THIS BULLETIN IS FAA APPROVED FOR ENGINEERING DESIGN

SERVICE BULLETIN M20-293
Issue Date: JANUARY 18, 2007

SUBJECT: INSPECTION OF EATON ELECTRIC GEAR ACTUATORS

REVISION: Serial Number Identification for EATON Actuators:
1.) Mooney P/N 560264-507 (EATON MFG. P/N 102000-7 S/N’s 2043 thru 2164)

MODELS S/N AFFECTED:
Mooney M20TN series aircraft: 31-0002 thru 31-0011

TIME OF COMPLIANCE: Within next 10 hours of operation

INTRODUCTION: There has been reported instances, discovered in the Mooney factory, the EATON Actuator Mfg. P/N 102000-7 (serial number range 2043 thru 2164) malfunctioning. These actuators were found to possibly have “Dead Spots” on the commutator, and/or interference problem between the brush lead and capacitor lead. This occurrence will not allow the brush assembly to make contact with the commutator, no electrical actuator movement. All Aircraft with the specified EATON Mfg. lot numbers will require the inspections to be done in accordance to this Service Bulletin. Failure to comply with this Service Bulletin could result in failure of the landing gear to retract or deploy (electrically). If this occurs manual extension will be required.

INSTRUCTIONS: Read entire procedure before beginning work.

1. Place the aircraft on jacks in accordance with applicable Service & Maintenance Manual, Section 7-10-00.
2. Remove belly panels.
3. Remove Actuator from the aircraft per applicable Service & Maintenance Manual Section 32-30-05
4. Mark housing and end cap (with scribe or permanent marker for correct orientation of housing during reassembly (ref. Figures M20-293-1). Note: Failure to correctly install housing and end will result in motor running in opposite direction.
5. Remove tamper sealant and (2) screws securing motor housing to base with a 5/16 nutdriver. Keep washers with screws when removing (ref. Figures M20-293-1).
6. Separate motor from actuator by pulling motor assembly out carefully. The front bearing cup may try to dislodge when removing assembly, if this occurs, seat cup seal back in base cap bearing bore with bearing cup outward and seat evenly (ref. Figures M20-293-2).
7. Separate end/rotor from housing by pulling apart carefully (ref. Figures M20-293-2). The housing contains magnets that will try to stick to the rotor when separating.

-CAUTION-
DO NOT SEPARATE ROTOR FROM END, BRUSH DAMAGE COULD OCCUR.

8. Visually inspect for the following:
   a.) Inspect for wire attaching points to commutator (ref. Figures M20-293-3), if problem is found return motor to Mooney Airplane Company, a new motor will be shipped to you.
b.) Inspect Capacitor wire lead preventing brush from moving (ref. Figures M20–293–4). If problem is found, adjust capacitor wire so it does not interfere with brush wire lead (ref. Figures M20–293–5). Check for full movement “in and out” and the contact of brushes to commutator (ref. Figures M20–293–6).

9. If unit passes all inspections or adjustment is made to capacitor lead, reassemble by placing the housing over the end/rotor and slide into place. Then assemble the motor housing onto the base. The end and housing assembly may have to be turned slightly to line-up motor shaft slot into place. Re-install screws with hardware, align marks indicated on housing and end assembly, tighten to “snug fit” (ref. Figure M20–293–6).

-CAUTION-

CAUTION: DO NOT OVER TIGHTEN SCREWS, failure of aluminum threads in the end piece could result. If this occurs the motor will have to be returned to Mooney Airplane Company for a replacement part.

11. Bench test unit by applying 24VDC and verify the following:
   a.) Ballscrew rotates counterclockwise when commanded to retract (negative to black wire and positive to yellow wire).
   b.) Motor no-load current does not exceed 5A

12. Apply tamper seal (torque seal) to (1) mounting screw. Inscribe using a vibrating pencil to permanently mark “MI” (Motor Inspected) next to the date code on the motor housing (ref. Figure M20–293–7).

13. Re-Install actuator assembly in accordance with procedures in the applicable MAC Service & Maintenance Manual, Section 32–30–05

14. Verify rigging is in accordance with procedures in the applicable MAC Service & Maintenance Manual, Section 32–30–00

15. Re-Install aircraft belly panels.

16. Static test while the aircraft is on jackstands and “conduit at least five complete retraction/extension cycles to verify correct operation of the actuator.”


18. Return aircraft to service.

Procedure complete.

WARRANTY: Mooney Airplane Company, Inc. recommends that the effected aircraft be taken to an authorized Mooney Service Center for removal of the actuator for inspection.

a.) MAC will warrant labor approximately 3 hours when all procedures completed in accordance of this Service Bulletin.

REFERENCE DATA: MAC Service & Maintenance Manuals (applicable A/C) Chapter 7 and 32

PARTS LIST: Motor P/N C145–350 (only if inspection finds faulty motor)
Loosen & remove screws with 5/16 nutdriver

Remove tamper Seal on screws

Mark housing and end cap of motor

Figure SB M20-293-1 - Before Removal of Motor
Slide commutator/housing out. If bearing cup dislodges, place cup back into base bearing bore and push into place. Note: bearing side of cup when replacing.

Carefully slide end/rotor out of housing for inspection.

Figure SB M20-293-2 - Disassemble Commutator and Housing
Inspect commutator for any “Dead Spots” or “Broken Circuits”.

Figure SB M20-293-3 - Inspect Commutator

Inspect brush lead and capacitor lead for any interference. Capacitor lead may not allow brush lead to travel inward, to make contact with commutator.

Figure SB M20-293-4 - Inspect Brush Lead for Interference
Move capacitor lead away from brush lead to prevent any interference with in & out movement.

Figure SB M20-293-5 - Separate wire leads to allow movement of Bush
Check for brush contacting commutator

Move rotor side to side, verify both brushes move freely and contacts commutator.

Figure SB M20-293-6 - Correct Contact of Brushes to Commutator
Inscribe “MI” (Motor Inspected) on motor with electric pencil

Install and tighten screws to a snug fit

**CAUTION:**
Over tightening screws will result in stripping threads in aluminum base

Apply tamper seal (1) screw

Figure SB M20-293-7 - Final Assembly and Identification Mark