A/S

United States of America
Department of Transportation—Federal Aviation Administration

Supplemental Type Certificate

Number SA3145SO

This certificate issued to Aero-Trim, Inc.
1130 102 Street
Bay Harbor, FL 33154

certifies that the change in the type design for the following product with the limitations and conditions thereto as specified hereon meets the airworthiness requirements of Part 3 *of the* Civil Air Regulations.

Original Product—Type Certificate Number: 2A3
Make: Mooney
Model: M20 Series

Description of Type Design Change:
Provides an approved procedure for applying Aero-Trim Aeroseal, part no. 500 externally to wing skin seams of fuel tanks to stop seepage from micro leaks up to .005 inches wide.

Limitations and Conditions:
This approval should not be extended to other aircraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the interrelationship between this change and any of those other previously approved modifications will produce no adverse effect upon the airworthiness of that airplane.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: December 23, 1991 *Date issued:*

Date of issuance: February 5, 1992 *Date amended:* February 20, 1992

By direction of the Administrator

John Tigue (Signature)
Manager, Atlanta Aircraft Certification Office (Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

FAA Form 8110-2 (10-65)

Enclosure

Parts Manufacturing Approval Listing

Supplement No. 3 to Parts Manufacturer Approval Letter

Dated April 17, 1989

Federal Aviation Administration

FAA - Approved Design Data	Approved Replacement for Modification Part	FAA Design Approval Means	Installation Eligibility
Aero-Trim Aeroseal P/N 500 No Rev. dtd 1/17/92 or later FAA revision		STC SA3145SO dated 2/5/92	Mooney M20 Series

(END OF LISTING)

P. E. Littleton

P. E. Littleton
Manager, Miami MIDO
March 11, 1992

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 IF 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", USM AD32ABS. 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 #6-32x¼.
- 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.

AIL TRM

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 AILERON 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 1½ 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(ailerons 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 ½" 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. Overtightening will break the screw.
11. Trim off excess push rod about 1/8" past the bug screw. File cut end smoo

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 2⅛" 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 HOOK-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 of 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 if fully certified and approved by the FAA and is manufactured by AeroTrim, Inc. under strict FAA-PMA regulations.

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.

EMERCENCY 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.

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STC LIST

SA1291SO Cessna 140A
SA1292SO Cessna 150,A,B,C,D,E,F,G,H,J,K,L,M,A150K,A150L,A150M,152,A152
SA1293SO Cessna 170A,170B
SA1294SO Cessna 172,A,B,C,D,E,F,G,H,I,K,L,M,N,P
SA1295SO Cessna 172RG,P172D,R172E,R172F,R172G,R172H,R172J,R172K,175,A,B,C
SA1140SO Cessna 177,177A,177B
SA1132SO Cessna 177RG
SA1296SO Cessna 180,A,B,C,D,E,F,G,H,J,K
SA1297SO Cessna 182,A,B,C,D,E,F,G,H,J,K,L,M,N,P,Q,R,R182,T182,TR182
SA1298SO Cessna 185,A,B,C,D,E,A185E,A185F
SA1157SO Cessna 206
SA1019SO Cessna 210
SA1170SO Cessna 336
SA1166SO Cessna 337,A,B,C,D,E,F,G,H,T337B,C,D,E,F,G,H
SA1044SO Piper PA23-160,PA23,PA23-235,250
SA1045SO Piper PA24-180,250,260
SA1216SO Piper PA28-140,150,160,180,235,PA28S-160,180,PA28-R180,PA28-R200
SA1046SO Piper PA28-151,161,181,RT-201,RT-201T,28R-201T,28-R201,28-236
SA1090SO Piper PA30,39
SA1026SO Piper PA32-260,300,R-300,S300,RT300,300T
SA1892SO Piper PA32-301,301T,R-301,R301T
SA1217SO Piper PA34-200,200T
SA1111SO Mooney M20B,C,D,E,F,G,J,K,
SA1204SO Mooney M22
SA1680SO Beech 19A,B19,M19,23,A23,A23A,A23-19,A23-24,B23,A24,A24R,B24R,C24R
SA1210SO Beech V-tails 35,A35,B35,C35,D35,E35,F35,G35,35R
SA1211SO Beech V-tails H35,J35,K35,M35,N35,P35,S35,V35,V35A,V35B
SA1836SO Beech Straight tails 35-33,35-A33,35-B33,35-C33,35-C33A,E33,E33A,E33(
rudder trim E33A,E33C,F33,F33A,F33C,G33,36,A36,A36TC,B36TC
SA1133SO Gulfstream American AA-5,AA5A,AA5B
SA1245SO Rockwell Commander 112,112B,112TC,112TCA,114,114A
SA1288SO Ercoupe 415C,415CD
SA1287SO Ercoupe,Forney,Alon Ercoupe 415D,E,G,ForneyF-1,F-1A,Alon A-2,A2-A
SA1219SO Navion A,B,C,D,E,F,G,H, for both Aileron and Rudder
SA1305SO Aerostar 600,601,601P,602P,Piper PA60-600,601,601P,602P
SA1142SO Lake LA-4,4A,4-200 for both aileron and rudder
SA2071SO Piper PA24-400
SA2151SO Maule M-4,-5,-6,-7,and MX-7 Series
SA2330SO 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 relevel 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 relevel the wings to compenstate 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!

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