



MU-2

SERVICE RECOMMENDATION

MITSUBISHI HEAVY INDUSTRIES, LTD.
NAGOYA AEROSPACE SYSTEMS WORKS
10, OYE-CHO, MINATO-KU, NAGOYA, JAPAN

No.078 DATE: February 28, 2017

Subject: Nose Landing Gear System Inspection

Effectivity: MU-2B-30/-35/-36: S/N 501 through 696 (except 652, 661)

Purpose: In order to maintain the continued airworthiness of aircraft, inspect, replace and/or adjust Nose Landing Gear system and associated parts.

Compliance: Optional

Responsible Agency of Compliance : MU-2 Owners/Operators

Disposition of Removed Parts: Scrap

Spare Parts Affected: Yes

Required Man Hours: See Table 1.

Special Tools Required: None

Weight and Balance Change: None

Flight Manual Revision: None

Note: This Service Recommendation is ONE-TIME inspection. All Owner/Operators must conduct periodic inspection of the Nose Landing Gear in accordance with the applicable MU-2 Maintenance Requirements Manual.

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DEFINITIONS

MHIA: Mitsubishi Heavy Industries America, Inc.

APD: Aircraft Product Support Division

NLG: Nose Landing Gear

SB: Service Bulletin

SR: Service Recommendation

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Table 1 Required Man-Hour

1. Preparation	
Preparation:	6 Man-Hours
2. NLG Drag Strut to Fuselage Bracket, Inspection of	
Inspection:	0.5 Man-Hours
Replacement of Bracket (LH/RH):	12 Man-Hours / 12 Man-Hours
Repair of Skin (LH/RH):	10 Man-Hours / 10 Man-Hours
Replacement of Channel:	32 Man-Hours (per each)
3. NLG Drag Strut Link, Inspection of	
Inspection:	0.5 Man-Hours
Removal/Modification of Drag Strut Link:	6 Man-Hours
4. NLG Drag Strut Pin, Inspection of	
Inspection:	1 Man-Hours
Replacement of Drag Strut Pin:	5 Man-Hours (per each)
5. NLG Eccentric Bolt, Inspection of	
Inspection:	1 Man-Hours
6. NLG Reinstallation	
Reinstallation:	16 Man-Hours
7. NLG Down Lock Mechanism, Inspection and Adjustment of	
Inspection:	1 Man-Hours
Replacement of Down Lock Assy:	3 Man-Hours
Adjustment of Drag Strut Assy:	2 Man-Hours
8. Restoration	
Restoration:	2 Man-Hours

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ACCOMPLISHMENT INSTRUCTIONS

Refer to the applicable MU-2 Maintenance Manual, Parts Catalog and Structural Repair Manual for compliance with this Service Recommendation.

1. Preparation

CAUTION

Anytime anyone is working on Landing Gear Systems, pull out the "LG MOTOR", "LG DOOR MOTOR" and "LG CONT." circuit breakers and place a sign in the cockpit.

- (1) Place the aircraft on jacks.
- (2) Remove LH and RH Access Panels from Forward Fuselage. (Figure 3)
- (3) Remove Traveling Nut Panel (Cabin).
- (4) Connect Torque Links.
- (5) Perform operational check of Landing Gear System.
 - (a) While applying 11 to 22 lbs (5 to 10 kg) to NLG Axle in the direction of retraction, retract Nose Landing Gear with no inertia and ensure that no abnormal popping sound is heard from Down Locks when disengagement occurs.
 - (b) Check and record Traveling Nut clearances with the gear in the UP and DOWN position.
 - (c) Check and record NLG Down Lock engagement.

NOTE

Step (a) through (c) should be completed at least three (3) times; the repetition is to ensure that Landing Gear Motor Brake is working properly. Cooling of Landing Gear Motor and Landing Gear Door Motor should be accomplished after continuous operations.

- (d) Note discrepancies found to be correct during reinstallation.
- (6) Remove NLG Wheel Assemblies.
- (7) Remove NLG Doors connecting bolts. (Figure 2 ①)
- (8) While holding NLG Strut, remove NLG Actuator (Screw Jack) connecting bolt from Down Lock Assembly. (Figure 1 ⑤) Extend Nose Landing Gear Strut to the down position.

CAUTION

Nose Landing Gear will move down, forward and lock (extended) after the connecting bolt is removed.

- (9) With NLG down and locked position, check/mark/secure position of:
 - (a) Actuator extension/length (to prevent rotation).
 - (b) Eccentric bolt position with relation to Bolt Retainer. (Figure 1 ②)
 - (c) Trunnion Pins and NLG UP Position Switch with relation to the airframe.
- (10) Remove Drag Strut attaching bolts and Eccentric Bolt from Drag Strut to Fuselage Brackets. (Figure 1 ①, ②)
- (11) Push Down Lock Assembly upward to move Drag Struts out of Drag Strut to Fuselage

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Brackets.

- (12) Disconnect and secure NLG UP Position Switch. (Figure 1 ⑧)
- (13) Remove Trunnion Pin attaching bolts from Trunnion. (Figure 1 ⑥)
- (14) Remove Trunnion Pins and slowly move NLG Strut away from aircraft while paying attention to NLG Trunnion Shims including location and save it for restoration. (Figure 1 ⑦)
- (15) Identify/mark the value of NLG Trunnion Shims including location and save it for restoration.
- (16) Remove Drag Strut Pin attaching bolts and Drag Strut Pins. (Figure 1 ③, ④)
- (17) Separate Drag Strut and Down Lock Assembly from NLG Strut.

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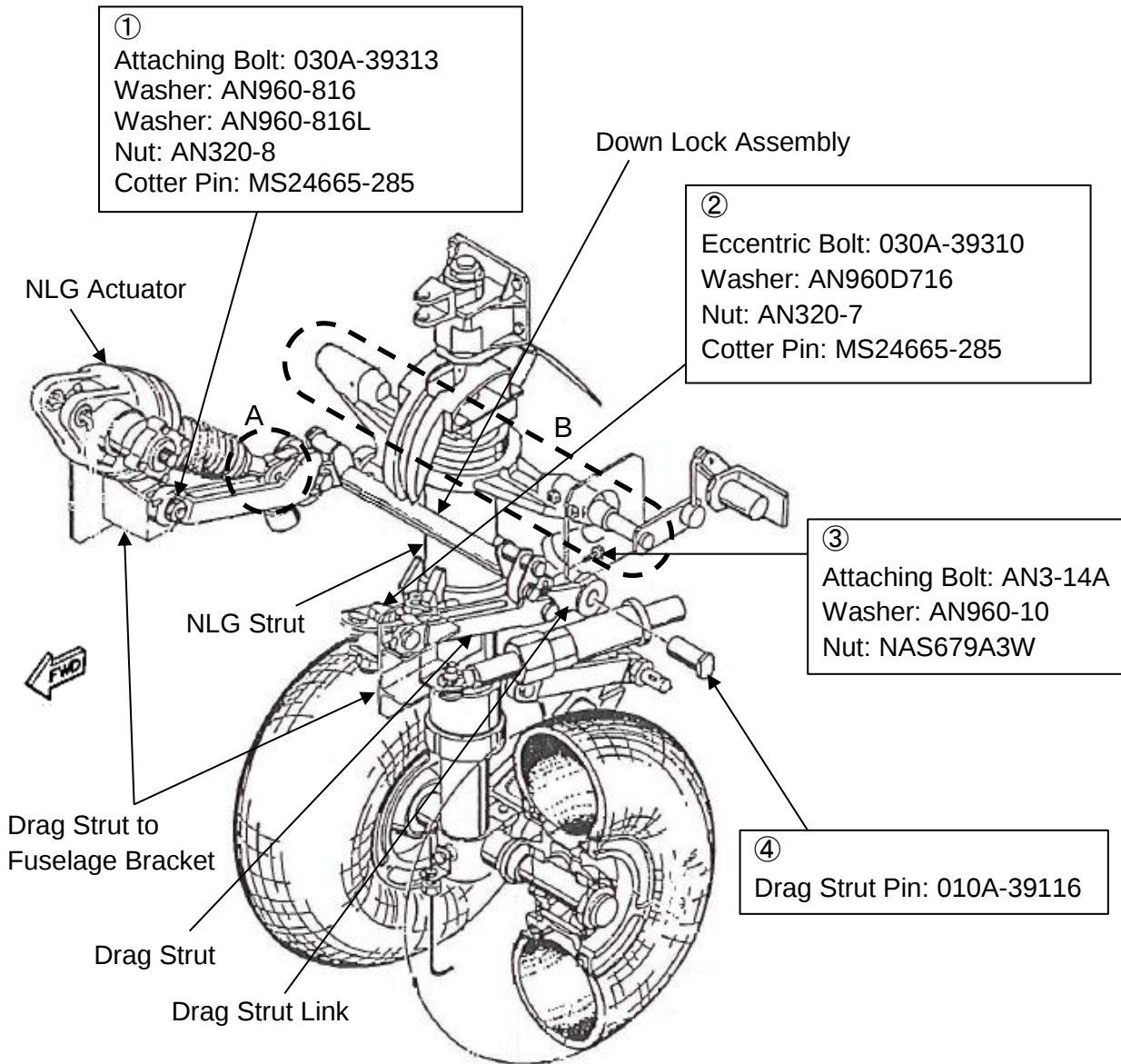


Figure 1: Nose Landing Gear System Components (1/2)

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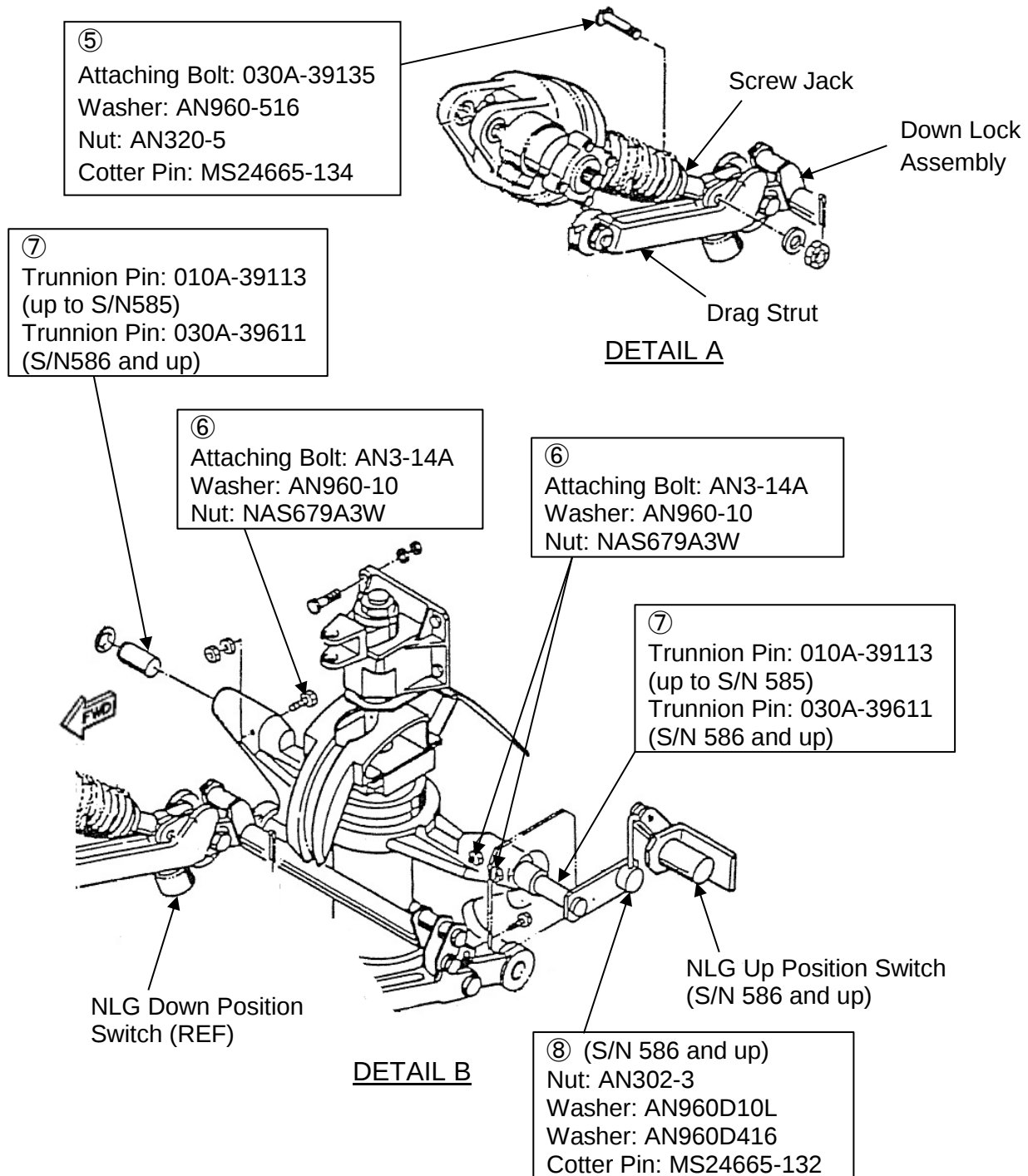


Figure 1: Nose Landing Gear System Components (2/2)

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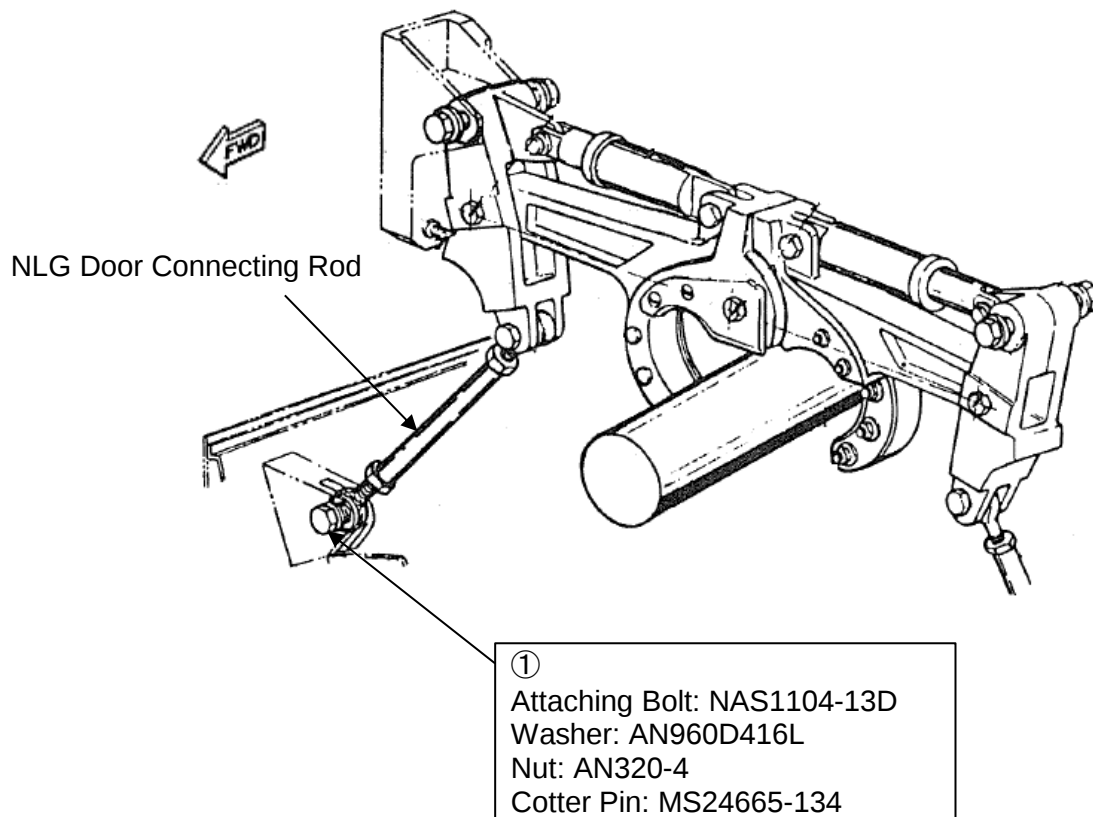


Figure 2: NLG Door Connecting Rod Disconnect

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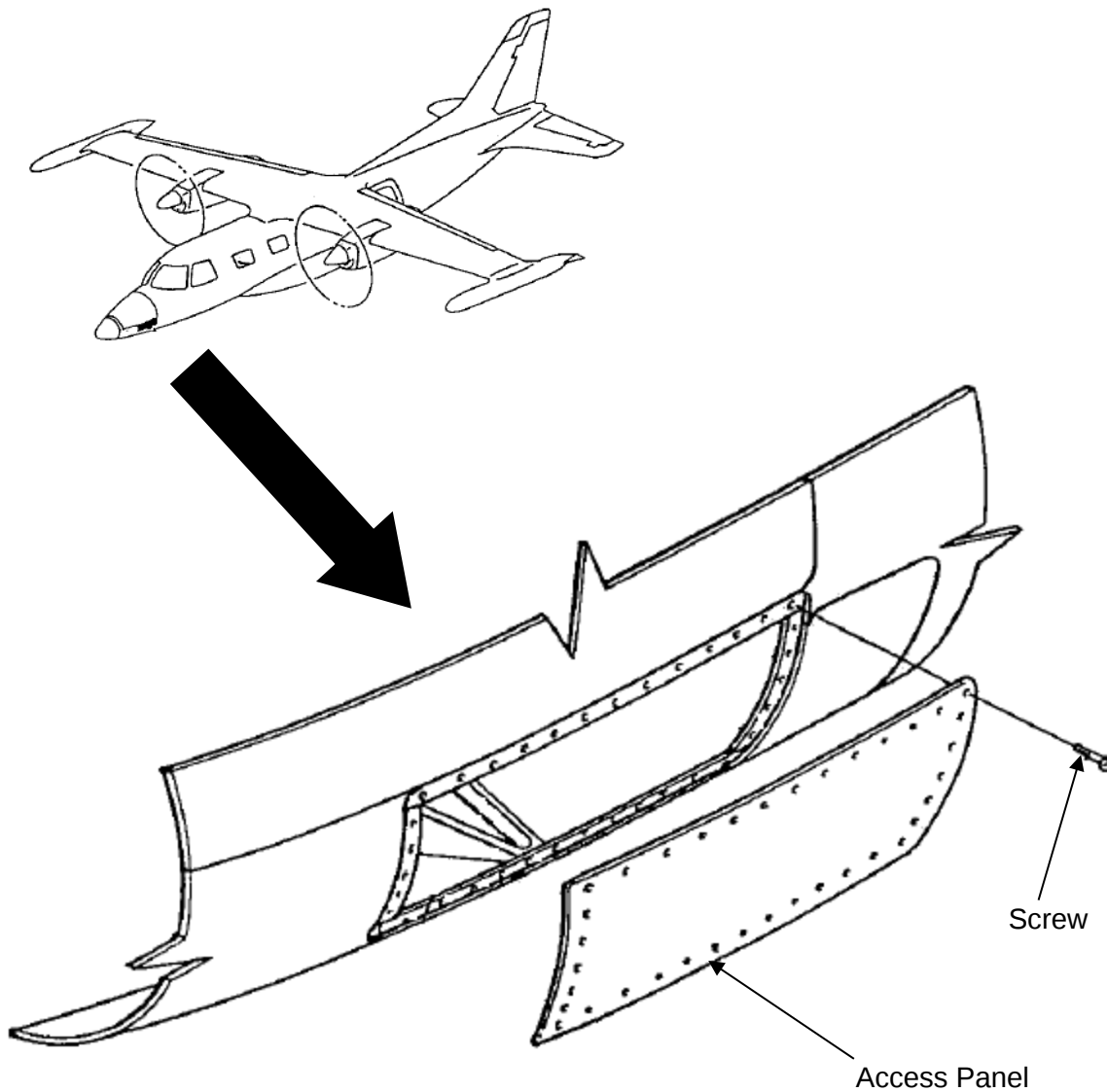


Figure 3: Access Panel Removal (LH/RH)

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2. NLG Drag Strut to Fuselage Bracket, Inspection of

2.1 Inspection

- (1) Confirm the part number of LH NLG Drag Strut to Fuselage Bracket. If the part number is 030A-31121, perform SB No. 195.
- (2) Visually inspect LH and RH Drag Strut to Fuselage Brackets (030A-31121-11 and 030A-31122-11) for cracks in the area shown in Figure 4, 5 and 6.
 - (a) If any crack is found, replace the bracket with new one.

NOTE

To have an easy access, Brackets (030A-31121-11 and 030A-31122-11) and Beams (030A-31123 and 030A-31124) may be temporary removed.

- (3) Visually inspect Outer Skins around fasteners which are installed common to Outer Skin, Channel and Beam for cracks and loosening fasteners in the area shown in Figure 5 and 6.
 - (a) If any crack is found, repair the skin in accordance with the MU-2 Structural Repair Manual.
 - (b) If any loosening fastener is found, replace the fasteners in accordance with the MU-2 Structural Repair Manual.
- (4) Visually inspect Channels (030A-31115-7/-9) between Outer Skin and Beam, and Channels (030A-31110-37 and 030A-31147) attaching to outboard lugs of Bracket for cracks and deformation shown in Figure 5 and 6.
 - (a) If any crack or deformation is found, replace the channel with new one.

NOTE

If any inconclusive damage is found, remove the suspicious part and perform Non-Destructive Testing (NDT) to the parts in accordance with the applicable MU-2 Maintenance Manual.

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2.2 Parts and Material Required for Chapter 2

Should defective or missing parts be found, the following parts and material are required when complying with this Service Recommendation.

Part Number	Qty	Part Name	Remarks
030A-31121-11	1	Bracket (LH)	Procure from MHIA
030A-31122-11	1	Bracket (RH)	Procure from MHIA
HL21PB-6-6	2	Pin (LH)	Hi-Shear Corp.
HL86PB-6	2	Collar (LH)	Hi-Shear Corp.
HL21PB-8-6	3	Pin (RH)	Hi-Shear Corp.
HL86PB-8	3	Collar (RH)	Hi-Shear Corp.
AN960D10	2	Washer (LH)	
AN960D416	3	Washer (RH)	
030A-31115-7	1	Channel (LH)	Procure from MHIA
030A-31115-9	1	Channel (RH)	Procure from MHIA
030A-31110-37	1	Channel (LH)	Procure from MHIA
030A-31147	1	Channel (RH)	Procure from MHIA

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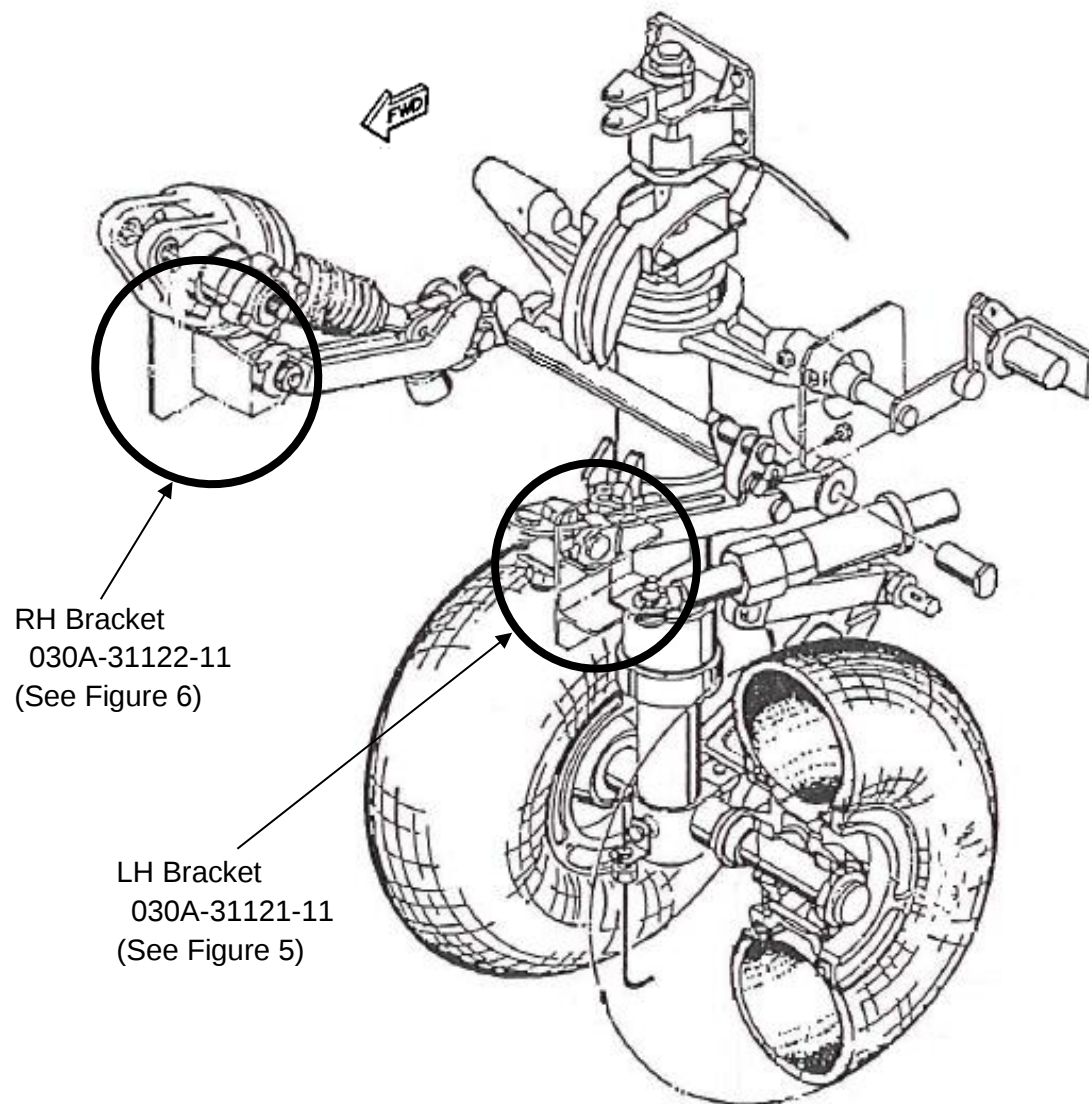


Figure 4: Drag Strut to Fuselage Bracket Location

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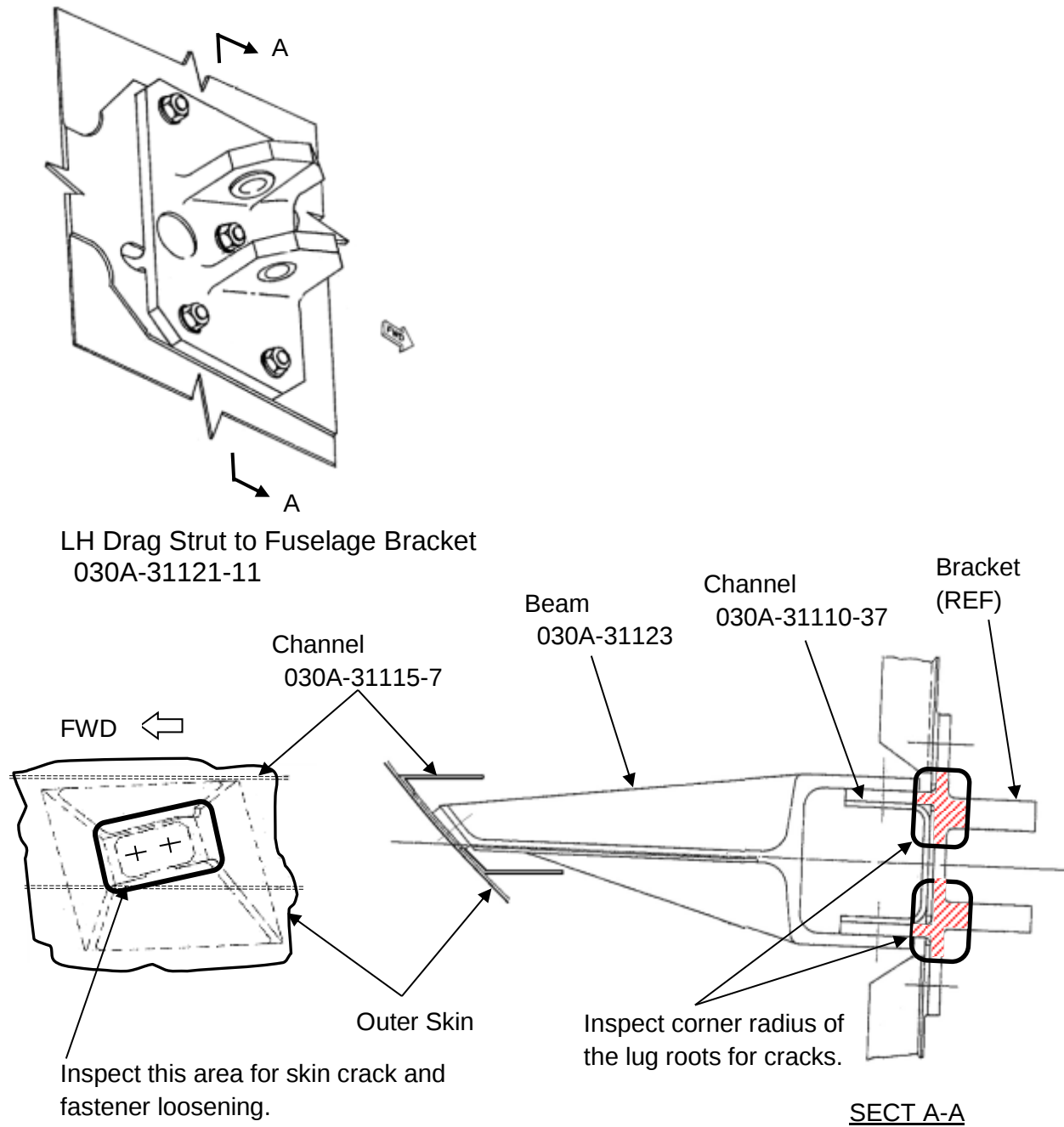


Figure 5: LH Drag Strut to Fuselage Bracket, Outer Skin and Channels

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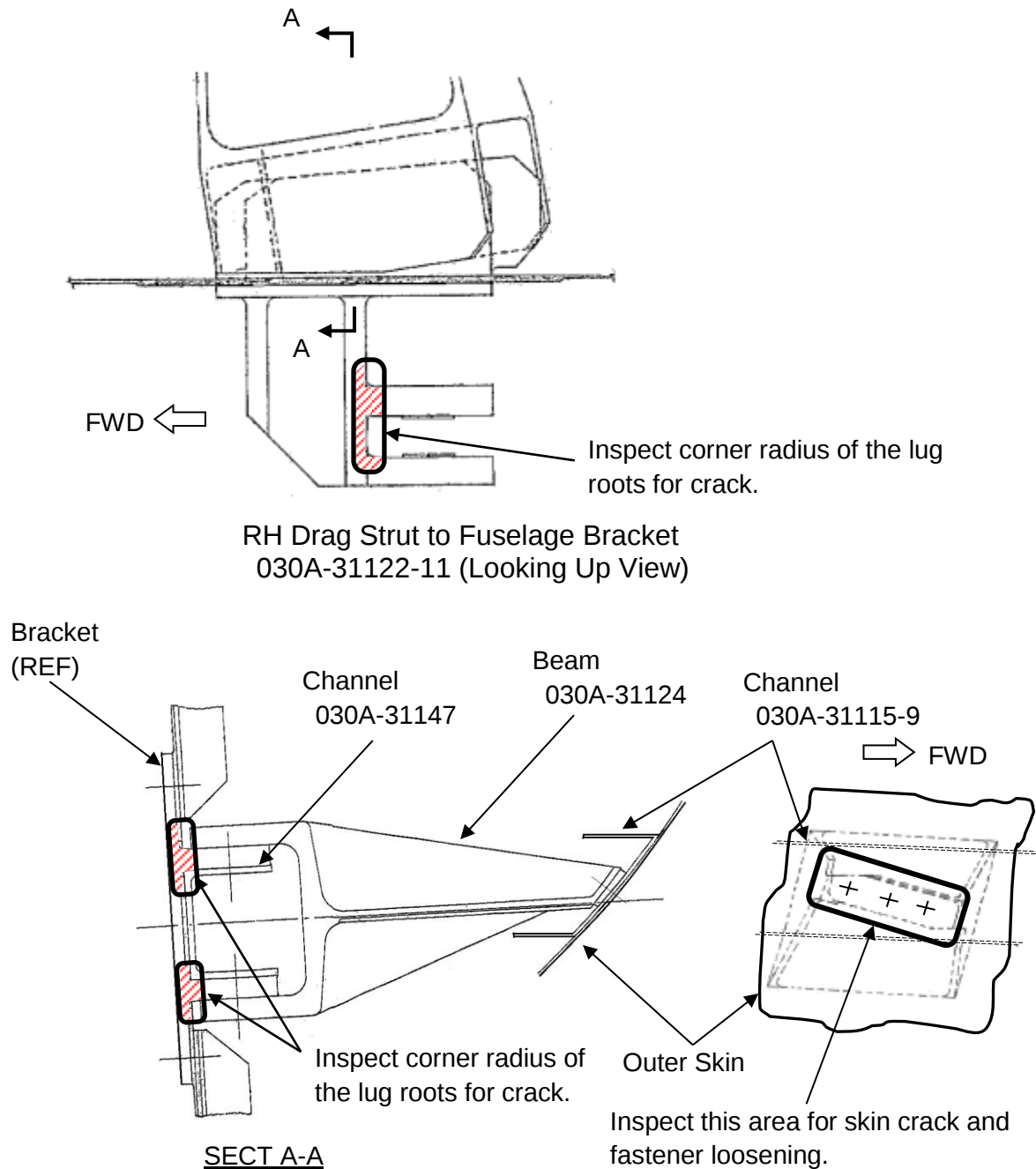


Figure 6: RH Drag Strut to Fuselage Bracket, Outer Skin and Channels

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3. NLG Drag Strut Link, Inspection of

3.1 Inspection

- (1) Visually inspect LH and RH Drag Strut Links for crack, deformation, nick, gouge, rust, wear of the groove and corrosion. (Figure 7)
 - (a) If any of these conditions are found, replace the Drag Strut Links with new 030A-39302-11/-21 Links; staking marks shall be on outboard side when installed.

NOTE

If any inconclusive damage is found, remove the suspicious part and perform Non-Destructive Testing (NDT) to the parts in accordance with the applicable MU-2 Maintenance Manual.

- (2) Visually inspect the existence of staking marks on the outboard side of Drag Strut Link for correct installation. (Figure 7 and 8)
 - (a) If the Drag Strut Link installation is incorrect (abnormal condition), install the correct Drag Strut Link identified in Figure 8.

NOTE

If the replacement of Drag Strut Links is necessary, remove Drag Strut Links from Drag Strut Assembly. Install Drag Strut Links to the correct side of Drag Strut Assembly. Staking marks shall be on outboard side. Grease the NLG systems per the applicable MU-2 Maintenance Manual.

- (3) Visually inspect Grease Fitting above Down Lock area of Drag Strut Link for Grease Fitting. (Figure 9)
 - (a) If there is a threaded hole and no Grease Fitting is installed, the condition is abnormal. Proceed to Paragraph 3.1 (4).
 - (b) If the Grease Fitting (MS15001-4) is installed or there is no threaded hole for Grease Fitting, the condition is normal. Proceed to Paragraph 3.1 (5).
- (4) Inspect the inner surface of Drag Strut attaching hole for nicks, scratches, rust, or corrosion.
 - (a) If any of these conditions are found, replace the Drag Strut Links with new 030A-39302-11/-21 Links; staking marks shall be on outboard side when installed.
 - (b) If none of these conditions are found, install Grease fitting (MS15001-4) and proceed to Paragraph 3.1 (5).

NOTE

If the part number is not legible, check Drag Strut Down Lock Sleeve Bearing for a Teflon Liner (035A-39302). If a Teflon Liner is found, the part is 030A-39302-11/-21 Drag Strut Link. (Figure 8)

- (5) Inspect Drag Strut Links for free play between the link body and outer bearing race. There should be no free play. (Figure 9)
 - (a) If any free play is found, replace the Drag Strut Links with new 030A-39302-11/-21 Links; staking marks shall be on outboard side when installed.

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3.2 Parts and Material Required for Chapter 3

Should defective or missing parts be found, the following parts and material are required when complying with this Service Recommendation.

Part number	Qty	Part name	Remarks
030A-39302-11	1	RH Drag Strut Link	Procure from MHIA
030A-39302-21	1	LH Drag Strut Link	Procure from MHIA
MS15001-4	2	Grease Fitting	1 per Link

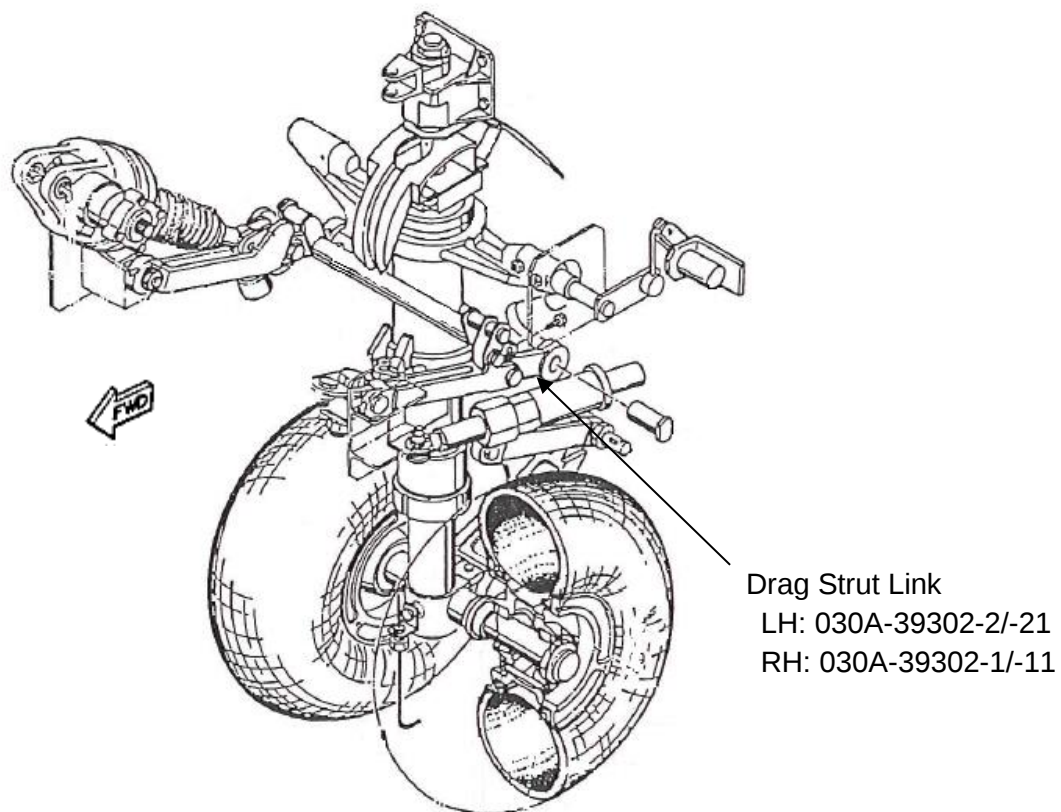


Figure 7: Drag Strut Link Location

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Drag Strut Link (030A-39302-1 typical shown)

Part number	Correct Location	Remarks
030A-39302-1	RH Drag Strut	With grease fitting
030A-39302-11	RH Drag Strut	With Teflon liner For new procurement
030A-39302-2	LH Drag Strut	With grease fitting
030A-39302-21	LH Drag Strut	With Teflon liner For new procurement

Figure 8: Drag Strut Link Identification

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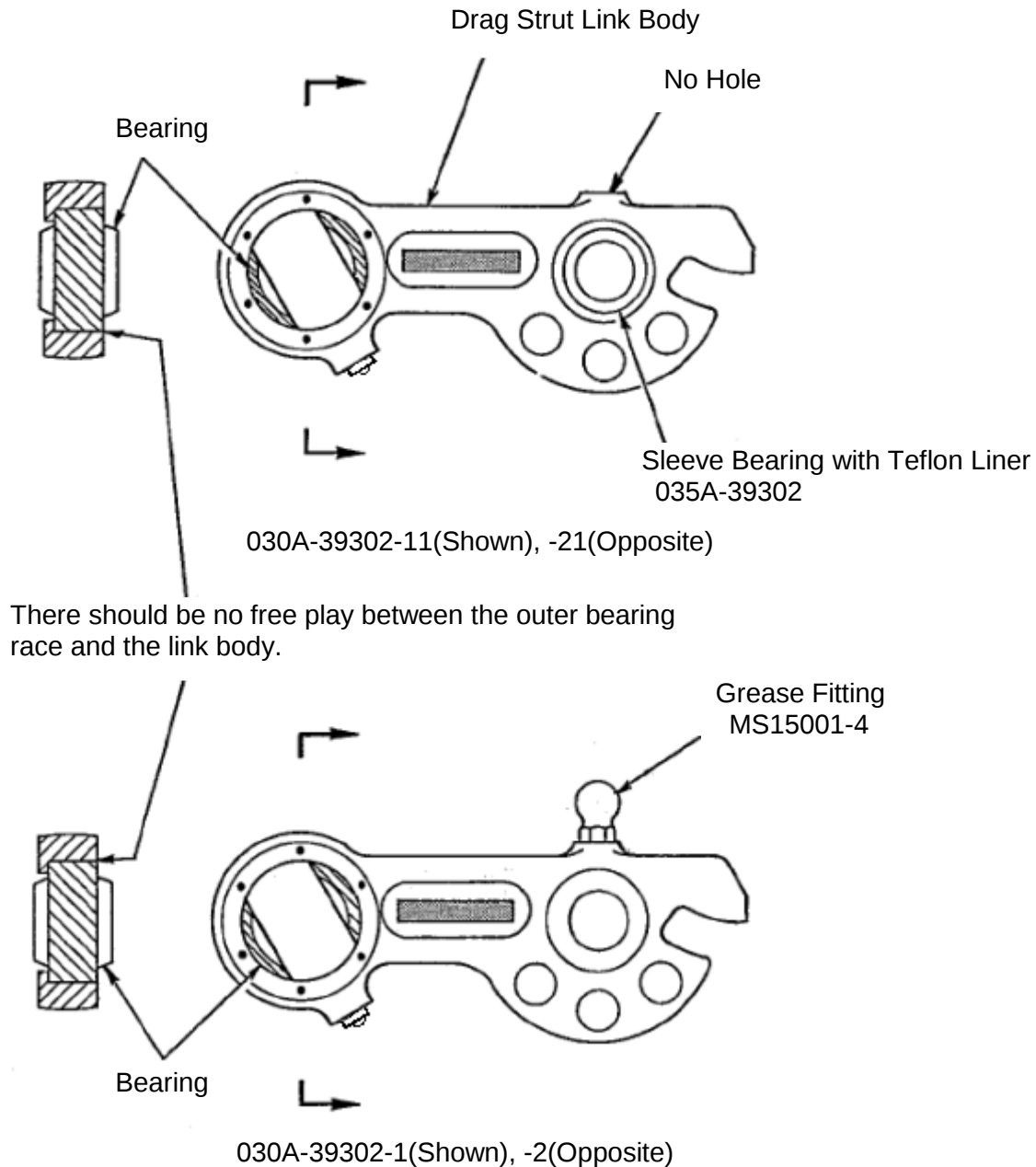


Figure 9: Drag Strut Link Free Play

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4. NLG Drag Strut Pin, Inspection of

4.1 Inspection

- (1) Clean LH and RH Drag Strut Pins and visually inspect for wear, cracks, deformation or corrosion. (Figure 10)
 - (a) If any of these conditions are found, replace the Drag Strut Pin with new one.

NOTE

If any inconclusive damage is found, remove the suspicious part and perform Non-Destructive Testing (NDT) to the parts in accordance with the applicable MU-2 Maintenance Manual.

- (b) If none of these conditions are found, the Pins may be reused.

4.2 Parts and Material Required for Chapter 4

Should defective or missing parts be found, the following parts and material are required when complying with this Service Recommendation.

Part Number	Qty	Part Name	Remarks
010A-39116	2	Drag Strut Pin	Procure from MHIA
PR-1221	AR	Sealant	
MIL-T-5544	AR	Thread Compound	Or Grease (MIL-G-23827)

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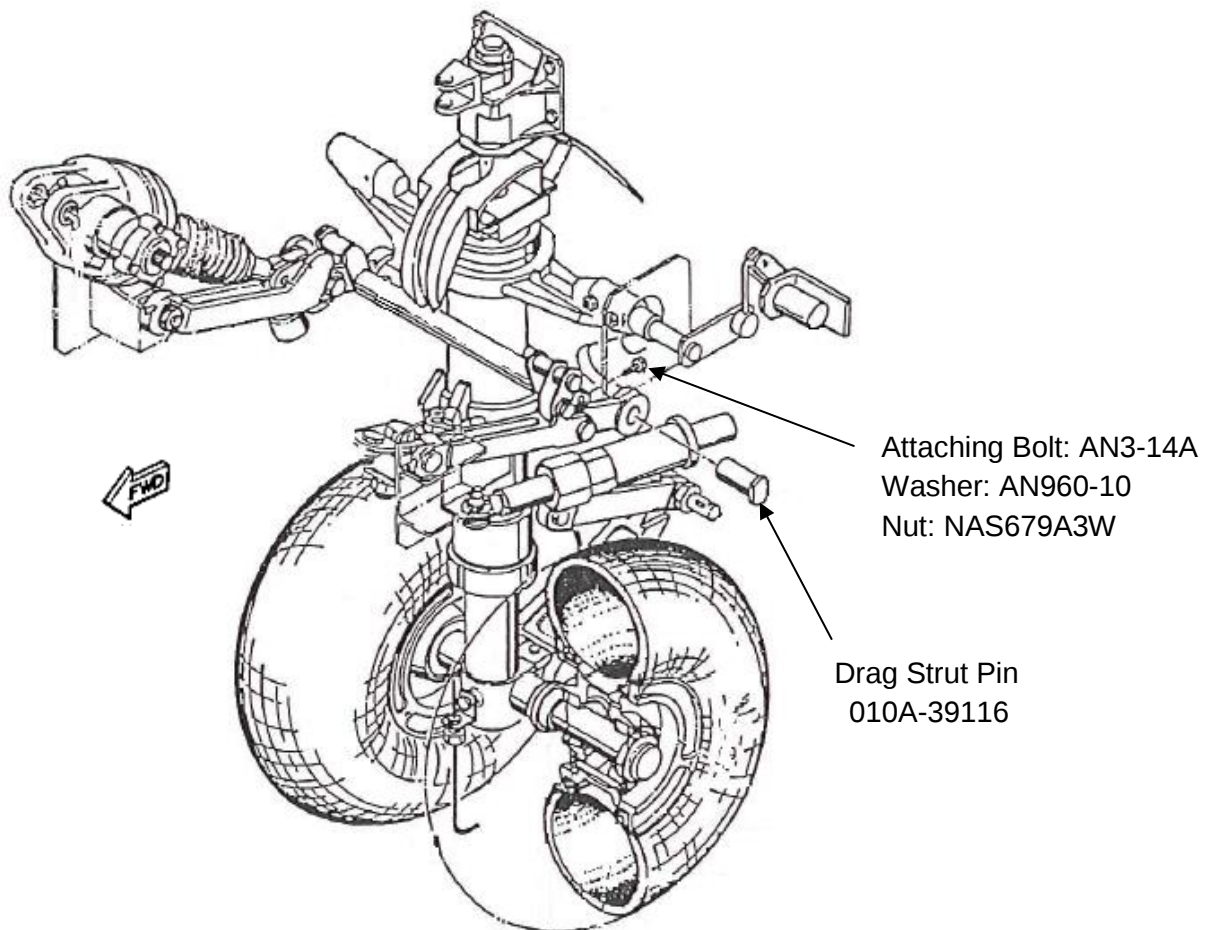


Figure 10: Drag Strut Pins and Attaching Bolts

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5. NLG Eccentric Bolt, Inspection of

5.1 Inspection

- (1) Visually inspect Eccentric Bolt for cracks, deformation or corrosion. (Figure 11)
 - (a) If any of these conditions are found, replace the Eccentric Bolt with new one. Prior to installation of a new bolt, apply alignment mark on the same place as the bolt being replaced.

NOTE

If any inconclusive damage is found, remove the suspicious part and perform Non-Destructive Testing (NDT) to the parts in accordance with the applicable MU-2 Maintenance Manual.

- (b) If none of these conditions are found, the Eccentric Bolt may be reused.

5.2 Parts and Material Required for Chapter 5

Should defective or missing parts be found, the following parts and material are required when complying with this Service Recommendation.

Part Number	Qty	Part Name	Remarks
030A-39310	1	Eccentric Bolt	Procure from MHIA
MS24665-285	1	Cotter Pin	
MIL-G-23827	AR	Grease	

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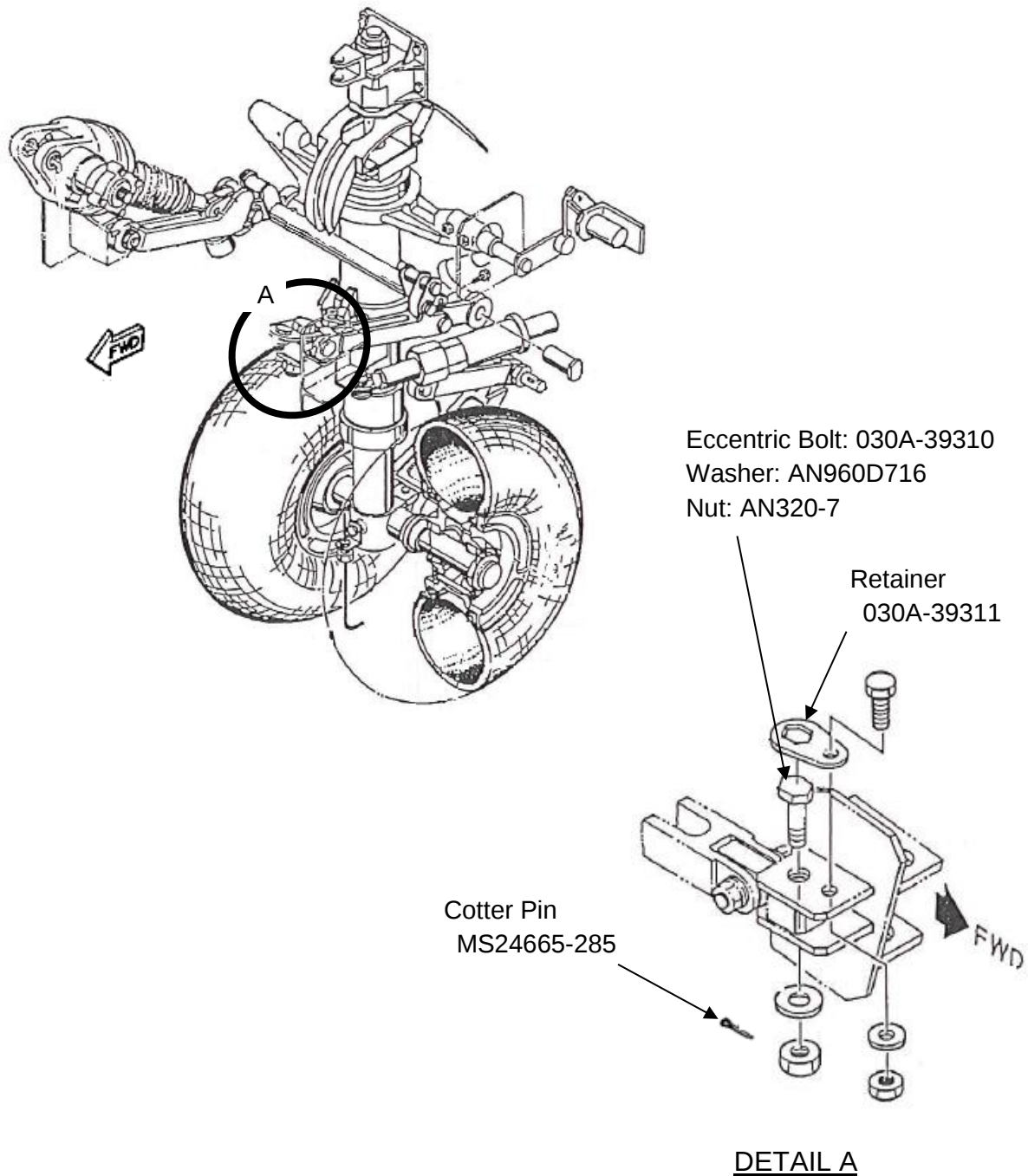
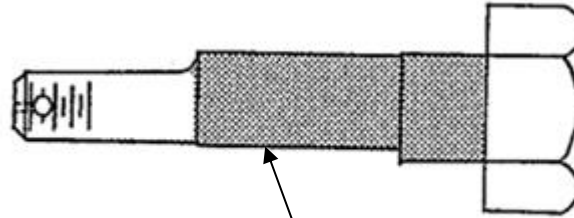


Figure 11: Eccentric Bolt

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Apply grease (MIL-G-23827) to shaded area.

Figure 12: Application of Grease to Shank

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6. NLG Reinstallation

- (1) Reinstall the NLG Assembly using Chapter 1- Preparation sequential procedures in reverse, up to step (6) except step (7) (Figure 1);
At step (16) of reinstalling Drag Strut Pins, the following applies (Figure 10):

NOTE

If Drag Strut Pins are replaced, take into consideration the clearance between LH and RH Drag Strut Links and Drag Strut Pins [0.002" to 0.012"] (0.05 mm to 0.30 mm) before drilling in accordance with the applicable MU-2 Maintenance Manual; Pin shanks must be drilled #11 [4.85 mm (+0.07/-0.02 mm)] in diameter at the position to match the holes in Trunnion for installation of Drag Strut Pin attaching bolts (AN3-14A, Figure 1 ③).

- (a) Apply thread compound (MIL-T-5544) or grease (MIL-G-23827) to Drag Strut Pins and install Drag Strut Pins to Trunnion.
- (b) Apply sealant (PR-1221) to the attaching bolt shank surface, and install the bolts, washers and nuts to Trunnion and Drag Strut Pins.
- (c) Apply sealant (PR-1221) on and around the bolt heads and nuts.

At step (10) of reinstalling Eccentric Bolt, the following applies (Figure 11):

- (a) Apply grease (MIL-G-23827) to the shank of Eccentric Bolt. (Figure 12)
- (b) Install Eccentric Bolt taking into consideration the aligning mating marks on the bolt head and the bolt retainer. (Figure 11 "A")
- (c) Ensure that Down Locks disengage and engage smoothly by partially retracting and extending the nose gear by hand.

NOTE

Cotter pin for Eccentric Bolt attaching nut and NLG Doors shall be installed after adjustment of Down Lock mechanism in Chapter 7.

- (2) Inspect all NLG restored components for security BEFORE proceeding to Chapter 7.

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7. NLG Down Lock Mechanism, Inspection and Adjustment of

7.1 Inspection and Adjustment

NOTE

Write down the following result in the Appendix A – Inspection Compliance Form

- (1) Turn electrical power on.
- (2) Retract Nose Landing Gear until Down Locks are disengaged.
 - (a) Measure LH and RH Down Lock width “C” and groove depth “D”. (Figure 13 and 14)

NOTE

For easy access, it may be measured before reinstallation of Drag Strut Assembly instead of 7.1(2)(a).

- (3) Continue retracting Nose Landing Gear to the up position.
- (4) Extend Nose Landing Gear with no load and no inertia until LH Down Lock touches Drag Strut Link.
 - (a) Measure dimension “B” of RH Down Lock unengaged portion. (Figure 13 and 14)
 - (b) Determine the RH Down Lock engagement dimension “A” as follows:
$$A = C - B$$
 - (c) The RH engagement dimension “A” must be less than 0.12 inch (3.0 mm). Replace the Down Lock Assembly if the dimension “A” is not within the specified value.
- (5) Extend Nose Landing Gear with no load and no inertia until stopped by Down Limit Switch, and verify that Traveling Nut clearance is in accordance with the applicable MU-2 Maintenance Manual.
 - (a) Calculate the LH and RH Down Lock engagement dimension “A” same as step (4) (a) and (b).
 - (b) The LH engagement dimension “A” must be 0.24 in. (6.0 mm) or more. Readjust the system as necessary to be within the specified value.
 - (c) Check the difference between the LH and RH Down Lock engagement dimension “A”. The RH engagement dimension must be greater than the LH by 0.00 to 0.06 inch (0.0 to 1.5 mm). Replace Down Lock Assembly if not within the specified value.
- (6) Manually operate and extend Nose Landing Gear until the clearance of the stop mechanism is zero (0.0).
 - (a) Calculate the RH Down Lock engagement dimension “A” same as step (4) (a) and (b).
 - (b) Calculate the remaining distance “E” of the RH Down Lock as follows:
$$E = D - A$$
 - (c) The distance “E” should be 0.08 inch (2.0 mm) or more. If the distance is less than the specified value, readjust the system.

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7.2 Abnormal Sound Check

- (1) Extend Nose Landing Gear to down position.
- (2) Apply 11 to 22 lbs (5 to 10 kg) to NLG Axle in the direction of retraction.
- (3) Retract Nose Landing Gear with no inertia.
- (4) Ensure that no abnormal popping sound is heard from Down Locks during Landing Gear operation.
- (5) If abnormal popping sound is heard from Down Locks, adjust Eccentric Bolt in accordance with the applicable MU-2 Maintenance Manual and reapply mark. Tighten the nut attaching to Eccentric Bolt by the torque of 270 to 300 in-lbs and install a new cotter pin (MS24665-285, Figure 11 "A").
- (6) If the abnormal popping sound cannot be eliminated after the adjustment, replace Down Lock Assembly with new one. Restart the abnormal popping sound check.

7.3 Parts and Material Required for Chapter 7

Should defective or missing parts be found, the following parts and material are required when complying with this Service Recommendation.

Part Number	Qty	Part Name	Remarks
030A-39303-21	1	Down Lock Assy	Procure from MHIA

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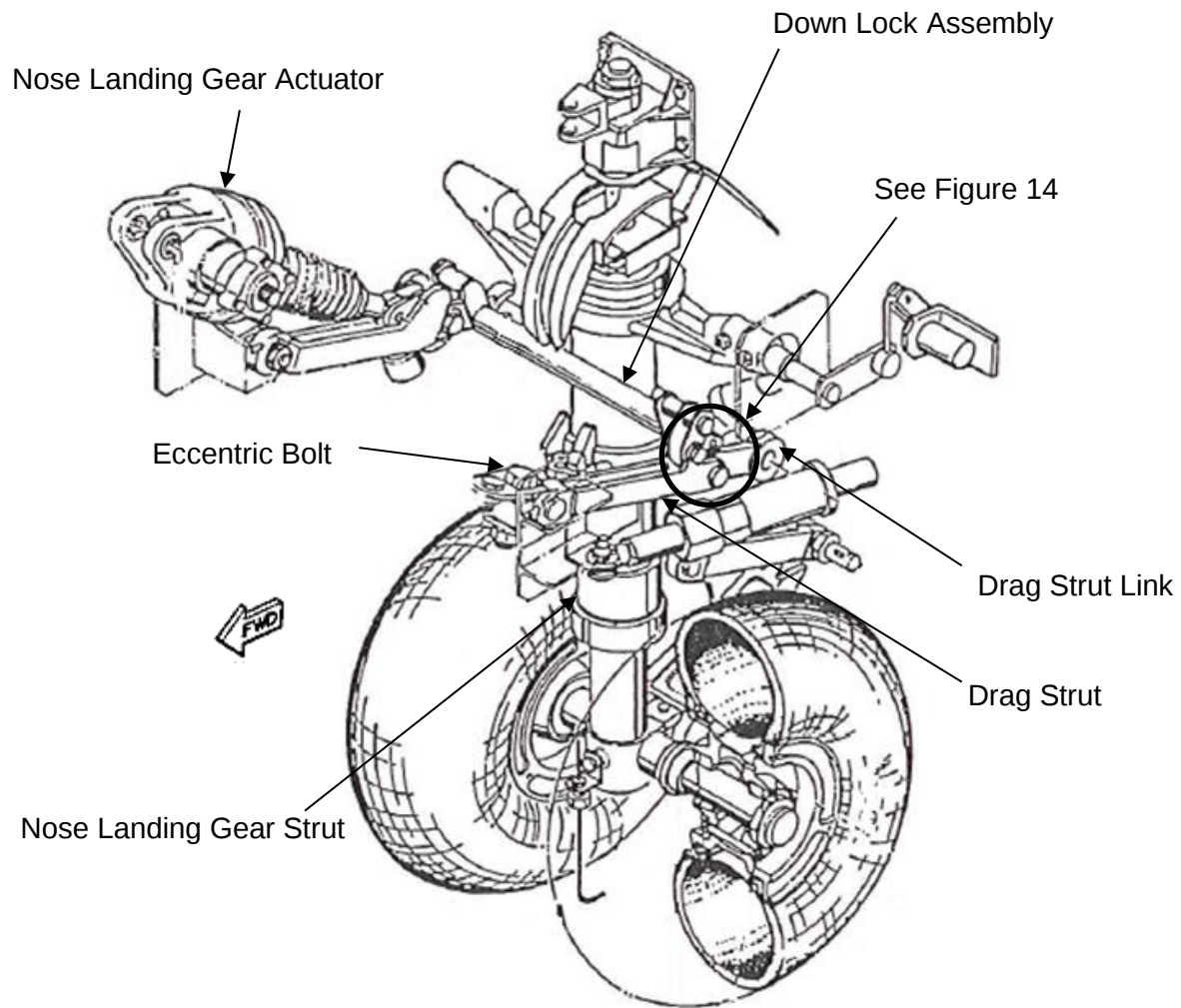
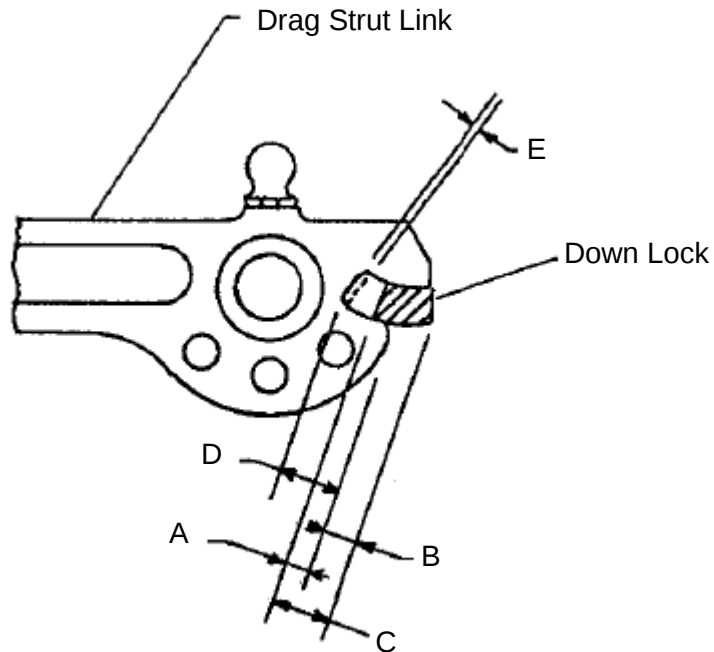


Figure 13: NLG Down Lock Mechanism

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- A : Down lock engagement ($A=C-B$, when landing gear is stopped by down limit switch)
- B : Unengaged portion
- C : Down lock width
- D : Down lock groove
- E : Remaining distance ($E=D-A$, at mechanical stop clearance zero (0))

Figure 14: Drag Strut Link and Down Lock

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8. Restoration

- (1) Inspect all Landing Gear System components for security and proper safeties.
- (2) Reinstall NLG Doors connecting bolts. (Figure 2 ①)
- (3) Perform full operational check of Landing Gear System and NLG Door System per the applicable MU-2 Maintenance Manual, including any adjustments needed.
- (4) Reinstall all previously remove access panels.
- (5) Lower the aircraft from jacks.

9. Log Book Entry

- (1) Complete the attached compliance form and return to MHIA APD. (Ref to Appendix)
- (2) Upon completion of this Service Recommendation, make an appropriate maintenance entry in the logbook similar to "Service Recommendation No. 078 complied with on (date) by (name)"

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COMPLETION

Complete the enclosed compliance card and mail back to Mitsubishi Heavy Industries America, Inc.
Aircraft Product Support Division.

Mitsubishi Heavy Industries America, Inc.
Aircraft Product Support Division
4951 Airport Parkway Suite 530
Addison, Texas 75001

Phone: (972) 934-5480
Fax; (972) 934-5488

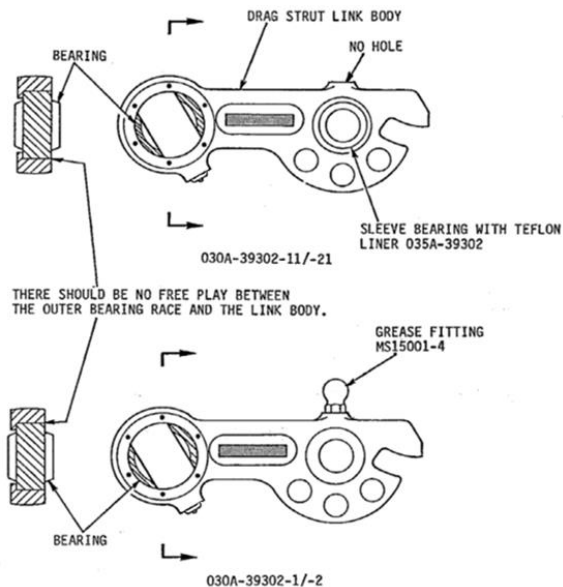
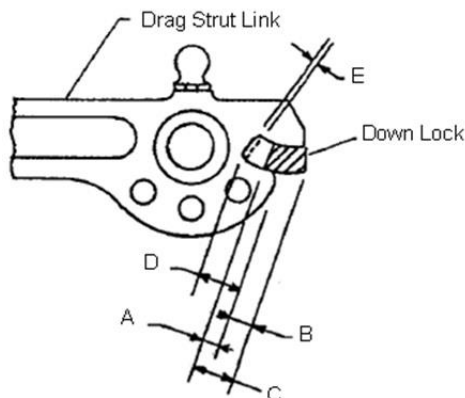
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Appendix A – Inspection Compliance Form

SR078 Nose Landing Gear System Inspection



Aircraft
S/N:

Measurement of Dimension

	RH	LH	
D (Act.)	_____	_____	
C (Act.)	_____	_____	
B (step 4, Act.)	_____	_____	
A (= C – B)	_____	_____	
(Requirement) A_{RH} : less than 0.12 inch (3.0 mm)			
B (step 5, Act.)	_____	_____	$A_{RH}-A_{LH}$
A (= C – B)	_____	_____	_____
(Requirement) A_{LH} : 0.24 inch (6.0 mm) or more			
$A_{RH}-A_{LH}$: 0.00 to 0.06 inch (0.0 to 1.5 mm)			
B (step 6, Act.)	_____	_____	
A (= C – B)	_____	_____	
E (= D – A)	_____	_____	
(Requirement) E: 0.08 inch (2.0 mm) or more			
<u>Check Staking Mark on Which Surface (Put a circle)</u>			
	LH (Inboard, Outboard)	RH (Inboard, Outboard)	

Findings, replaced parts, information