V2500 Propulsion System - Nacelle

# SERVICE BULLETIN

NACELLE - EXHAUST - ACTUATOR, THRUST REVERSER, - REPLACEMENT OF

MODEL APPLICATION

V2500-D5

BULLETIN INDEX LOCATOR

78-00-00

| Compliance Category Code | Internal Reference No. |
|---|---|
| 4 | JG 99VN801 |

December 22, 2000

**V2500-NAC-78-0173**

# SERVICE BULLETIN

NACELLE - EXHAUST - ACTUATOR , THRUST REVERSER - REPLACEMENT OF

1. Planning Information

A. Effectivity

(1) Aircraft

Boeing MD-90

(2) Nacelle

(a) V2500-D5 thrust reversers with serial numbers prior to 0701001.

B. Reason

(1) Condition

Operators have found that thrust reverser actuators have exhibited reduced reliability due to excessive external leaks from the piston rod seal.

(2) Background

The thrust reverser actuators can develop excessive external leaks from the piston rod seal while in service.

(3) Objective

To provide thrust reverser actuators more tolerant of in-service conditions.

(4) Substantiation

By analysis.

(5) Effect of Bulletin on:

| | | |
|---|---|---|
| (a) | Removal/Installation | Not Affected |
| (b) | Disassembly/Assembly | Not Affected |
| (c) | Cleaning | Not Affected |
| (d) | Inspection/Check | Not Affected |
| (e) | Repair | Not Affected |
| (f) | Testing | Not Affected |

C. Description

Leaking thrust reverser actuators are removed and replacement actuators are installed. Leaking actuators are returned to Lucas Aerospace for re-work.

D. Approval

The part number changes and/or part modifications described in Paragraphs 2 and 3 of this Service Bulletin have been shown to comply with the applicable Federal Aviation Regulations and are FAA approved for the equipment model(s) listed.

E. Compliance

Category 4

Accomplish at the first visit of the nacelle or nacelle component to a maintenance base capable of compliance with the accomplishment instructions regardless of the planned maintenance action for the nacelle or component.

F. Manpower

For each thrust reverser half:

| VENUE | | | ESTIMATED MANHOURS |
|---|---|---|---|
| (1) | In Service | | Not applicable |
| (2) | In Shop | | |
| | (b) To rework | | 3.0 M/Hrs. |
| | | Total | 3.0 M/Hrs. |

NOTE: Manhours are provided for planning purposes only. No labor reimbursement is provided under the terms of this service bulletin offering

G. Weight and Balance

| | | |
|---|---|---|
| (1) | Weight change | None |
| (2) | Moment arm | No effect |
| (3) | Datum | Engine Front Mount Centreline (Powerplant Station PPS 100.0) |

H. Electrical Load Data

Not affected.

I References

| Manual | Chapter/Section |
|---|---|
| IAE V2500 Standard Practices/Processes Manual (SPP-V2500-1IA) | 70-09-00 |
| MD-90 Aircraft Maintenance Manual | 71-13-00<br>78-31-13<br>78-31-14<br>78-31-16<br>78-32-00 |
| Lucas Service Bulletin 1801-78-L1801-04 | |
| Lucas Service Bulletin 1802-78-L1802-08 | |

J. Other Publications Affected

| Manual | Chapter/Section |
|---|---|
| V2500/MD90 Thrust Reverser Component Maintenance Manual (CMM-TR-V2500-31A) | 78-31-13<br>78-31-14 |

2. Material Information

A. Material - Price and Availability

Refer to the following Lucas Service Bulletins for material cost and availability:

1801-78-L1801-04 (for non-locking actuator TY1801)
1802-78-L1802-08 (for locking actuator TY1802)

B. Material Requirements

(1) The following is applicable to a thrust reverser half.

C. Kits associated with this Bulletin:

None.

D. Parts affected by this Bulletin:

| NEW PART NO. (ATA NO.) | QTY | EST'D UNIT PRICE | KEYWORD | OLD PART NO. (IPC NO.) | INSTR/ DISPOS |
|---|---|---|---|---|---|
| TY1802-50 (78-31-14) | 1 | | Actuator, Locking | TY1802-04 (01-05) (02-05) | (A)(B)(1D) (2D) |
| TY1801-50 (78-31-13) | 1 | | Actuator, Non-Locking | TY1801-03 (01-05) (02-05) | (A)(B)(1D) (2D) |

E. Instruction/Disposition Code Statements

(A) New part will be available March 2001.
(B) Old part will no longer be available.
(1D) Old part can be reworked to new part configuration.
(2D) Old and new parts are fully interchangeable.

F. Tooling - Price and Availability

None.

G. Materials Required to Incorporate this Service Bulletin:

None.

3. Accomplishment Instructions

A. Pre-requisite Instructions

(1) Remove the leaking thrust reverser actuator. Refer to the MD90 Aircraft Maintenance Manual, TASK 78-31-13-020-801 (non-locking actuator) or TASK 78-31-14-020-801 (locking actuator).

(2) Refer to Lucas Service Bulletin 1801-78-L1801-04 (TY1801 non-locking actuator) or 1802-78-L1802-08 (TY1802 locking actuator) for disposition instructions for the removed actuator.

B. Install the Replacement Actuator

(1) Install the replacement thrust reverser actuator. Refer to the MD90 Aircraft Maintenance Manual, TASK 78-31-13-420-801 (non-locking actuator) or TASK 78-31-14-420-801 (locking actuator).

C Rig the Translating Sleeves and Actuators.

(1) Open the fan cowls. Refer to the MD-90 Aircraft Maintenance Manual, TASK 71-13-00-010-801 and 71-13-00-010-802.

(2) Open the thrust reverser halves far enough to clear the shear pins of the translating sleeve double latches. Refer to the MD-90 Aircraft Maintenance Manual, TASK 78-32-00-010-801.

CAUTION: THE CROSS-OVER FLEXSHAFT MUST BE REINSTALLED BEFORE THE AIRCRAFT IS RETURNED TO SERVICE.

(3) Temporarily remove the cross-over flex shaft and re-install the cross-over flexshaft tube. Refer to the MD-90 Aircraft Maintenance Manual, TASK 78-31-16-020-801.

(4) Manually move one translating sleeve approximately 4 inches (101,6 mm) from the fully stowed position so it is away from the stow seals. Refer to the MD-90 Aircraft Maintenance Manual, TASK 78-32-00-980-801.

(5) Remove the actuator access doors and then remove the rod end-to-translating sleeve attach bolts from both actuators. Refer to Figure 1.

(6) Manually move the translating sleeve aft until the actuator rod ends are away from the translating sleeve mounting brackets. Refer to Figure 1.

(7) Check the actuators and flex shaft rigging.

CAUTION: DO NOT ALLOW THE ACTUATOR ROD ENDS TO TURN WHILE YOU USE THE MANUAL DRIVE TO MOVE THE ACTUATORS TO THE STOWED POSITION.

(a) Use the manual drive to move the actuators to the fully stowed position. Do not allow the actuator rod ends to turn. If the lock lever of the locking actuator does not move to the locked position, you must rig the locking actuator and flex shaft:

1 Remove the deploy tube and the flex shaft between the locking and non-locking actuators. Refer to the MD-90 Aircraft Maintenance Manual, TASK 78-31-16-020-801.

2 With the manual drive, turn the locking actuator in the stow direction until the lock lever moves to the locked position.

3 Re-install the flex shaft and the deploy tube. Refer to the MD-90 Aircraft Maintenance Manual, TASK 78-31-16-420-801.

NOTE: Do not turn the square end of the flex shaft more than one eighth (1/8) of a turn in either direction when you put it into the actuator receptacle.

(b) On the non-locking (inboard) actuator, measure the distance between the piston rod end collar and the lock nut. Refer to Figure 3. If the distance is greater than 1.30 inch (33,02 mm), you must rig the inboard actuator and the flex shaft:

1 Remove the deploy tube and the flex shaft between the locking and non-locking actuators. Refer to the MD-90 Aircraft Maintenance Manual, TASK 78-31-16-020-801.

CAUTION: MAXIMUM CRANKING TORQUE SHOULD NOT EXCEED 45 IN-LBS WHEN CRANKING DIRECTLY IN-LINE WITH THE ACTUATOR. (SIDE LOADING DURING CRANKING WILL CAUSE SERIOUS DAMAGE TO THE ACTUATOR WORM GEAR).

2 Insert a 0.190 inch (3/12 inch) (4,83 mm) square drive in to the flex shaft receptacle in the inboard (non-locking) actuator. Turn the actuator towards the stowed direction until the actuator bottoms out and the internal stop is met.

3 Re-install the flex shaft and the deploy tube. Refer to the MD-90 Aircraft Maintenance Manual, TASK 78-31-16-420-801.

NOTE: Do not turn the square end of the flex shaft more than one eighth (1/8) of a turn in either direction when you put it into the actuator receptacle.

(c) Manually unlock the outboard (locking) actuator. Refer to Figure 2.

CAUTION: DO NOT ALLOW THE ACTUATOR ROD ENDS TO TURN WHILE YOU USE THE MANUAL DRIVE TO MOVE THE ACTUATORS TO THE STOWED POSITION.

(d) Using the manual drive, manually deploy the actuators approximately 2-3 inches (50,8 - 76,2 mm).

(e) Push the translating sleeve slowly forward until one or both of the actuator rod ends can be engaged in the translating sleeve mounting brackets.

(f) If only one actuator rod end can be engaged in the translating sleeve mounting bracket, adjust the actuator rod end as necessary. Refer to Figure 3.

NOTE: Adjustment of the actuator rod end will change the actuator length. The actuator rod end can be adjusted + 0.25 inch (+ 6.35 mm) from its factory set length. Make sure you do not exceed this limit (the distance from the face of the locknut to the center of the rod end, as shown in Figure 3, must be 1.60 inch (40,40 mm) maximum).

NOTE: One full turn of the rod end, while you hold the piston rod, will change the actuator overall length + 0.056 inch (+ 1,42 mm), or a half turn will change the length + 0.028 inch (+ 0.71 mm).

(g) Using the manual drive, deploy then stow the translating sleeve. The sleeve must move smoothly without binding. If any binding occurs, determine cause and eliminate.

(h) Repeat steps C through G for the other translating sleeve.

(i) With the thrust reverser halves open far enough to disengage the translating sleeve double latch shear pins and the cross-over deploy hose connected, hydraulically deploy then stow the thrust reverser. Refer to the MD-90 Aircraft Maintenance Manual.

CAUTION: THE CROSS-OVER FLEX SHAFT MUST ONLY BE INSTALLED AFTER BOTH THRUST REVERSER HALVES HAVE BEEN HYDRAULICALLY STOWED. FAILURE TO COMPLY MAY RESULT THRUST REVERSER HALVES WHICH ARE NOT SYNCHRONIZED.

(j) Install the cross-over flex shaft. Refer to the MD-90 Aircraft Maintenance Manual, TASK 78-31-16-420-801.

NOTE: Do not turn the square end of the flex shaft more than one eighth (1/8) of a turn in either direction when you put it into the actuator receptacle.

(k) Rig the actuator length and translating sleeve position.

1 Close and latch the thrust reverser halves. Make sure the shear pins on the aft latch align properly with their mating holes. If they do not align, adjust the length of the actuators as necessary. Refer to the MD-90 Aircraft Maintenance Manual, TASK 78-32-00-410-801.

NOTE: If actuator length adjustment is required, you must adjust the length of both actuators on the same c-duct by the same amount.

2 Close and latch the fan cowls. Refer to the MD-90 Aircraft Maintenance Manual, TASKs 71-13-00-410-801 and 71-13-00-410-802.

CAUTION: THE GAP MEASUREMENTS NOTED IN THE PREVIOUS STEP WILL ONLY APPLY IF THE THRUST REVERSER IS STOWED WITH HYDRAULIC POWER. IF THE THRUST REVERSER IS STOWED MANUALLY, THE GAP WILL BE LARGER AND THE ABOVE REQUIREMENTS DO NOT APPLY.

3 Measure the gap (distance) between the translating sleeve leading edge and the fan cowl aft edge. Refer to Figure 4. The gap (distance) must be equal to 0.030 - 0.250 inch (0,76 - 6,36 mm) for 80% of the measurements and 0.030 - 0.310 (0,76 - 7,87 mm) for 20% of the measurements.

4 If the gap (distance) does not meet the requirements, adjust the actuator length as necessary.

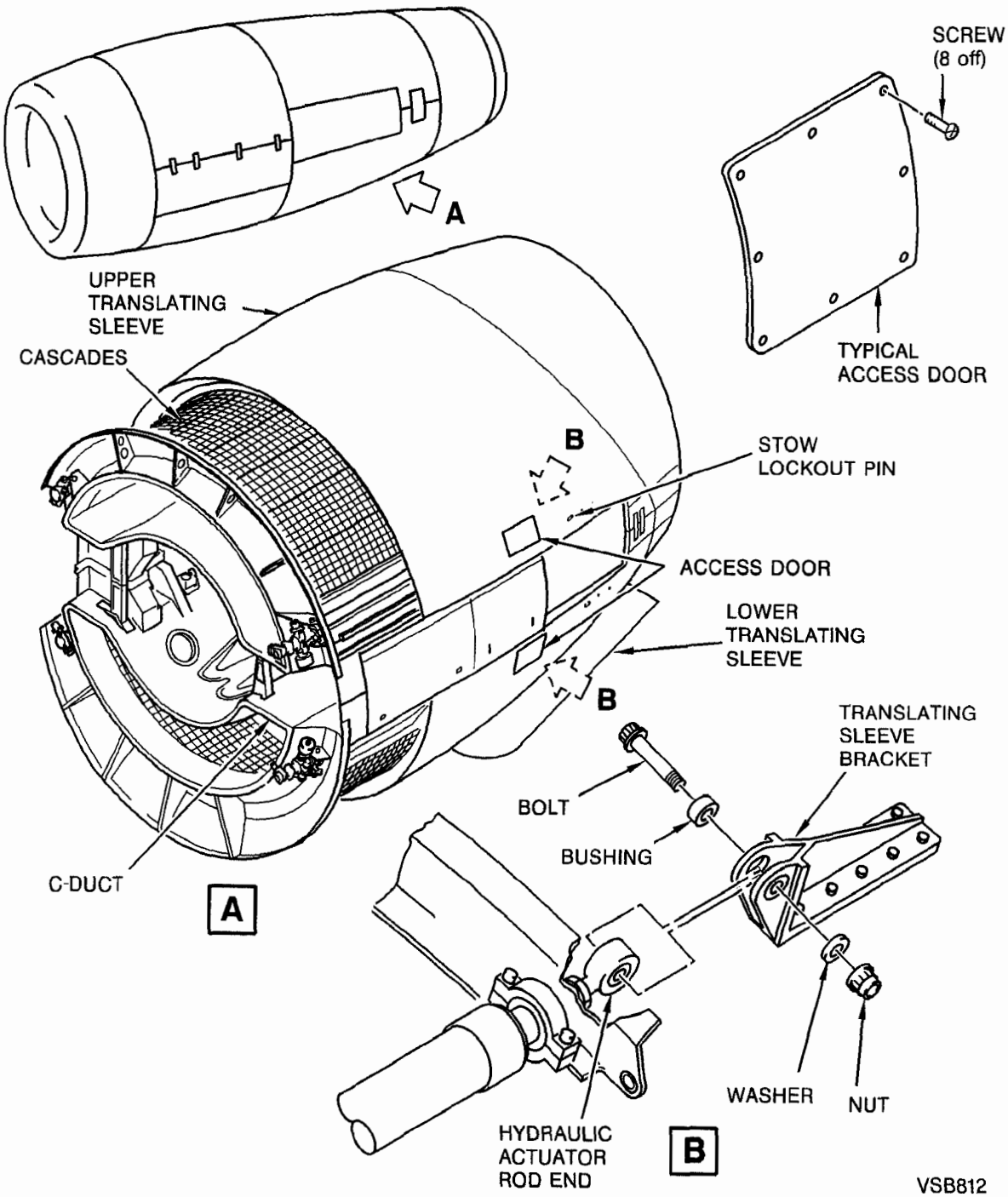
NOTE: If actuator length adjustment is required, you must adjust the length of both actuators on the same thrust reverser half by the same amount.

NOTE: Adjustment of the actuator rod end will change the actuator length. The actuator rod end can be adjusted + 0.25 inch (+ 6.35 mm) from its factory set length. Make sure you do not exceed this limit (the distance from the face of the locknut to the center of the rod end, as shown in Figure 3, must be 1.60 inch (40,40 mm) maximum).

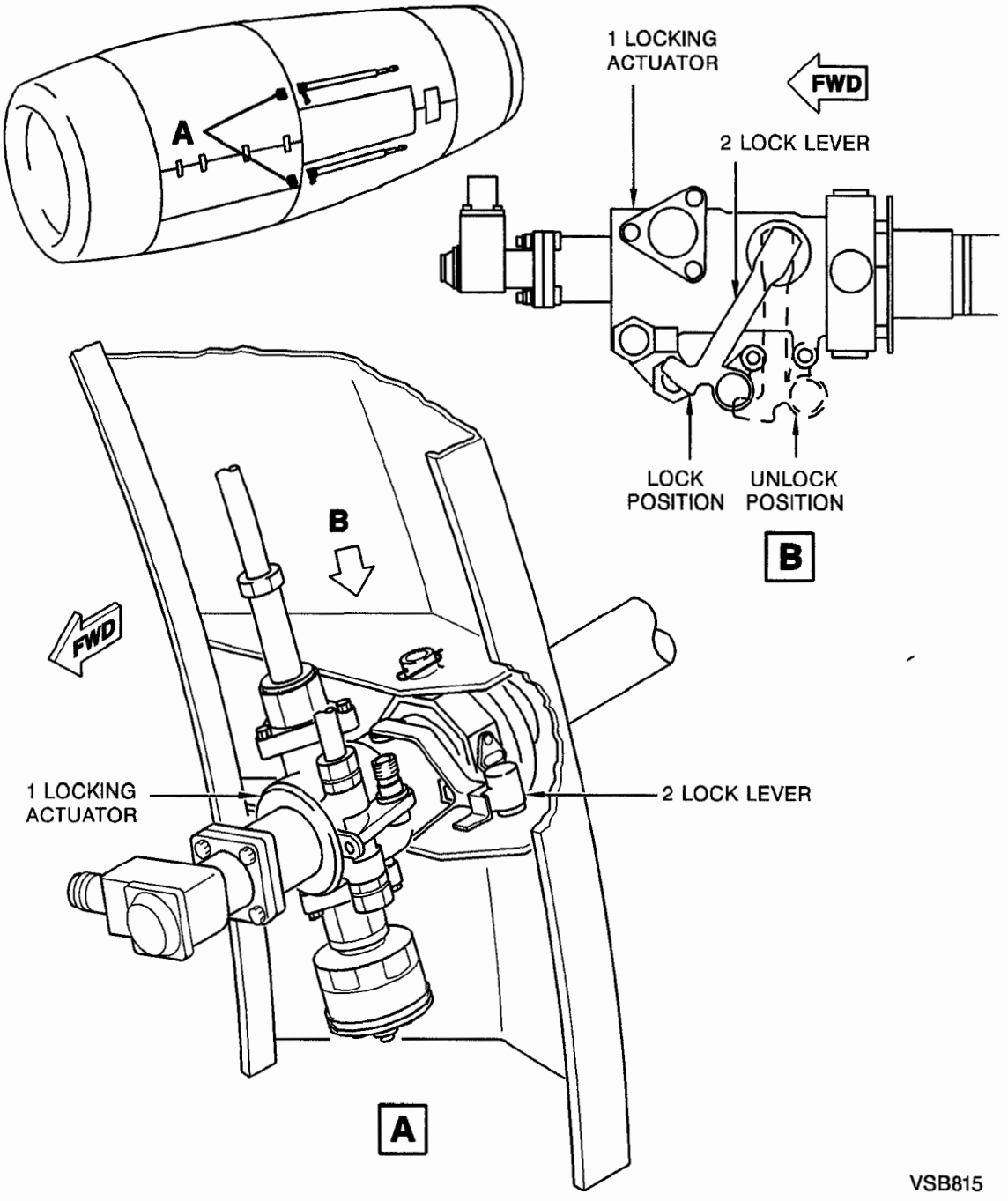
NOTE: One full turn of the rod end, while you hold the piston rod, will change the actuator overall length + 0.056 inch (+ 1,42 mm), or a half turn will change the length + 0.028 inch (+ 0.71 mm).

D. Record of Accomplishment

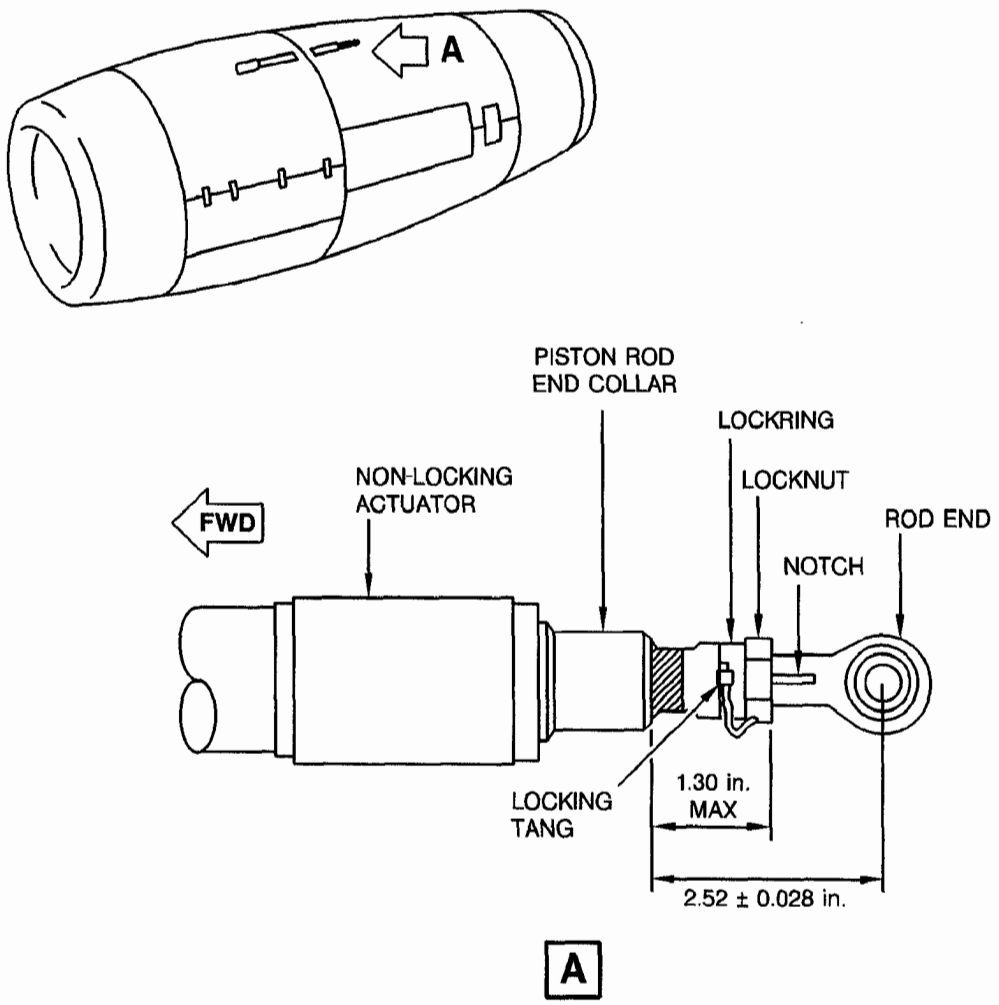
A record of accomplishment is necessary. Write in the applicable records and metal stamp, electroetch, or vibroetch on the thrust reverser data plate that Service Bulletin V2500-NAC-78-0173 has been done. Refer to the IAE V2500 Standard Practices/Processes Manual, Chapter 70-09-00.




Thrust Reverser Actuator and Translating Sleeve Rigging
Figure 1




Thrust Reverser Actuator and Translating Sleeve Rigging
Figure 2

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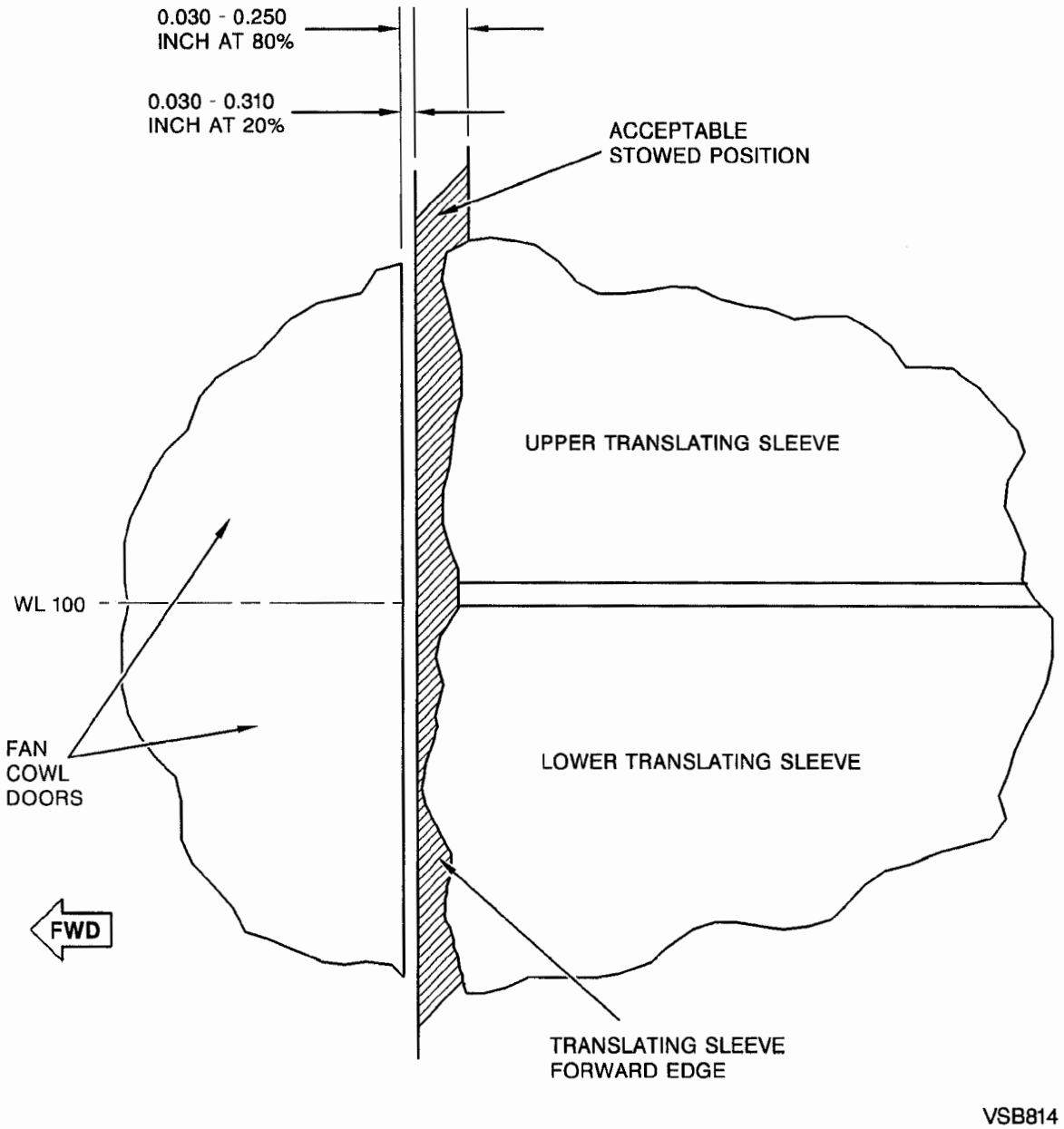
Thrust Reverser Actuator and Translating Sleeve Rigging
Figure 3




Thrust Reverser Actuator and Translating Sleeve Rigging
Figure 4

TR W **Aeronautical Systems - Lucas Aerospace**

SERVICE BULLETIN

1801-78-L1801-04

## TRW Aeronautical Systems - Lucas Aerospace

# REVISION TRANSMITTAL

TO: THE HOLDERS OF TRW AERONAUTICAL SYSTEMS LUCAS AEROSPACE SERVICE BULLETIN 1801-78-L1801-04 FOR INNER ACTUATOR TY1801.

THIS PAGE TRANSMITS REVISION NO. 1 TO THE SERVICE BULLETIN 1801-78-L1801-04

Reason for the Revision

The List of Components and Figure 2 amended, part marking information added, CSC contact numbers updated and several minor changes introduced.

Action

Refer to the Revision State of the Bulletin and make sure that all the previous revisions have been incorporated.

Remove and destroy pages 1 thru 14 insert new pages 1 thru 14.

Revision State of the Bulletin

| Page | Revision |
|---|---|
| 1 thru 14 | 1 |

APPROVED FOR TRW AERONAUTICAL SYSTEMS LUCAS AEROSPACE

| | |
|---|---|
| ..... | ..... |
| Technical Manager Product Support | Specialist Engineer Airworthiness |

THIS PAGE IS NOT USED

# TR W Aeronautical Systems - Lucas Aerospace

# SERVICE BULLETIN

1801-78-L1801-04

ENGINE - INNER ACTUATOR TY1801-03
Introduction of an Actuator with Improved Piston Rod Sealing.

MODIFICATION L1801-04

1. Planning Information

A. Effectivity

V2500/D5 Inner Actuator TY1801.

B. Concurrent Requirements

It is recommended that all earlier modifications (L1801-02 (SB1801-78-L1801-02) and L1801-04 (SB1801-78-L1801-04)) are incorporated. If all modifications have been incorporated the unit can be identified as a -50 standard.
If all modifications have not been incorporated, only the unit amendment section should be marked to list the modification(s) that have been incorporated.

C. Reason

Cases have occurred where actuators have exhibited reduced reliability due to excessive external leaks from the piston rod seal. This modification introduces an improved piston rod/piston rod guide interface.

D. Description

(1) This Service Bulletin (SB) introduces a new rod gland and a new piston assembly. The new piston assembly has a chrome plated and superfinished piston rod. The rod gland is modified to provide additional piston rod support and improved internal sealing.

(2) This SB may be incorporated with either of the methods described in para 2. Material Information. Piston assemblies returned to TRW Aeronautical Systems Lucas Aerospace under option 1 will be repaired with a surface coating of tungsten carbide. Piston rods coated with tungsten carbide are an approved alternative to the new chrome plated rods.

E. Compliance

Incorporation of this modification is recommended.

F. Manpower

Approximately 12.25 man-hours are required to disassemble, clean, check, assemble and test in accordance with TRW Aeronautical Systems Lucas Aerospace Component Maintenance Manual (CMM) 78-31-13.

G. Weight and Balance

No change.

Original Issue 29/11/00
Revision No. 1 May 7/02

H. Electrical Load Data

No Change.

J. Software Accomplishment Summary

None

K. References

Aircraft Maintenance Manual and TRW Aeronautical Systems Lucas Aerospace Component Maintenance Manual (CMM) 78-31-13.

L. Other Publications Affected

TRW Aeronautical Systems Lucas Aerospace Component Maintenance Manual (CMM) 78-31-13.

M. Interchangeability or Intermixability of Parts

Two way - either the old or new part number unit may be used.

N. Warranty

Confirmed failures during the standard warranty period of 3 years will have the modification implemented at no cost to the operator.

2. Material Information

A. Material - Price and Availability

(1) The following options are available to incorporate this Service Bulletin:

Option 1

Send the actuator to TRW Aeronautical Systems Lucas Aerospace. TRW Aeronautical Systems Lucas Aerospace will, if possible, repair the existing piston and nut machining assembly CH1802A0003 at a cost of US$ 12,714.11, with a turn round time of thirty (30) days from receipt. The price quoted includes:

- Disassembly of the unit and removal of the defective piston
- Cleaning of removed parts and new parts
- Check of removed parts and new parts prior to assembly
- The cost of the new parts
- The cost of a repaired piston assembly

- The cost of a new rod gland assembly, rod seal and scraper
- Assembly of the unit
- Testing of the unit

A repaired piston and nut machining assembly part number CH1802A0003 will be re-identified as Part Number CH1802A0003-LRS8424.

NOTE: Parts, other than the piston and nut machining assembly, found unserviceable during the repair procedure shall be replaced and charged at additional cost.

Option 2

As Option 1 except TRW Aeronautical Systems Lucas Aerospace will replace the existing piston and nut machining assembly with a new chromed piston and nut machining assembly CH1802A0013 at a cost of US$ 13,784.80.

NOTE: Parts, other than the piston and nut machining assembly, found unserviceable during the replacement procedure shall be replaced and charged at an additional cost.

(2) For options 1 and 2, mod kit CH1541-00 SHT 6 is included in the stated price. The mod kit has a delivery time of thirty (30) days.

(3) For options 1 and 2, send the actuator or piston and nut machining assembly to your nearest TRW Aeronautical Systems Lucas Aerospace Customer Service Centre (CSC) (Ref para (7)).

(4) Piston and nut machining assembly CH1802A0013 and mod kit CH1541-00 SHT 6 can be ordered from any TRW Aeronautical Systems Lucas Aerospace Customer Service Centre (CSC) (Ref para (7)).

(5) The prices and provisions contained in this Service Bulletin are valid until 31/12/02. After that date, please refer to the spare parts catalogue or request a quotation from TRW Aeronautical Systems Lucas Aerospace.

(6) The Piston and Nut Assembly (CH1802A0003) should be returned to TRW Aeronautical Systems Lucas Aerospace Customer Service Centre (CSC) (Ref para (7)) for LRS8424 to be done.

(7) TRW Aeronautical Systems Lucas Aerospace Customer Support Centres (CSC):

| | |
|---|---|
| TRW Aeronautical Systems<br>Lucas Aerospace CSC.<br>Stratford Road,<br>Solihull,<br>West Midlands B90 4LA.<br>England. | Phone: (44) (0)121 451 5999<br>Fax: (44) (0)121 451 5881<br>AOG: (44) (0)121 451 5904<br>Sita/Arinc: BHXLW7X |
| TRW Aeronautical Systems<br>Lucas Aerospace CSC and Repair Base.<br>30, Van Nostrand Avenue,<br>Englewood,<br>New Jersey 07631.<br>USA | Phone: (1) 201 567 6400<br>Telex: 135374 LUCASAEROEGW<br>Fax: (1) 201 894 1965<br>AOG: (1) 201 567 6411<br>Sita/Arinc: EWRLU7X |
| TRW Aeronautical Systems<br>Lucas Aerospace CSC<br>Lucas Taeco Aerospace (Xiamen) Co Ltd<br>Taeco Maintenance Hangar<br>Gaoqi International Airport<br>Xiamen<br>Fujian<br>Peoples Republic Of China | Phone: (86) 592 573 0089<br>Fax: (86) 592 573 0090<br>AOG: (86) 592 573 1098<br>Sita/Arinc: BJSLU7X |
| TRW Aeronautical Systems<br>Lucas Aerospace CSC<br>35-37 Loyang Way<br>Singapore 508733 | Phone: (65) 545 9975<br>Fax: (65) 545 9965<br>AOG: (65) 545 6253<br>Sita/Arinc: SINLU7X |

B. Industry Support Information

None

C. List of Components

One of the following mod kit is required to accomplish this Service Bulletin on one inner actuator:

| | New P/N | Keyword | Old P/N | Qty | Special Instructions/ Disposition |
|---|---|---|---|---|---|
| Option 1 | CH1802A0003-LRS8424 | Piston and Nut Assembly | CH1802A0003 | 1 | TRW Rework to CH11802A0003-LRS8424 (Tungsten Carbide Coating) |

| | New P/N | Keyword | Old P/N | Qty | Special Instructions/ Disposition |
|---|---|---|---|---|---|
| Option 2 | CH1802A0013 | Piston and Nut Assembly | CH1802A0003 | 1 | Scrap |
| | CH1541-00 SHT6 | Mod Kit | | 1 | |
| | Comprising: | | | | |
| | WEZHA10123T05 | DC Excluder | - | 1 | |
| | | Scraper | CH250253-1 | 1 | Scrap |
| | RAZHAK0027 | Wedgepak Seal Set | - | 1 | |
| | | Rod Seal | CH250398 | 1 | Scrap |
| | CH1541P0218 | Rod Gland Assembly | - | 1 | |
| | | Rod Guide | CH1541-0098 | 1 | Scrap |
| | CH1541-0225 | Locking Cup | - | 1 | |
| | | Lockwasher | CH1541-0034 | 1 | Scrap |
| | Displacement Parts Included in Mod Kit CH1541-00 SHT6 | | | | |
| | CH250113-1 | Piston Seal AGT Ring | - | 1 | |
| | CH250285 | End Cap GTL Ring Seal | - | 1 | |
| | CH101-42-020 | O-Ring Seal | - | 2 | |
| | CH101-42-906 | O-Ring Seal | - | 2 | |
| | CH250397-1 | Piston Seal | - | 1 | |
| | CH1541-0086 | Bearing Ring | - | 1 | |
| | NAS1611-118 | O-Ring Seal | - | 1 | |
| | CH125-03-0213 | Shim Solid | - | 1 | |

D. Tooling

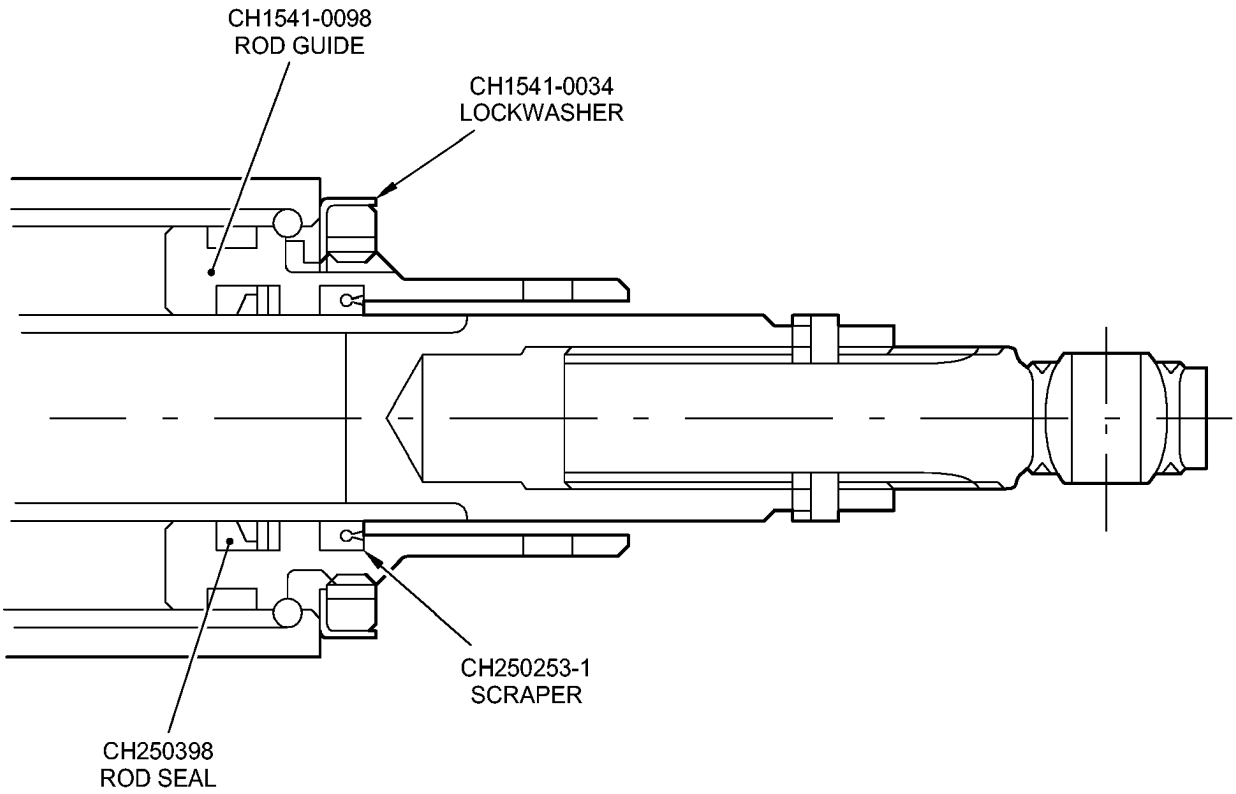
Refer to CMM 78-31-13

(1) Special Tools

A673856 Settling Plug

ENGINE - INNER ACTUATOR TY1801-03
Introduction of an Actuator with Improved Piston Rod Sealing.

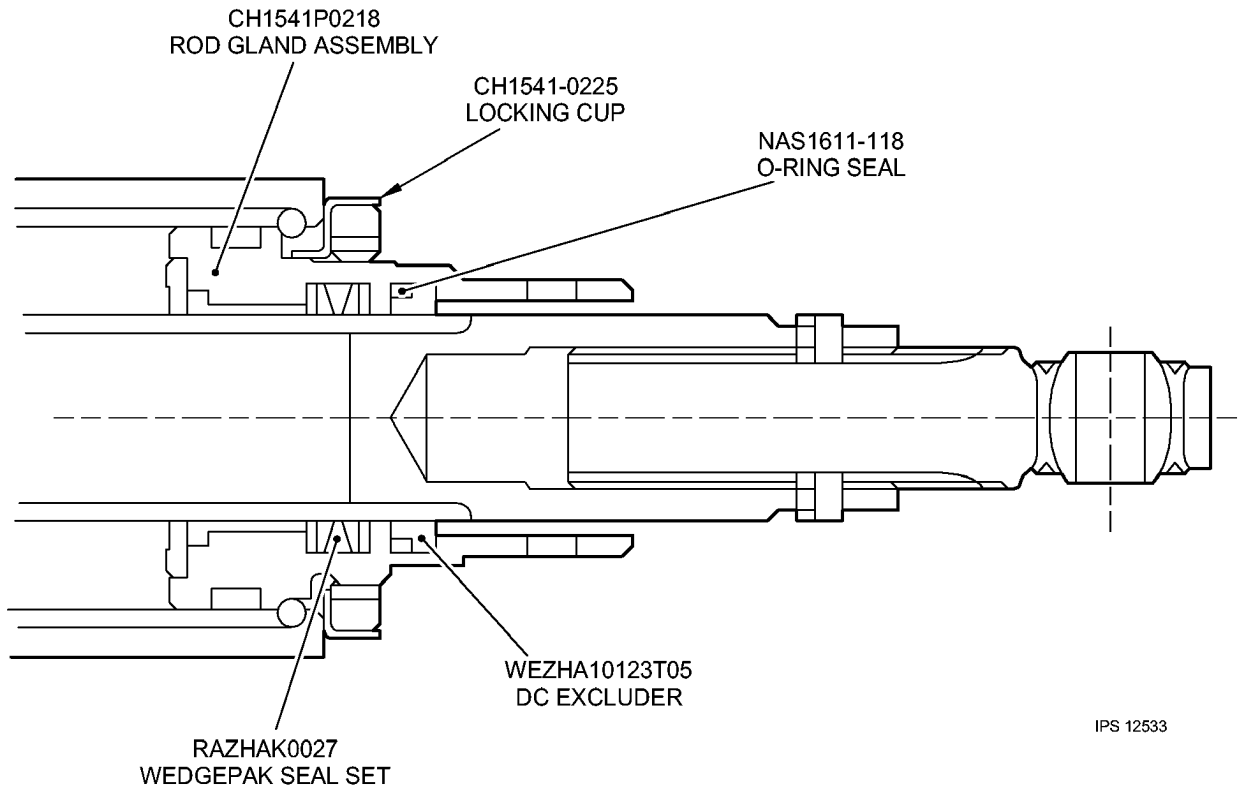
MODIFICATION L1801-04




Pre Mod L1801-04
Figure 1

ENGINE - INNER ACTUATOR TY1801-03
Introduction of an Actuator with Improved Piston Rod Sealing.

MODIFICATION L1801-04




Post Mod L1801-04
Figure 2

3. Accomplishment Instructions (Refer to Component Maintenance Manual (CMM) 78-31-13)

WARNING: REFER TO THE PAGE OF WARNINGS AND CAUTIONS IN CMM 78-31-13 BEFORE YOU DO THIS TASK.

A. Procedure

(1) Remove the defective piston and nut machining assembly (Ref DISASSEMBLY).

CAUTION: HANDLE THE NEW PISTON ROD WITH CARE TO AVOID DAMAGE TO THE SURFACE.

(2) Clean the disassembled and the new parts (Ref CLEANING).

(3) Examine the disassembled and the new parts (Ref CHECK).

(4) Install the new or repaired piston and nut machining assembly (Ref ASSEMBLY) as instructed in paragraphs 5A through 5G.

(5) Ignore para 5H (Ref ASSEMBLY) and install the rod gland assembly as follows (Ref Fig 2, 3 and 4, and Ref CMM 78-31-13 Fig 302):

(a) With the Seal Assembly Tool CHA1542-0037, install the piston seal (340, Fig 302) on the rod gland assembly (CH1541P0218).

(b) Lubricate the wedgepak seal set (RAZHAK0027) components with Skylube fluid.

(c) Insert the first backing ring in rod gland assembly (CH1541P0218).

(d) Insert the first wedge backing in the rod gland assembly.

(e) With the Setting Plug A673856, insert the wedge seal in the rod gland assembly.

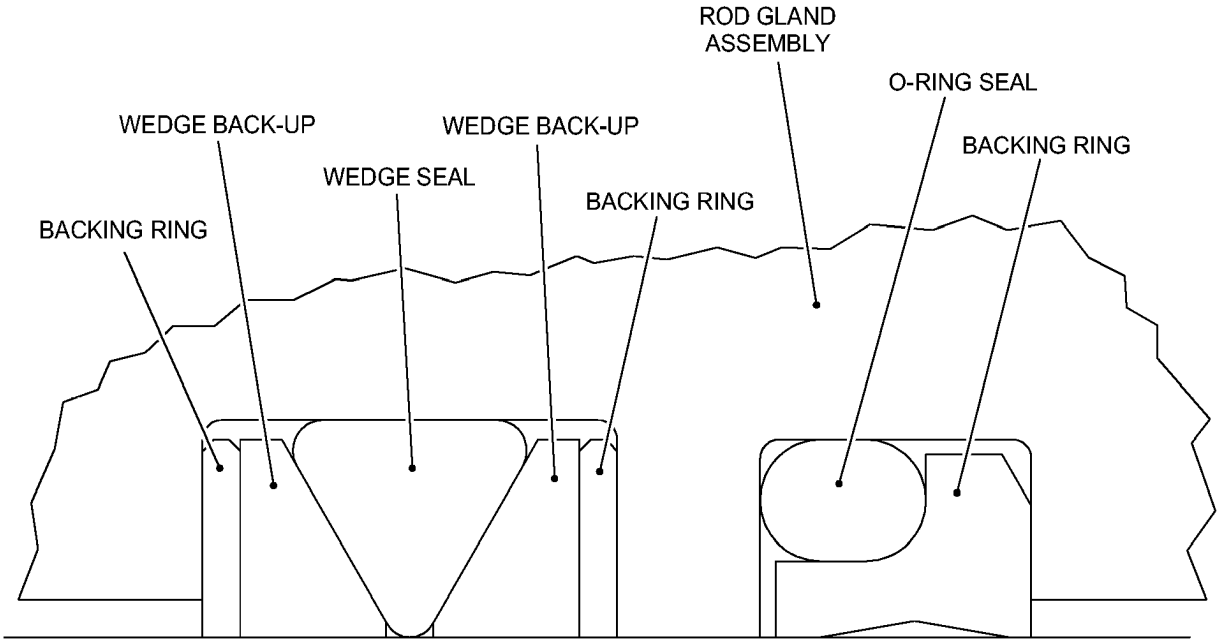
(f) Insert the second wedge backing in the rod gland assembly.

(g) Insert the second backing ring the rod gland assembly.

(h) Visually examine the rod seal components to make sure they are in correct position.

(j) Lubricate the DC excluder (WEZHA10123T05) components with Skylube fluid.

(k) Install the DC Excluder O-ring seal (NAS 1611-118) in the rod gland assembly (CH1541P0218) followed by the backing ring, making sure that the O-ring seal is engaged on the backing ring.




Rod Seal and Scraper
Figure 3

(l) Install the Settling Block CHA1542-0041 on the piston seal (340, Fig 302), refer to ASSEMBLY para 1C (1).

(m) Install the Settling Plug CH1542-0043 in the wedgepak seal set (RAZHAK0027), refer to ASSEMBLY para 1C (1).

(n) Put the rod gland assembly (CH1541P0218) and assembled parts in Cardice, refer to ASSEMBLY para 1C (2).

WARNING: PROTECTIVE CLOTHING, GLOVES AND GOGGLES MUST BE WORN WHEN CARDICE IS USED.

(p) Remove the rod gland assembly (CH1541P0218) from the Cardice.

WARNING: DO NOT LET THE PHOSPHATE ESTER BASE TYPE 4 TOUCH THE EYES OR THE SKIN. DO NOT BREATHE THE FLUID IF IT IS IN A MIST CONDITION. PHOSPHATE ESTER BASE 4 CAUSES IRRITATION. IF THE FLUID TOUCHES THE EYES, IMMEDIATELY FLUSH THE EYES WITH A LARGE QUANTITY OF CLEAN WATER AND GET MEDICAL AID. ALWAYS CLEAN THE HANDS FULLY, AFTER USE, WITH CLEAN WATER.

(q) Immediately remove the Settling Block and the Settling Plug from the rod gland assembly (CH1541P0218). Quickly clean the rod gland assembly in Phosphate Ester Base Type 4 to remove the ice particles.

CAUTION: INSTALL THE ROD GLAND ASSEMBLY IN THE JACK HEAD ASSEMBLY WITH THE KEY SLOT UPPERMOST (REF FIG 4).

(r) Install the rod gland assembly (CH1541P0218) in the jack head assembly with the key slot uppermost (Ref Fig 4) and position rod gland sufficient to let the retaining ring (320, Fig 302) be installed.

(s) Install the retaining ring (320, Fig 302), with the segments equally spaced, in the jack head assembly and pull the rod gland assembly (CH1541P0218) against the retaining ring.

(t) Install the locking cup (CH1541-0225) WA- and the nut (300, Fig 302) WA- on the rod gland assembly (CH1541P0218).

(u) Hold the rod gland assembly (CH1541P0218) with the holding tool CHA1542-0055. With the Dog Spanner CH1542-0054, torque tighten the nut 73,17 to 89,43Nm (54 to 66 lbf ft).

(v) Remove the Guide CHA1542-0058 from the piston brazing assembly.

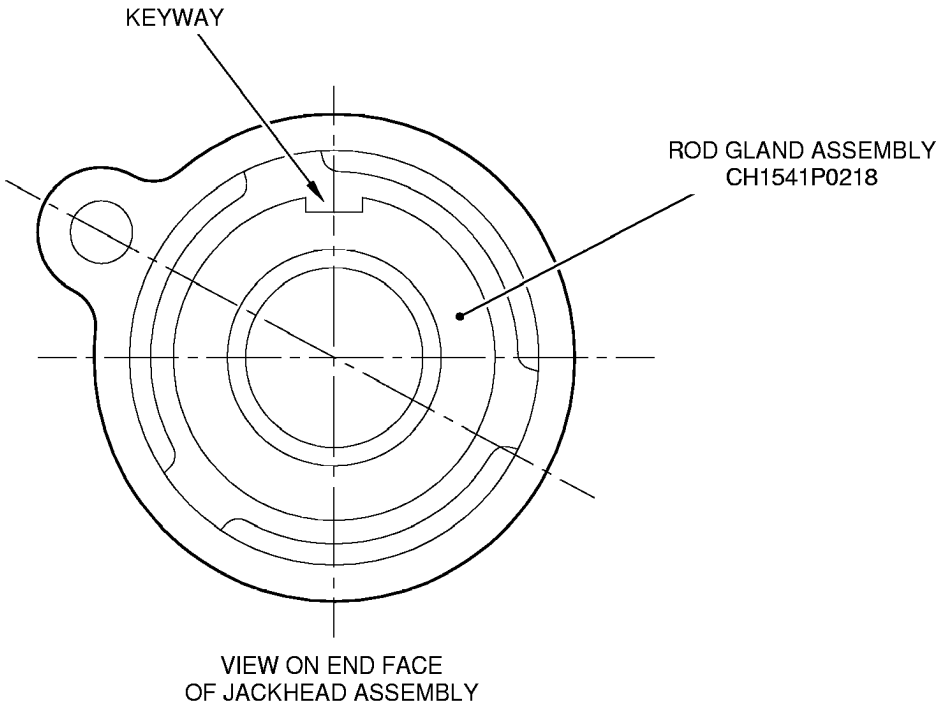
(6) Continue assembly from ASSEMBLY para L.

B. Do a Test of the Actuator (Ref TESTING AND TROUBLE SHOOTING).

(1) Do the procedures and tests given in paragraphs 1 to 4 inclusive.

C. Safety the Unit

(1) Do the Last Procedure after Functional Test (Ref ASSEMBLY para 7).




Location of Rod Gland Assembly in Jack Head Assembly
Figure 4

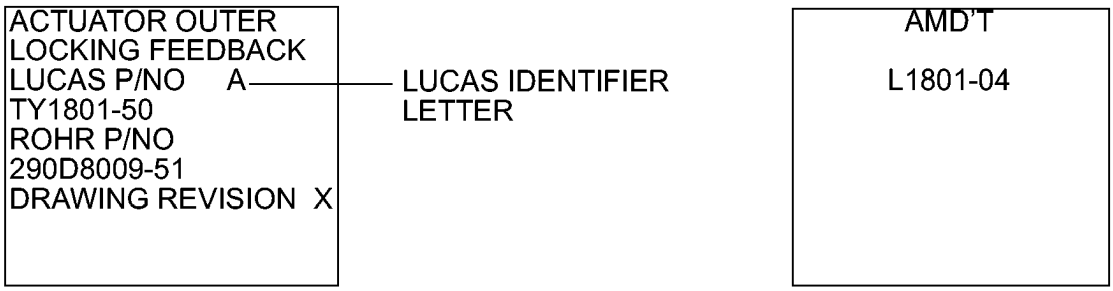
D. Re-Identify the Actuator (All modifications incorporated)

CAUTION: DO NOT USE THE VIBRO-PEEN METHOD OR METAL STAMP TO RE-IDENTIFY THE UNIT.

(1) Use the electro-chemical etch method or ink and varnish to re-identify the TY1801-03 unit (Ref Fig 5).

TY1801-03 Lucas ident letter C Re-identified as TY1801-50 Lucas ident letter A

(2) If the unit is below build standard TY1801-03 ident letter C use the electro-chemical etch method or ink and varnish to mark the modification reference number, L1801-04. The amendment section is adjacent to the nameplate section of the jack head.




Unit Nameplate and Amendment Section
Figure 5

E. Storage Instructions

(1) If the unit is not to be immediately used, do the procedures given in ASSEMBLY, para 8.

TR W **Aeronautical Systems - Lucas Aerospace**

# SERVICE BULLETIN

1801-78-L1801-04

ENGINE - INNER ACTUATOR TY1801-03
Introduction of an Actuator with Improved Piston Rod Sealing.

MODIFICATION L1801-04

APPROVED FOR TRW LUCAS AEROSPACE LIMITED

PP

Technical Manager
Product Support

Engineering Manager
Airworthiness and Technology

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TRW **Aeronautical Systems - Lucas Aerospace**

SERVICE BULLETIN

1802-78-L1802-08

## TRW Aeronautical Systems - Lucas Aerospace

# REVISION TRANSMITTAL

TO: THE HOLDERS OF TRW AERONAUTICAL SYSTEMS LUCAS AEROSPACE SERVICE BULLETIN 1802-78-L1802-08 FOR INNER ACTUATOR TY1802.

THIS PAGE TRANSMITS REVISION NO. 1 TO THE SERVICE BULLETIN 1802-78-L1802-08

Reason for the Revision

The List of Components and Figure 2 amended, part marking information added, CSC contact numbers updated and several minor changes introduced.

Action

Refer to the Revision State of the Bulletin and make sure that all the previous revisions have been incorporated.

Remove and destroy pages 1 thru 14 insert new pages 1 thru 14.

Revision State of the Bulletin

| Page | Revision |
|---|---|
| 1 thru 14 | 1 |

APPROVED FOR TRW AERONAUTICAL SYSTEMS LUCAS AEROSPACE

| | |
|---|---|
| ..... | ..... |
| Technical Manager Product Support | Specialist Engineer Airworthiness |

THIS PAGE IS NOT USED

# TRW Aeronautical Systems - Lucas Aerospace

# SERVICE BULLETIN

1802-78-L1802-08

ENGINE - LOCKING FEEDBACK ACTUATOR TY1802-04
Introduction of an Actuator with Improved Piston Rod Sealing.

MODIFICATION L1802-08

1. Planning Information

A. Effectivity

V2500/D5 Locking Feedback Actuator TY1802

B. Concurrent Requirements

It is recommended that all earlier modifications (Mods L1802-02 (SB1802-78-L1802-02), L1802-03, L1802-04 (SB1802-78-L1802-04), L1802-05 (SB1802-78-L1802-05), L1802-07 and L1802-08 (SB1802-78-L1802-08)) are incorporated. If all modifications have been incorporated, the unit can be identified as a -50 standard.
If all modifications have not been incorporated only the unit amendment section should be marked to list the modification(s) that have been incorporated.

C. Reason

Cases have occurred where actuators have exhibited reduced reliability due to excessive external leaks from the piston rod seal. This modification introduces an improved piston rod/piston rod guide interface.

D. Description

This Service Bulletin (SB) introduces a new rod gland and a new piston assembly. The new piston assembly has a chrome plated and superfinished piston rod. The rod gland is modified to provide additional piston rod support and improved internal sealing.

This SB may be incorporated with either of the methods described in para 2. Material Information. Piston assemblies returned to TRW Aeronautical Systems Lucas Aerospace under option 1 will be repaired with a coating of tungsten carbide. Piston rods coated with tungsten carbide are an approved alternative to the new chrome plated rods.

E. Compliance

Incorporation of this modification is recommended.

F. Manpower

Approximately 12.25 man-hours are required to disassemble, clean, check, assemble and test in accordance with TRW Aeronautical Systems Component Maintenance Manual (CMM) 78-31-14.

G. Weight and Balance

No change.

H. Electrical Load Data

No Change.

J. Software Accomplishment Summary

None

K. References

Aircraft Maintenance Manual and TRW Aeronautical Systems Lucas Aerospace Component Maintenance Manual (CMM) 78-31-14.

L. Other Publications Affected

TRW Aeronautical Systems Lucas Aerospace Component Maintenance Manual (CMM) 78-31-14.

M. Interchangeability or Intermixability of Parts

Two way - either the old or new part number unit may be used.

N. Warranty

Confirmed failures during the standard warranty period of 3 years will have the modification implemented at no cost to the operator.

2. Material Information

A. Material - Price and Availability

(1) The following options are available to incorporate this Service Bulletin:

Option 1

Send the actuator to TRW Aeronautical Systems Lucas Aerospace. TRW Aeronautical Systems Lucas Aerospace will, if possible, repair the existing piston and nut machining assembly CH1541A0102 at a cost of US$ 12,714.11, with a turn round time of thirty (30) days from receipt. The price quoted includes:

- Disassembly of the unit and removal of the defective piston
- Cleaning of removed parts and new parts
- Check of removed parts and new parts prior to assembly
- The cost of the new parts
- The cost of a repaired piston assembly

- The cost of a new rod gland assembly, rod seal and scraper
- Assembly of the unit
- Testing of the unit.

A repaired piston and nut machining assembly part number CH1541A0102 will be re-identified as Part Number CH1541A0102-LRS8424.

NOTE: Parts, other than the piston and nut machining assembly, found unserviceable during the repair procedure shall be replaced and charged at additional cost.

Option 2

As Option 1 except TRW Aeronautical Systems Lucas Aerospace will replace the existing piston and nut machining assembly with a new chromed piston and nut machining assembly CH1541A0201 at a cost of US$ 15,020.65.

NOTE: Parts, other than the piston and nut machining assembly, found unserviceable during the replacement procedure shall be replaced and charged at an additional cost.

(2) For options 1 and 2, mod kit CH1541-00 SHT 5 is included in the stated price. The mod kit has a delivery time of thirty (30) days.

(3) For options 1 and 2, send the actuator or piston and nut machining assembly to your nearest TRW Aeronautical Systems Lucas Aerospace Customer Service Centre (CSC) (Ref para (7)).

(4) Piston and nut machining assembly CH1541A0201 and mod kits CH1541-00 SHT 5 and 6 can be ordered from any TRW Aeronautical Systems Lucas Aerospace Customer Service Centre (CSC) (Ref para (7)).

(5) The prices and provisions contained in this Service Bulletin are valid until 31/12/02. After that date, please refer to the spare parts catalogue or request a quotation from TRW Aeronautical Systems Lucas Aerospace.

(6) The Piston and Nut Assembly (CH1541A0102) should be returned to TRW Aeronautical Systems Lucas Aerospace Customer Service Centre (CSC), (Ref para (7)) for LRS8424 to be done.

(7) TRW Aeronautical Systems Lucas Aerospace Customer Support Centres (CSC):

| | |
|---|---|
| TRW Aeronautical Systems<br>Lucas Aerospace CSC.<br>Stratford Road,<br>Solihull,<br>West Midlands B90 4LA.<br>England. | Phone: (44) (0)121 451 5999<br>Fax: (44) (0)121 451 5881<br>AOG: (44) (0)121 451 5904<br>Sita/Arinc: BHXLW7X |
| TRW Aeronautical Systems<br>Lucas Aerospace CSC and Repair Base.<br>30, Van Nostrand Avenue,<br>Englewood,<br>New Jersey 07631.<br>USA | Phone: (1) 201 567 6400<br>Telex: 135374 LUCASAEROEGW<br>Fax: (1) 201 894 1965<br>AOG: (1) 201 567 6411<br>Sita/Arinc: EWRLU7X |
| TRW Aeronautical Systems<br>Lucas Aerospace CSC<br>Lucas Taeco Aerospace (Xiamen) Co Ltd<br>Taeco Maintenance Hangar<br>Gaoqi International Airport<br>Xiamen<br>Fujian<br>Peoples Republic Of China | Phone: (86) 592 573 0089<br>Fax: (86) 592 573 0090<br>AOG: (86) 592 573 1098<br>Sita/Arinc: BJSLU7X |
| TRW Aeronautical Systems<br>Lucas Aerospace CSC<br>35-37 Loyang Way<br>Singapore 508733 | Phone: (65) 545 9975<br>Fax: (65) 545 9965<br>AOG: (65) 545 6253<br>Sita/Arinc: SINLU7X |

B. Industry Support Information

None

C. List of Components

The following mod kit is required to accomplish this Service Bulletin on one locking feedback actuator:

| | New P/N | Keyword | Old P/N | Qty | Special Instructions/ Disposition |
|---|---|---|---|---|---|
| Option 1 | CH1541A0102-LRS8424 | Piston and Nut Assembly | CH1541A0102 | 1 | TRW Rework to CH1541A102-LRS8424 (Tungsten Carbide Coating) |

MODIFICATION L1802-08

| | New P/N | Keyword | Old P/N | Qty | Special Instructions/ Disposition |
|---|---|---|---|---|---|
| Option 2 | CH1541A0201 | Piston and Nut Assembly | CH1541A0102 | 1 | Scrap |
| | CH1541-00SHT5 | Mod Kit | | 1 | |
| | Comprising: | | | | |
| | WEZHA10123T05 | DC Excluder | - | 1 | |
| | | Scraper | CH250253-1 | 1 | Scrap |
| | RAZHAK0027 | Wedgepak Seal Set | - | 1 | |
| | | Rod Seal | CH250398 | 1 | Scrap |
| | CH1541P0218 | Rod Gland Assembly | - | 1 | |
| | | Rod Guide | CH1541-0098 | 1 | Scrap |
| | CH1541-0225 | Locking Cup | - | 1 | |
| | | Lockwasher | CH1541-0034 | 1 | Scrap |
| | Displacement Parts Included in Mod Kit CH1541-00SHT5 | | | | |
| | CH250113-1 | Piston Seal AGT Ring | - | 1 | |
| | CH250285 | End Cap GTL Ring Seal | - | 1 | |
| | CH101-42-020 | O-Ring Seal | - | 2 | |
| | CH101-42-906 | O-Ring Seal | - | 2 | |
| | CH250397-1 | Piston Seal | - | 1 | |
| | CH250113-2 | Piston Seal AGT Ring (SCD) | - | 1 | |
| | CH250113-3 | Piston Seal AGT Ring (SCD) | - | 1 | |
| | 91223223 | Screw | - | 4 | |
| | CH250284-1 | Roll Pin (Metric) | - | 4 | |
| | CH1541-0086 | Bearing Ring | - | 1 | |
| | NAS1611-118 | O-Ring Seal | - | 1 | |
| | CH125-03-0213 | Shim Solid | - | 1 | |

D. Tooling

Refer to CMM 78-31-14

(1) Special Tools

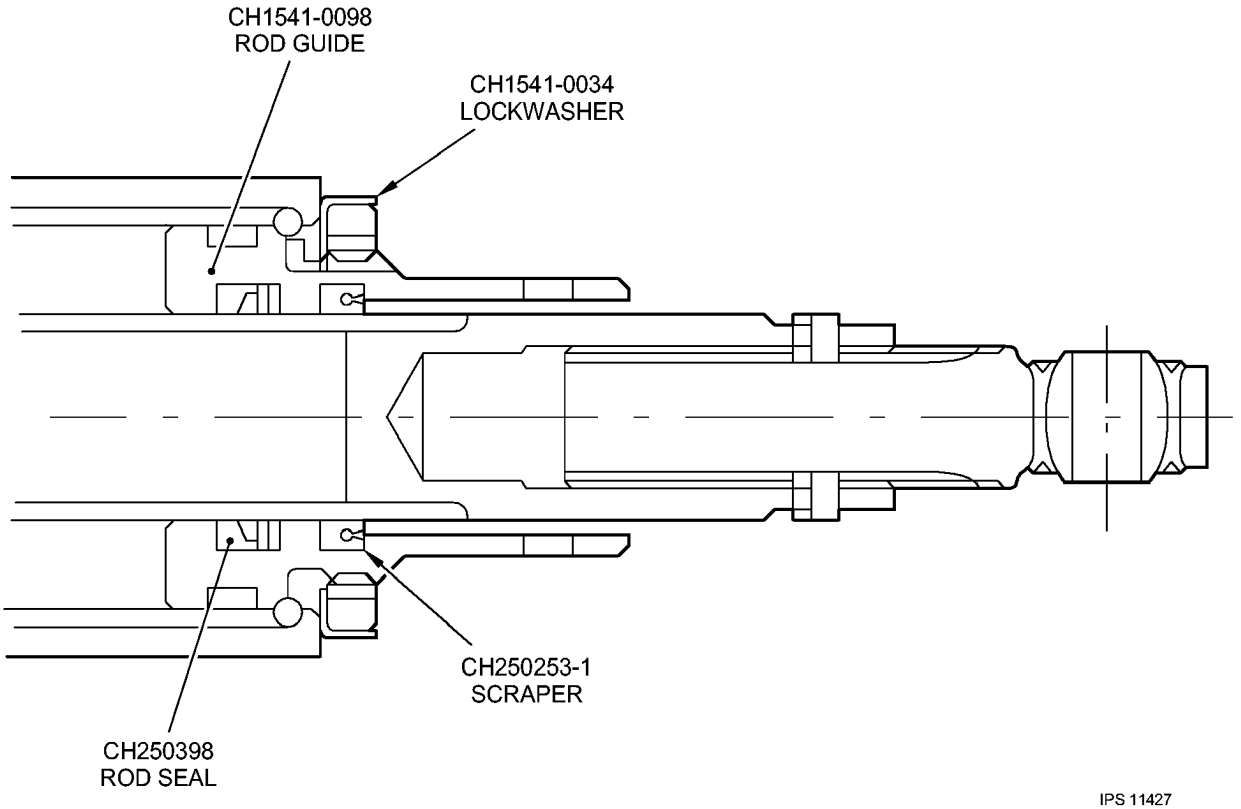
A673856 Settling Plug

# SERVICE BULLETIN

1802-78-L1802-08

ENGINE - LOCKING FEEDBACK ACTUATOR TY1802-04
Introduction of an Actuator with Improved Piston Rod Sealing.

MODIFICATION L1802-08



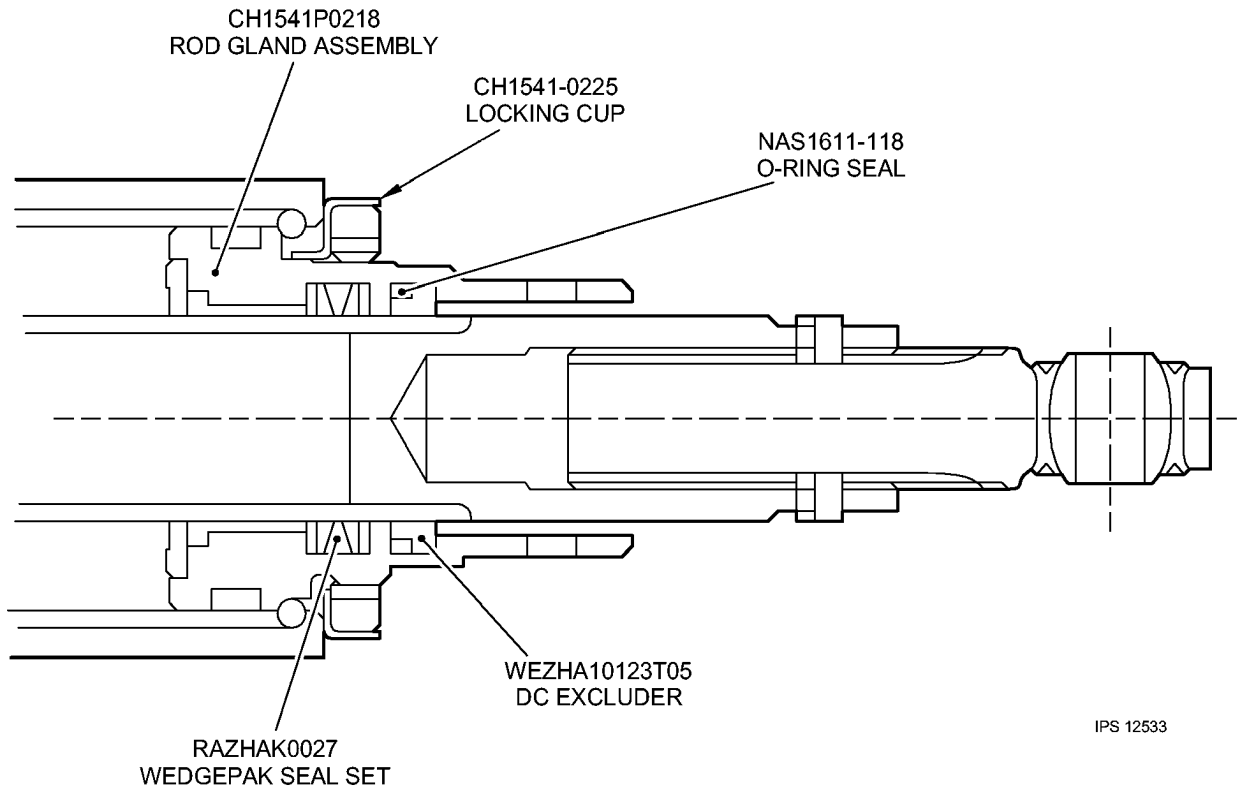

Pre Mod L1802-08
Figure 1

# SERVICE BULLETIN

1802-78-L1802-08

ENGINE - LOCKING FEEDBACK ACTUATOR TY1802-04
Introduction of an Actuator with Improved Piston Rod Sealing.

MODIFICATION L1802-08




Post Mod L1802-08
Figure 2

3. Accomplishment Instructions (Refer to Component Maintenance Manual (CMM) 78-31-14)

WARNING: REFER TO THE PAGE OF WARNINGS AND CAUTIONS IN CMM 78-31-14 BEFORE YOU DO THIS TASK.

A. Procedure

(1) Remove the defective piston and nut machining assembly (Ref DISASSEMBLY).

CAUTION: HANDLE THE NEW PISTON ROD WITH CARE TO AVOID DAMAGE TO THE SURFACE.

(2) Clean the disassembled and the new parts (Ref CLEANING).

(3) Examine the disassembled and the new parts (Ref CHECK).

(4) Install the new or repaired piston and nut machining assembly (Ref ASSEMBLY) as instructed in paragraphs 5A through 5J.

(5) Ignore para 5K (Ref ASSEMBLY) and install the rod gland assembly as follows (Ref Fig 2, 3 and 4 and CMM 78-31-14 Fig 302):

(a) With the Seal Assembly Tool CHA1542-0037, install the piston seal (470, Fig 302) on the rod gland assembly (CH1541P0218).

(b) Lubricate the wedgepak seal set (RAZHAK0027) components with Skylube fluid.

(c) Insert the first backing ring in rod gland assembly (CH1541P0218).

(d) Insert the first wedge backing in the rod gland assembly.

(e) With the Settling Plug A673856, insert the wedge seal in the rod gland assembly.

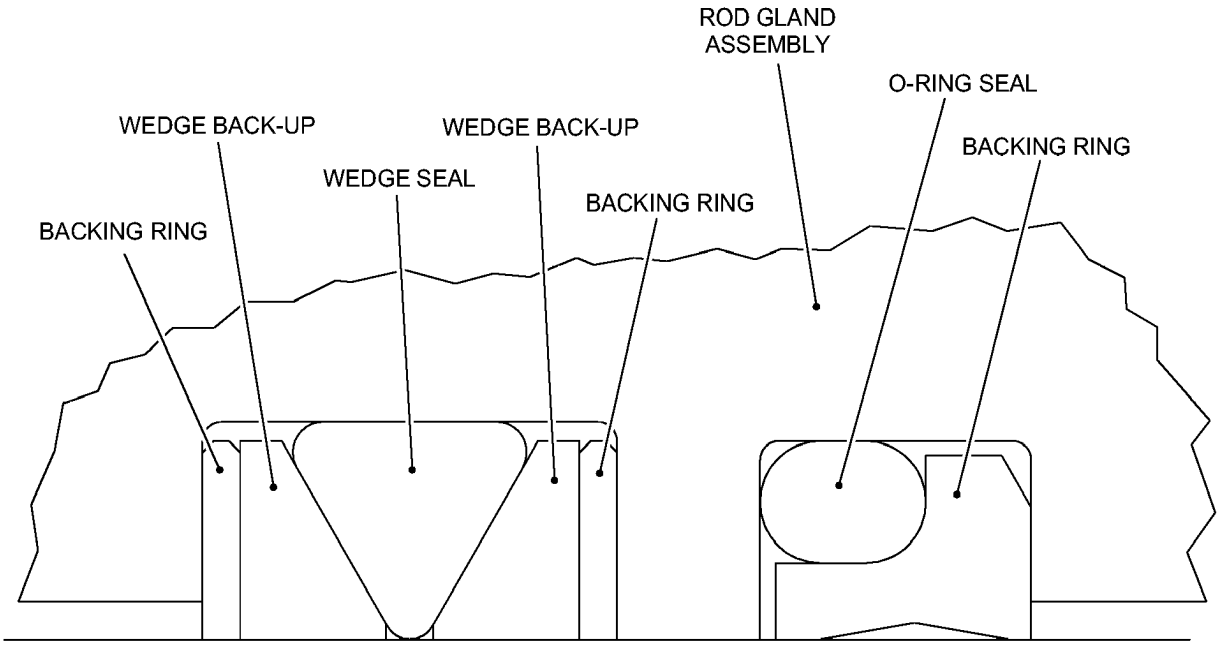
(f) Insert the second wedge backing in the rod gland assembly.

(g) Insert the second backing ring in the rod gland assembly.

(h) Visually examine the rod seal components to make sure they are in correct position.

(j) Lubricate the DC excluder (WEZHA10123T05) components with Skylube fluid.

(k) Install the DC Excluder O-ring seal in the rod gland assembly (CH1541P0218) followed by the backing ring, making sure that the O-ring seal is engaged on the backing ring.




Post Mod Rod Seal and Scraper
Figure 3

(l) Install the Settling Block CHA1542-0041 on the piston seal (470, Fig 302), refer to ASSEMBLY para 1C (1).

(m) Install the Settling Plug CH1542-0043 in the wedgepak seal set (RAZHAK0027), refer to ASSEMBLY para 1C (1).

(n) Put the rod gland assembly (CH1541P0218) and assembled parts in Cardice, refer to ASSEMBLY para 1C (2).

WARNING: PROTECTIVE CLOTHING, GLOVES AND GOGGLES MUST BE WORN WHEN CARDICE IS USED.

(p) Remove the rod gland assembly (CH1541P0218) from the Cardice.

WARNING: DO NOT LET THE PHOSPHATE ESTER BASE TYPE 4 TOUCH THE EYES OR THE SKIN. DO NOT BREATHE THE FLUID IF IT IS A MIST CONDITION. PHOSPHATE ESTER BASE 4 CAUSES IRRITATION. IF THE FLUID TOUCHES THE EYES, IMMEDIATELY FLUSH THE EYES WITH A LARGE QUANTITY OF CLEAN WATER AND GET MEDICAL AID. ALWAYS CLEAN THE HANDS FULLY, AFTER USE, WITH CLEAN WATER.

(q) Immediately remove the Settling Block and the Settling Plug from the rod gland assembly (CH1541P0218). Quickly clean the rod gland assembly in Phosphate Ester Base Type 4 to remove the ice particles.

CAUTION: INSTALL THE ROD GLAND ASSEMBLY IN THE JACK HEAD ASSEMBLY WITH THE KEY SLOT UPPERMOST (REF FIG 4).

(r) Install the rod gland assembly (CH1541P0218) in the jack head assembly with the key slot uppermost (Ref Fig 4) and position sufficient to let the retaining ring (450, Fig 302) be installed.

(s) Install the retaining ring (450, Fig 302), with the segments equally spaced, in the jack head assembly and pull the rod gland assembly (CH1541P0218) against the retaining ring.

(t) Install the locking cup (CH1541-0225) WA- and the nut (430) WA- on the rod gland assembly (CH1541P0218).

(u) Hold the rod gland assembly (CH1541P0218) with the holding tool CHA1542-0055. With the Dog Spanner CH1542-0054, torque tighten the nut 73,17 to 89,43Nm (54 to 66 lbf ft).

(v) Remove the Guide CHA1542-0058 from the piston brazing assembly.

(6) Continue assembly from ASSEMBLY para L.

B. Do a test of the Actuator (Ref TESTING AND TROUBLE SHOOTING).

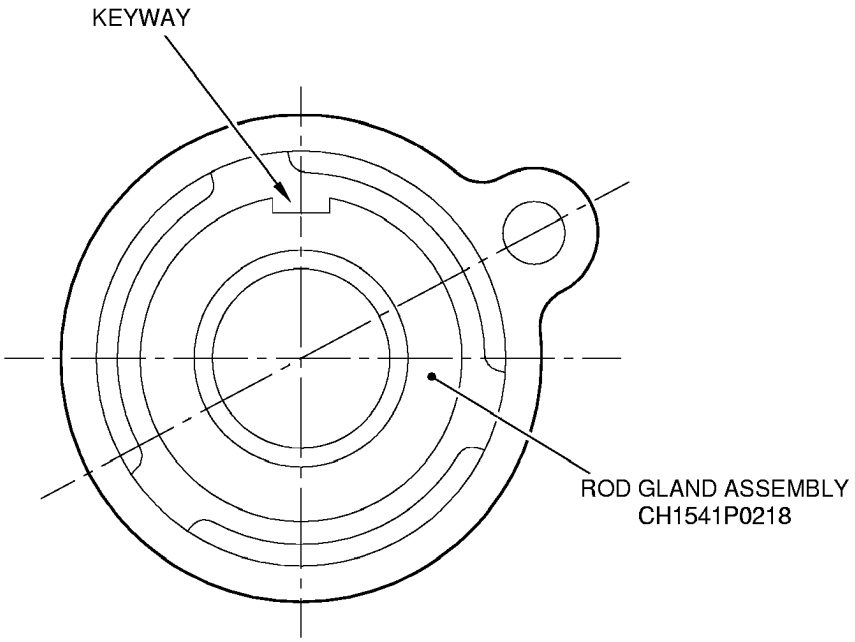
(1) Do the procedures and tests given in paragraphs 1 to 4 inclusive.

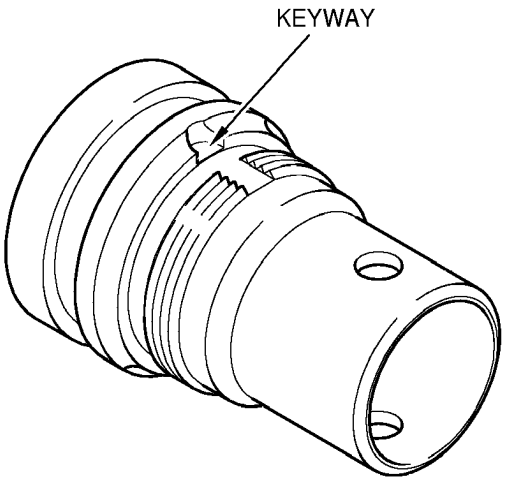
C. Safety the Unit

(1) Do the Last Procedure after Functional Test (Ref ASSEMBLY para 7).

ENGINE - LOCKING FEEDBACK ACTUATOR TY1802-04
Introduction of an Actuator with Improved Piston Rod Sealing.

MODIFICATION L1802-08




IPS 11706

Location of Rod Gland Assembly in Jack Head Assembly
Figure 4

ENGINE - LOCKING FEEDBACK ACTUATOR TY1802-04
Introduction of an Actuator with Improved Piston Rod Sealing.

MODIFICATION L1802-08

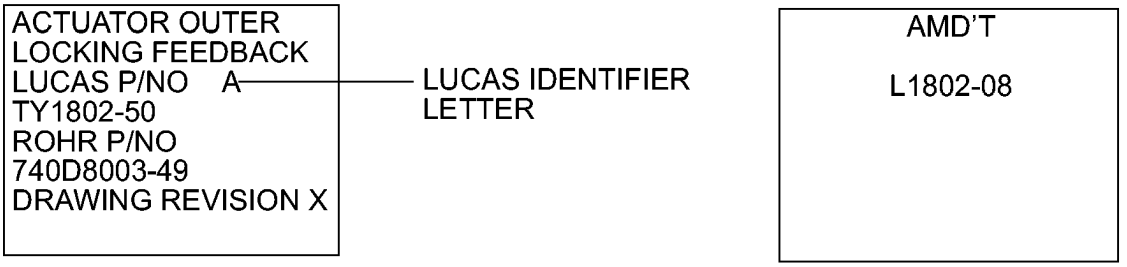
D. Re-Identify the Actuator (All modifications incorporated)

CAUTION: DO NOT USE THE VIBRO-PEEN METHOD OR METAL STAMP TO RE-IDENTIFY THE UNIT.

(1) Use the electro-chemical etch method or ink and varnish to re-identify the TY1802-04 unit (Ref Fig 5).

TY1802-04 Lucas ident letter C Re-identified as TY1802-50 Lucas ident letter A

(2) If the unit is below build standard TY1802-04 ident letter C, use the electro chemical etch or ink and varnish to mark the modification reference number, L1802-08. The amendment section is adjacent to the nameplate section on the jack head.




Unit Nameplate and Amendment Section
Figure 5

E. Storage Instructions

(1) If the unit is not to be immediately used, do the procedures given in ASSEMBLY, para 8.

TR W **Aeronautical Systems - Lucas Aerospace**

# SERVICE BULLETIN

1802-78-L1802-08

ENGINE - LOCKING FEEDBACK ACTUATOR TY1802-04
Introduction of an Actuator with Improved Piston Rod Sealing.

MODIFICATION L1802-08

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Airworthiness and Technology

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