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SERVICE BULLETIN M20-279 REVISION C

Date: September 11, 2002

SUBJECT: Mooney Aircraft Corporation, Inspection of EATON and AVIONIC PRODUCTS Landing Gear Actuators, MAC P/N 560254-501, -503, -505, And -507, (EATON and AVIONIC PRODUCTS P/N 102000-1, -2, -3, -4, -5, and -7 Landing Gear Actuators).

MODELS/ S/N AFFECTED: **Rev. C: Revised FAA Approved Statement & Revised S/N Effectivities**
-M20C – S/N 20-1147 through 20-1185 and 20-0010 equipped with AVIONIC PRODUCTS or EATON P/N 102000-1, -2, -3, -4, -5, or -7 Landing Gear Actuator per MAC Drawing 940007 “Retrofit, Avionic Products/Plessey Electric Gear Actuator”.
-M20E – S/N 21-1161 through 21-1180 and 21-0038 equipped with AVIONIC PRODUCTS or EATON P/N 102000-1, -2, -3, -4, -5, or -7 Landing Gear Actuator per MAC Drawing 940007 “Retrofit, Avionic Products/Plessey Electric Gear Actuator”.
-M20F – S/N 22-1179 through 22-1291 except 22-1246, and 22-1293 through 22-1305 equipped with AVIONIC PRODUCTS or EATON P/N 102000-1, -2, -3, -4, -5, or -7 Landing Gear Actuator per MAC Drawing 940007 “Retrofit, Avionic Products/Plessey Electric Gear Actuator”.
-M20J – S/N 24-0001 and ON equipped with AVIONIC PRODUCTS or EATON P/N 102000-1, -2, -3, -4, -5, or -7 Landing Gear Actuator.
-M20K – S/N 25-0001 and ON equipped with AVIONIC PRODUCTS or EATON P/N 102000-1, -2, -3, -4, -5, or -7 Landing Gear Actuator.
-M20L – S/N 26-0001 through 26-0041 equipped with AVIONIC PRODUCTS or EATON P/N 102000-1, -2, -3, -4, -5, or -7 Landing Gear Actuator.
-M20M – S/N 27-0001 through 27-0316 equipped with EATON P/N 102000-5, or -7 Landing Gear Actuator.
-M20R – S/N 29-0001 through 29-0279 equipped with EATON P/N 102000-5, or -7 Landing Gear Actuator.
-M20S – S/N 30-0001 through 30-0061 equipped with EATON P/N 102000-5, or -7 Landing Gear Actuator.

TIME OF COMPLIANCE: **ONE TIME INSPECTION AT NEXT SCHEDULED MAINTENANCE, NOT TO EXCEED 100 FLIGHT HOURS**

INTRODUCTION: Mooney Aircraft received a report concerning failure of a landing gear actuator. This failure rendered the landing gear **inoperative** in both normal and emergency modes. Mooney Aircraft directs that all effected aircraft comply with EATON SERVICE INSTRUCTION SI102000-1-901 (Enclosure 1), which outlines the one time only inspection procedures to be performed and action taken, if necessary.

INSTRUCTIONS: **NOTE 1:** Prior compliance with this Service Bulletin can be verified by inspection of the unit Data Plate verifying the presence of the letters “NB” stamped in the upper right hand corner.
NOTE 2: If it can be verified by logbook entry or aircraft inventory records that the aircraft does not have one of the landing gear actuators installed as referenced above, proceed to step 9 and comply with steps 9 and 11 only. Logbook entry should state “ Complied with MAC Service Bulletin M20-279 of 4 Sept. 2001. Verified by document inspection that landing gear actuator was of a part number not affected by SB M20-279.” If verification is not possible, proceed to step 1.

1. Place aircraft on jacks.
2. Remove the one piece belly skin on M20C, E, F, J and K aircraft, and the forward belly skin on M20M, R and S aircraft.
3. Refer to the applicable MAC Service & Maintenance Manual, SECTION 32-30-0 to locate landing gear actuator. Check part number to see if actuator is referenced by this Service Bulletin. If not, proceed to steps 8, 9, and 11.
4. Refer to the applicable MAC Service & Maintenance Manual, SECTION 32-30-05 on procedures for removing and installing the actuator. (MAC SI M20-52, Revision A or B can also be referred to for removal and installation of the actuator), and remove actuator.
5. Comply with Enclosure 1 (EATON SERVICE INSTRUCTION SI102000-1-901).
6. Re-install actuator in accordance with procedures in the applicable MAC Service & Maintenance Manual, SECTION 32-30-05. Verify Landing Gear Rigging and proper operation is in accordance with all of SECTION 32-30-00 procedures.
7. Test landing gear operation by cycling gear several times. Allow @ 1 minute between cycles to avoid overheating motor.
8. Remove electrical power, reinstall belly skins per MAC Service and Maintenance Manual, and remove aircraft from jacks.
9. Return aircraft to service after Logbooks entries have been completed.
10. Perform functional test flight to ensure normal landing gear and warning system operation (extension and retraction). Perform tests in both normal and emergency extension modes.
11. Add CAUTION note to the aircraft POH per the instructions in Paragraph II of this bulletin.
12. No further action is required after compliance with this one time Service Bulletin.

NOTE: While EATON 102000 Landing Gear SERVICE INSTRUCTION SI102000-1-901 of September 24,2001 only recommends replacement of the Clutch (No-Back) Spring if the aircraft is approaching 1000 hours since compliance with MAC Service Instruction M20-52, Mooney Aircraft Corporation recommends replacement of the spring while the actuator is disassembled. MAC is supplying (1) Eaton P/N 203207-1 Clutch (No-Back) Spring to be installed at the time of compliance of this SB. The installation of the new Clutch (No-Back) spring in conjunction with compliance with this SB fulfills the 1000 hour inspection requirement set forth in MAC Service Letter 98-2 Revision A or B, MAC Service Instruction M20-52 Revision B, or MAC Service Bulletin M20-266A Revision A dated 1December, 1998. This Service Bulletin does not supercede, cancel, or modify in any way SUBSEQUENT required 1000 hour inspections. Compliance with the above referenced ServiceBulletin/Letter will be due 1000 hours from the time of compliance with SB M20-279.

WARRANTY: Mooney Aircraft Corporation recommends that the effected aircraft be taken to an authorized Mooney Service Center for removal, inspection, installation, testing and documentation. It is estimated that compliance with this Service Bulletin should take no longer than 5.5 man hours. Service Bulletin compliance performed in conjunction with other maintenance actions should reflect a corresponding decrease in billable hours. At this time, Eaton Corporation intends to provide the 1020MODKIT-1 parts kit to the customer through Mooney Aircraft Corporation Parts Department.

REFERENCE DATA: Enclosure 1: EATON 102000 Landing Gear SERVICE INSTRUCTION SI102000-1-901 of September 24, 2001.

PARTS LIST: KIT: (1) P/N 1020MODKIT-1; (1) P/N 203207-1 Spring, (No-Back) Clutch

FIGURE/TABLES: Reference Enclosure 1

- II. Cut along outline, punch holes and place in AIRPLANE FLIGHT MANUAL, Section 7, LANDING GEAR, as page facing **WARNING SYSTEM** paragraph:

MOONEY
M20C/E/F/J/K/L/M/R/S

SECTION VII
AIRPLANE AND SYSTEM DESCRIPTION

Addendum to: **LANDING GEAR**

WARNING SYSTEM

~~~~~  
~CAUTION~  
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The absence of any of the above described indications in their Normal sequence may represent a potential failure in the Landing Gear or Indicator system. The floor mounted visual gear position Indicator presents a mechanical indication of gear status. The Visual gear position indicator shall be verified to be in the **DOWN** Position (indicator marks aligned with the word **DOWN** fully visible) prior to **ALL** landings.

Issued 09-01

SERVICE BULLETIN M20-279

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102000 Landing Gear Actuator

SERVICE INSTRUCTION

Document No.	SI102000-1-901 Rev. 2
Subject:	Landing Gear Actuator No-Back Inspection
Date:	April 3, 2003

NOTE: This document supersedes SI102000-1-901, Rev. 1 issue date of October 29, 2002.

Eaton Aerospace has received notification of a recent malfunction of the no-back clutch assembly within the landing gear actuator. Although it is believed that the no-back clutch malfunction was an isolated incident, it is recommended that the no-back clutch assembly be removed and inspected before the next 100 flight hours per the Mooney Service Bulletin. Malfunction of the no-back clutch assembly may prevent the landing gear from actuating either electrically or manually.

MODELS AFFECTED: All Mooney M20 series aircraft with the Eaton or Vickers electrical landing gear actuator.

TIME OF COMPLIANCE: Per Mooney Service Bulletin, before next 100 flight hours. Eaton considers this Service Instruction to be MANDATORY. **WARNING: FAILURE TO COMPLY MAY RESULT IN DAMAGE TO AIRCRAFT AND POSSIBLE PERSONAL INJURY.**

Note: If the aircraft has 1000 HRS. time in service since compliance with Mooney Service Instruction M20-52, it is recommended that it be complied with in conjunction with this Service Instruction.

INSTRUCTIONS

DISASSEMBLY OF ACTUATOR:

(Refer to figure 1)

1. Remove the two long screws(item 3) and two short screws (item 4) securing the recoiler assembly to the actuator.
2. With the four screws removed, separate the recoiler assembly (item 5) and the no-back clutch housing mount (item 5A).

NOTE: Care should be taken not to allow bearings or shims to drop out of the clutch housing mount assembly. If bearing and shims should fall out, ensure all shims are reinstalled in bearing recess and bearing reinstalled over the shims.

3. Remove input gear assembly (item 6) by pulling with slight force.
4. Remove two screws (item 7) securing the clutch housing(item 8), remove the clutch housing and no-back spring (item 9). Remove the output gear assembly (item 10).

No-Back Clutch Inspection:

(Refer to figure 2)

NOTE: Loosening of set screws and disassembly of input hub and gear shaft will require the application of heat to reduce the bond of Loctite 609. Apply heat to parts being disassembled using a heat gun or suitable substitute. Parts need to be heated to a temperature of 450 degrees Fahrenheit to soften the bond of the Loctite 609.

5. Remove input hub from input gear shaft by loosening the two set screws. Note the location and quantity of shims and reinstall upon reassembly.
6. Clean and inspect the parts, Replace any parts with damage.
7. Index mark the location of the two machined flats of the gear shaft onto the shaft shoulder next to the gear by applying a small dot of paint, refer to figure 2.

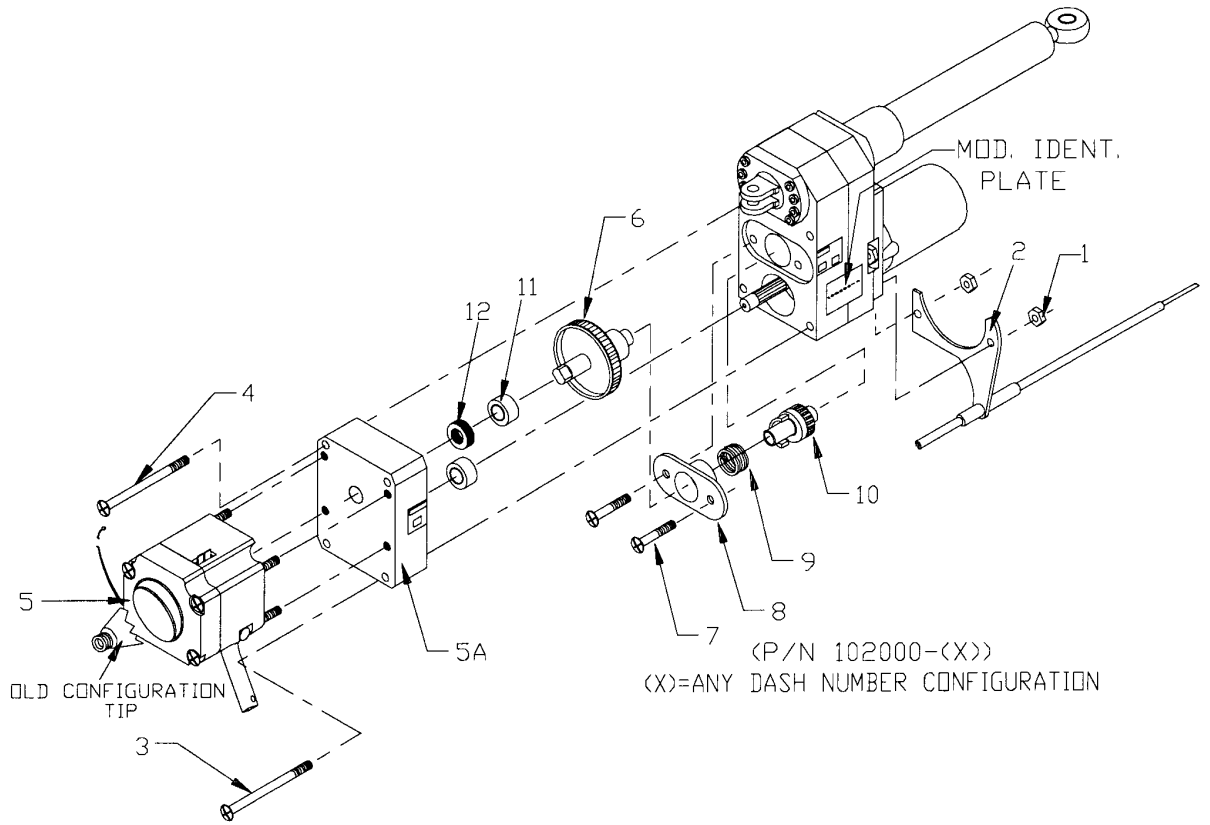
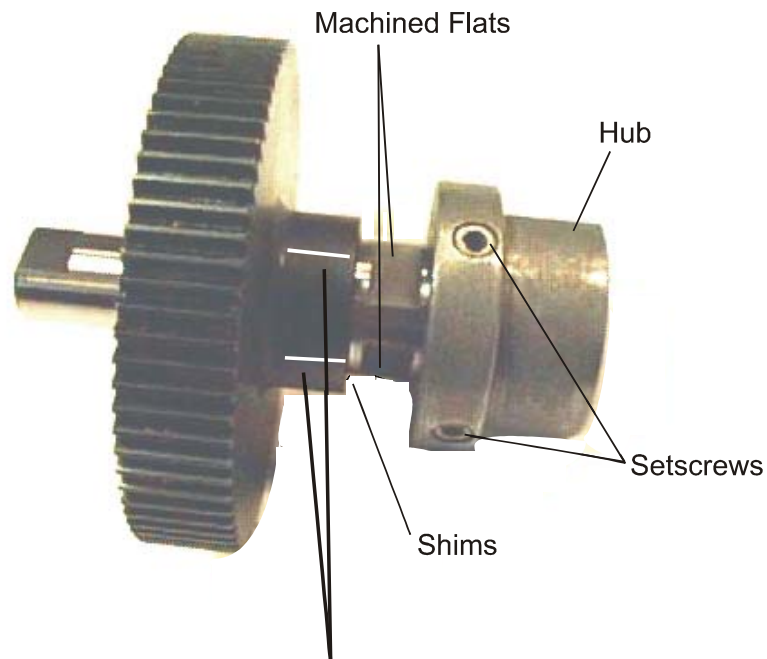


Figure 1.



Scribe Alignment Marks To Indicate Position of Both Machined Flats of Input & Output Gears in relation to Setscrews

Figure 2.

Reassembly:

8. Wash all no-back clutch parts in acetone prior to reassembly. An oil free surface must exist for the proper adhesion of the loctite product.
9. Reinstall shims (as removed) onto input gear shaft and apply a liberal coating of loctite 609 to the gear shaft area of hub contact. Reinstall hub aligning the set screw holes with the index marks. Ensure the hub is seated firmly against the shims and gear shaft shoulder. Apply loctite 609 to set screws and reinstall, tighten set screws ensuring that they are fully seated on the gear shaft flats. Torque Set screws to 5 to 8 inch pounds.
10. Repeat steps 8 through 9 for the no back clutch output gear.

Note: Loctite must cure per Loctite 609 spec. before applying any grease to parts. A minimum 24 hour cure time is recommended.

Actuator Reassembly:
(Refer to figure 1)

11. Verify set screw alignment with index marks. Apply a thin film of MIL-G-81322 grease to the inside diameter of the no-back housing (item 8) and to the inside of the no-back spring (item 9). Apply a thin film of MIL-G-81322 grease to both gears, hubs and shafts.

Note: Do not apply grease to the inside diameter of the input gear.

12. Install the output gear assembly (item 10) into the no-back housing (item 8) and rotate the gear to position the notches in the hub to index with the offset tangs on the spring (item 9).

Note: Verify proper assembly by temporarily inserting the input gear into the no-back housing and engaging the hub notches with the spring tangs. Rotation in either direction of the large input gear should result in rotation of the smaller output gear.

13. Install the output gear, spring and housing back into the actuator body by mating the output gear to the output gear train. To engage gear teeth and fully seat shaft pilot into bearing, rotation of the gear assembly may be required.
14. Reinstall the two screws (item 7) securing the clutch housing (item 8) into the actuator body, use loctite on screw threads and tighten securely.
15. Insert the input gear and hub assembly (item 6) into the clutch housing and rotate to engage hub notches into clutch spring tangs. Verify that rotation of input gear both clockwise and counter clockwise results in movement of the jackscrew.
16. Record the impression stamped information from the data plate. Remove the data plate, and the clutch housing mount assembly (item 5A) from the recoiler assembly (item 5). Do not allow the bearing or shims (items 11 & 12) to drop out of the housing mount assembly.
17. Install the housing mount assembly (item 5A) and tighten the housing screws. Check the rotational torque of the no-back clutch drive with a modified socket and torque wrench, rotational torque should be no greater than 4 inch pounds in both directions. The objective is to remove endplay without applying a preload on the bearings.

18. If rotational torque is greater than 4 inch pounds, remove housing mount(item 5A) and remove the least amount of shims (item 12) necessary to obtain proper rotational torque. Shims are installed under the bearing (item 11) within the housing mount assembly (item 5A). Three different thickness of shims are available, and any combination of these three are allowed to achieve proper rotational torque of the input gearshaft with the housing mount installed and torqued.

Available shims: P/N 110117-1...0.003 in.
 P/N 110117-2...0.005 in.
 P/N 110117-3...0.010 in.

19. When correct rotational torque has been obtained, reinstall the recoiler assembly (item 5).

Note: Flats on gear shaft (item 6) must line up with the recoiler brass manual drive clutch for proper assembly. Slightly pull manual drive cable to obtain alignment.

20. Install four new bolts (item 3) and (item 4), torque bolts to 20-25 inch pounds.
21. Reinstall cable support bracket and secure with lock nuts (item 6) and torque to 20-25 inch pounds.
22. Transfer the information from the old data plate to the new data plate by impression stamping. Stamp the letters "NB" on the upper right hand corner of the new data plate to indicate S.I.compliance and install on the actuator.

PARTS LIST:

ITEM (fig.1)	PART NUMBER	DESCRIPTION	QTY	F O C
	MIL-G-81322	GREASE	AS REQ.	
	LOCTITE 609	THREAD LOCK	AS REQ	
3	ADS145-10-43	BOLT	2	*
4	ADS145-10-38	BOLT	2	*
1	MS20365-1032	NUT	2	*
	102049	DATA PLATE	1	*

PARTS AVAILABILITY:

Asterisked items listed above will be furnished. Gear sets that exhibit damage in the area of the gear-shaft flats may be returned for evaluation and possible replacement.

TOOLS REQUIRED:

IMPACT SCREWDRIVER

3/8 in. WRENCH

SCREWDRIVER

HAMMER

TORQUE DRIVER (0-15 inch pound

METAL IMPRESSION STAMP SET

SOCKET TO FIT TORQUE DRIVER (modified to engage flats of input gear)

