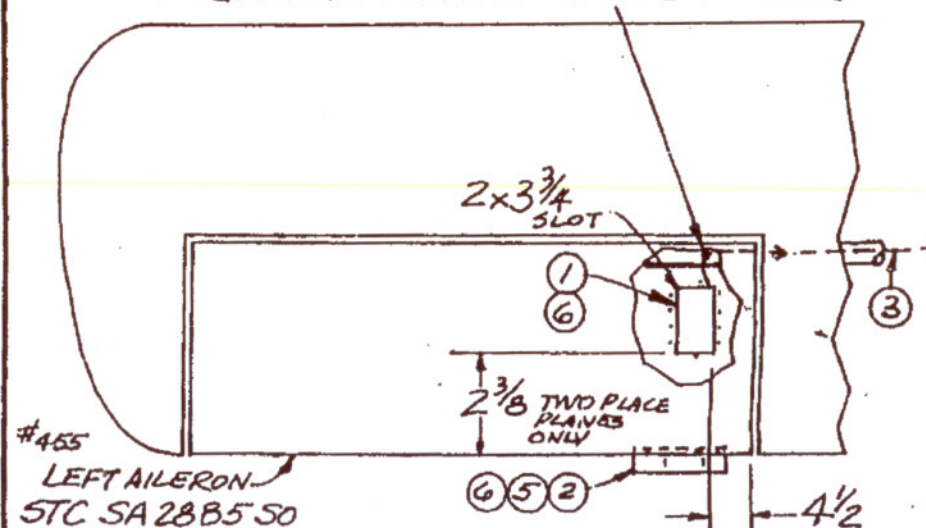


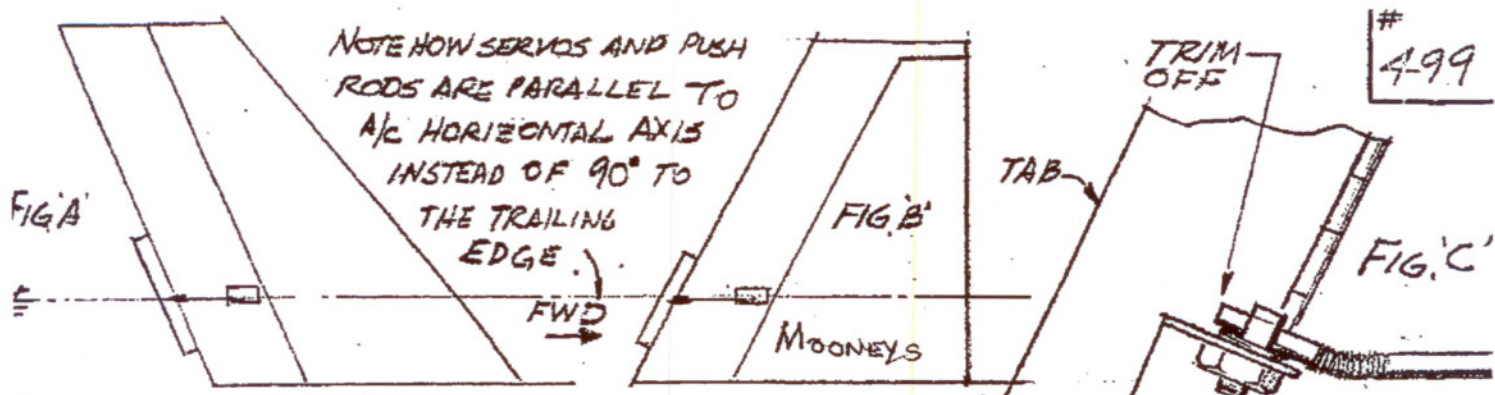
FIG.28 ROUTE WIRE THRU  $\frac{1}{4}$ "  $\phi$  HOLE DRILLED IN TORQUE TUBE THEN INTO CABIN AND INDICATOR



GULFSTREAM AEROSPACE (YANKEE) AA-1, -1A, -1B, -1C



# 499



INSTALLATION: FASTEN SERVO WITH SPRING CLIPS TEMPORARILY. INSTALL TAB AND -1 ROD PER FIG. C: CLAMP TAB IN STREAMLINED POSITION AND MARK PUSH ROD FOR CUTOFF. INSERT ROD IN EITHER SPRING OR TUBE, WITH EPOXY. NOW FASTEN SERVO PERM. WITH 3/32 POP RIVETS.

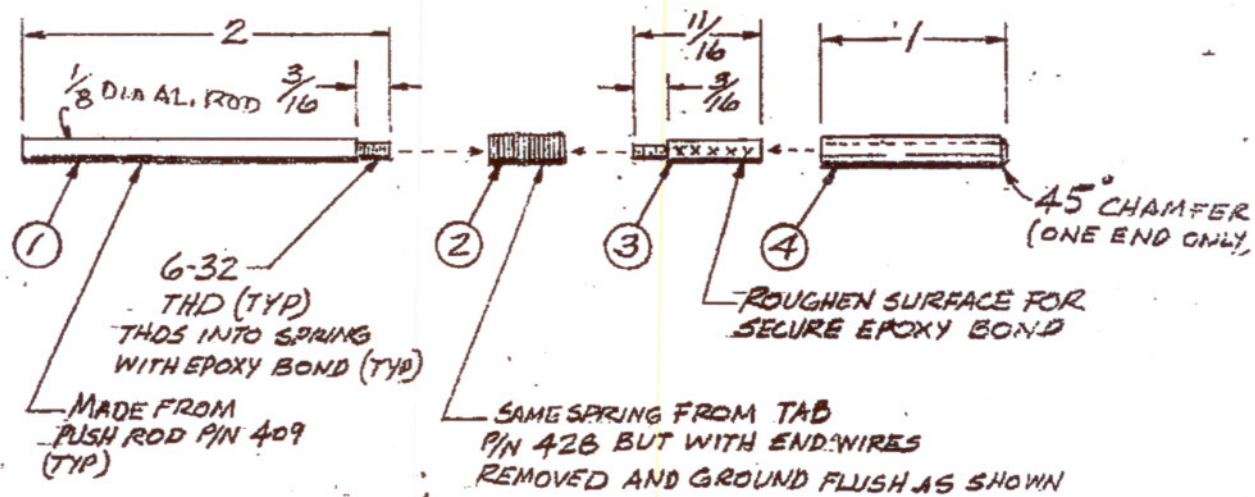
EXISTING PUSH ROD FROM SERVO TRIMMED TO LENGTH, ROUGHENED AND EPOXIED IN PLACE WITH TAB IN STREAMLINED CONDITION

THIS END CLAMPS INTO BUG SCREW IN 426 AND TRIMMED OFF PER STD INSTALLATION SEE FIG. C

### THE ASSEMBLY

WITH ALL PARTS EPOXIED IN PLACE

INSERT 1/2" IN TUBING OR 3/16" INTO SPRING.



NOTE 1. AS AN OPTION, PARTS 3 & 4 (THE TUBING), MAY BE ELIMINATED IN FAVOR OF THREADING THE EXISTING PUSH ROD FROM THE SERVO. TO MATCH - 3

NOTE 2: THIS UNIVERSAL FEATURE IS TO BE USED WHEN AERODYNAMICS OR AESTHETICS ARE OF CONCERN. OLD INSTALLATION (90° TO TRAILING EDGE) IS ARTISTICALLY OFFENSIVE TO SOME OWNERS.

item	qty	part#	description
4	499.4		TUBING (FROM HOBBY SHOP)
3	499.3		ADAPTER ROD
2	499.2		SPRING P/N 428
1	499.1		CLAMP ROD
title PUSH ROD UNIVERSAL JOINT FOR RUDDERS			
mat'l MADE FROM P/N 409.			
date	4-1-95	scale	FULL
tolerances	dec ± .005	frac ± 1/64	next assy
aero-trim, inc.			# 499