

THRUST-REVERSER DOOR ACTUATOR - REMOVAL/INSTALLATION

EFFECTIVITY: ALL

1. General

- A. This section gives the procedures to remove and install the thrust-reverser door actuator and the actuator rod end.
- B. This procedure is applicable to the upper and the lower pivot door actuator.
- C. The procedures in this section are given in the sequence below. The tasks identified with (♦) are part of the Scheduled Maintenance Requirements Document (SMRD).

TASK NUMBER	DESCRIPTION	EFFECTIVITY
78-32-01-000-801-A	THRUST-REVERSER DOOR ACTUATOR - ALL REMOVAL	
78-32-01-400-801-A	THRUST-REVERSER DOOR ACTUATOR - ALL INSTALLATION	
78-32-01-000-802-A	THRUST-REVERSER ACTUATOR ROD END - REMOVAL	ALL
78-32-01-400-802-A	THRUST-REVERSER ACTUATOR ROD END - INSTALLATION	ALL

TASK 78-32-01-000-801-A

EFFECTIVITY: ALL

2. THRUST-REVERSER DOOR ACTUATOR - REMOVAL

A. General

(1) Obey these instructions to remove the thrust-reverser door actuator.

B. References

REFERENCE	DESIGNATION
AMM MPP 06-43-00/100	- COMPONENT LOCATION
AMM MPP 78-30-00/200	- MAINTENANCE PRACTICES
AMM TASK 29-10-00-860-802-A/200	HYDRAULIC SYSTEM - PRESSURIZATION WITH EMDP
AMM TASK 54-30-02-000-801-A/400	T/R DOOR-ACTUATOR FITTING BUSHING - REMOVAL
AMM TASK 78-31-01-940-801-A/200	THRUST REVERSER - OPENING PROCEDURE
AMM TASK 78-33-01-980-801-A/200	ISOLATION CONTROL UNIT - INHIBITION PROCEDURES

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
416	416HT	LH Thrust reverser
416	416BB	LH Thrust reverser
416	416MT	LH Thrust reverser
416	416NT	LH Thrust reverser
416	416FB	LH Thrust reverser
416	416GB	LH Thrust reverser
416	416QL	LH Thrust reverser
416	416LT	LH Thrust reverser
416	416DB	LH Thrust reverser
426	426HT	RH Thrust reverser
426	426BB	RH Thrust reverser
426	426MT	RH Thrust reverser
426	426NT	RH Thrust reverser
426	426FB	RH Thrust reverser
426	426GB	RH Thrust reverser
426	426QL	RH Thrust reverser
426	426LT	RH Thrust reverser
426	426DB	RH Thrust reverser
312	312AR	Fuselage Rear Section 2

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	Workstand	To get access to the engine nacelle	
Commercially available	Container	To catch oil	
GSE 340	Door Retaining Rod	To keep the doors open and prevent damage to the deploy microswitches	

E. Auxiliary Items

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	Rubber gloves, phosphate ester-base, fluid-resistant	Protection for the hands	1
Commercially available	Goggles, phosphate ester-base, fluid-resistant	Protection for the eyes	1

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	In the work area

I. Preparation ([Figure 401](#))

SUBTASK 841-002-A

WARNING: • REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN [AMM MPP 78-30-00/200](#) WHEN YOU DO THE THRUST REVERSER MAINTENANCE PROCEDURES.

- MAKE SURE THAT THE THRUST REVERSERS ARE DEENERGIZED. ENERGIZED CIRCUITS CAN CAUSE INJURY TO PERSONS.
- MAKE SURE THAT THE HYDRAULIC TEST STAND IS NOT CONNECTED.
- THE PHOSPHATE ESTER-BASE OIL IS HIGHLY CORROSIVE AND CAUSES INJURY TO THE EYES AND SKIN. BE CAREFUL NOT TO TOUCH THIS OIL. YOU MUST USE GLOVES AND GOGGLES.

CAUTION: • ALWAYS CLEAN UP THE HYDRAULIC FLUID THAT FALLS FROM THE ENGINE. DAMAGE COULD COME FROM ITS CORROSIVE ACTION.

- USE APPLICABLE CONTAINERS TO COLLECT THE REMAINING FLUIDS FROM THE OPEN LINES, AND KEEP THE WORK AREA CLEAN AND SAFE.

- (1) Open the thrust-reverser doors ([AMM TASK 78-31-01-940-801-A/200](#)).
- (2) Release the pressure from the hydraulic system ([AMM TASK 29-10-00-860-802-A/200](#)).
- (3) On the circuit breaker panel, open these circuit breakers and attach a DO-NOT-CLOSE tag to them:
 - THRUST REVERSER 1/2.
 - HYD. ELEC. PUMP 1/2.
- (4) Put a DO-NOT-OPERATE-THE-THRUST-REVERSER sign on the instrument panel, in the cockpit.
- (5) Inhibit the ICU ([AMM TASK 78-33-01-980-801-A/200](#)).
- (6) Loosen the bolts that attach the hold-open stay to the torsion box firewall and remove the hold-open stay from its location.

CAUTION: DAMAGE TO THE PIVOT-DOOR ACTUATOR ROD CAN CAUSE DAMAGE TO THE ACTUATOR SEALS. THIS WILL RESULT IN LEAKAGE OF HYDRAULIC FLUID FROM THE ACTUATOR. BE CAREFUL NOT TO CAUSE DAMAGE TO THE ACTUATOR ROD WHEN YOU REMOVE THE HOLD-OPEN STAY AND WHEN YOU USE MAINTENANCE TOOLS NEAR THE PIVOT DOOR ACTUATOR.

- (7) Install the hold-open stays on the pivot door actuators.

WARNING: DO NOT APPLY HYDRAULIC POWER TO THE AIRCRAFT AND DO NOT OPERATE THE THRUST REVERSER WHILE THE MAINTENANCE PERSONS ARE AT WORK.

- (8) Remove access panels 416LT, 416HT, 416MT and 416NT or 426LT, 426HT, 426MT, and 426NT ([AMM MPP 06-43-00/100](#) - upper actuator) or access panels 416DB, 416BB, 416FB and 416GB or 426DB, 426BB, 426FB, and 426GB ([AMM MPP 06-43-00/100](#) - lower actuator), as applicable.
- (9) Install GSE 340 to keep the doors open and prevent damage to the deploy microswitches.

J. Removal ([Figure 401](#)) ([Figure 402](#))

SUBTASK 020-002-A

WARNING: BE VERY CAREFUL WHEN YOU DISCONNECT HYDRAULIC LINES. SKYDROL FLUID IS VERY DANGEROUS.

- (1) Disconnect the three hydraulic lines (13, 14, and 15) from the head and rod ports of the actuator, and install applicable caps to the hoses and to the actuator ports.
- (2) Hold the pivot door in the open position.
- (3) Remove the split pin (1), nut (2), and washers (3).

WARNING: TO PREVENT INJURY TO PERSONS AND DAMAGE TO THE MATERIAL, KEEP THE DOOR IN ITS DEPLOYED POSITION. MAKE SURE THAT GSE 340 IS INSTALLED BECAUSE, AFTER THE ACTUATOR BOLT IS REMOVED FROM THE DOOR, THE MOVEMENT OF THE DOOR AROUND THE PIVOT POINTS IS FREE. LET THE ACTUATOR MOVE AT THE BOX ATTACHING POINT UNTIL IT STAYS AT A STABLE POSITION.

- (4) Remove the actuator attaching bolt (4) and sliding bearing (5).
- (5) Remove the split pin (6), castellated nut (7), and washer (8).
- (6) Remove the shouldered bolt (9), washer (10), and sliding bearing (11).
- (7) Remove the actuator (12) from its attaching points.

NOTE: Examine the flanged bushing for condition. If necessary, replace it ([AMM TASK 54-30-02-000-801-A/400](#)).

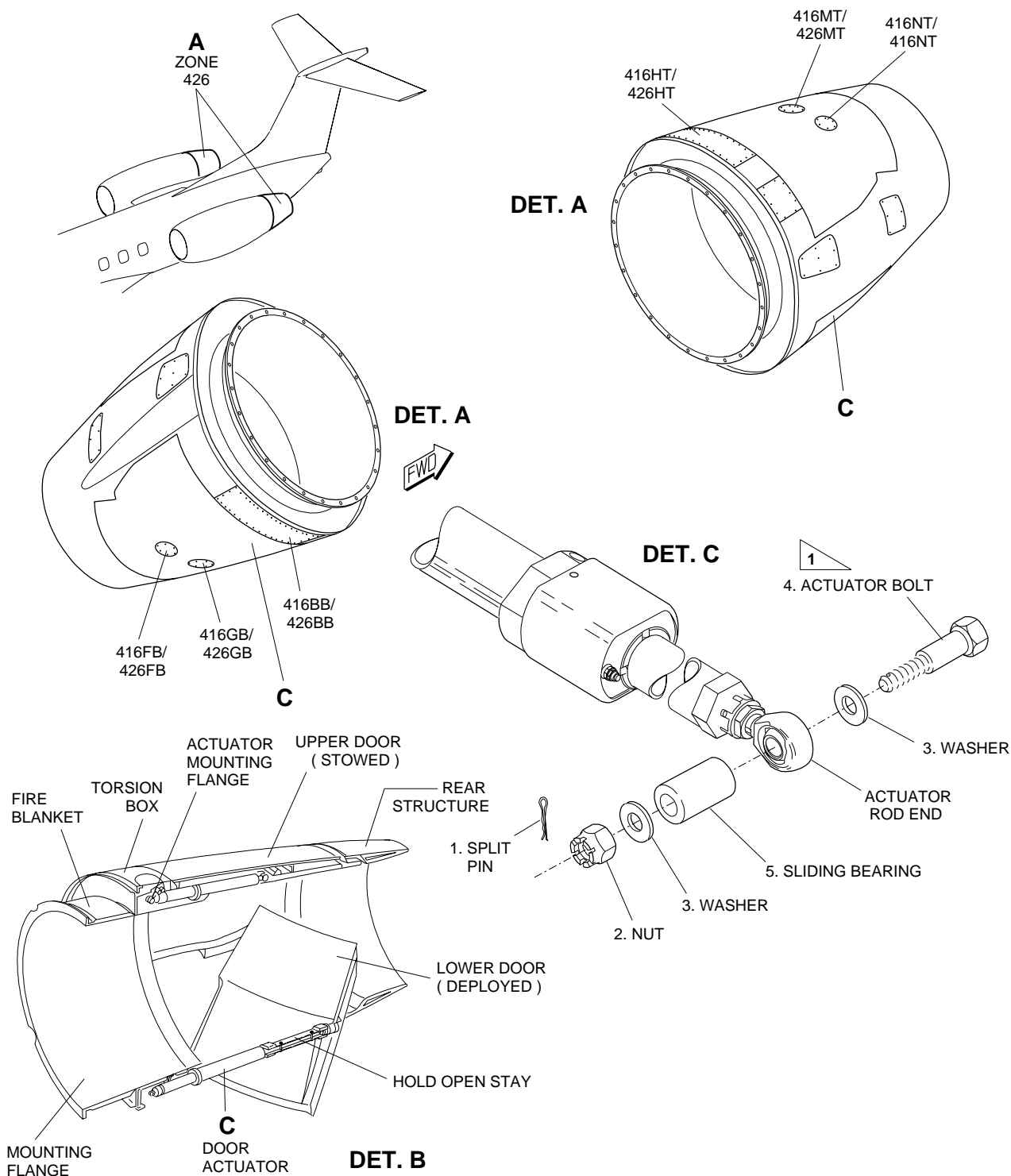
CAUTION: DAMAGE TO THE PIVOT DOOR ACTUATOR ROD CAN DAMAGE THE ACTUATOR SEALS. THIS WILL RESULT IN LEAKAGE OF HYDRAULIC FLUID FROM THE ACTUATOR. TAKE CARE NOT TO DAMAGE THE ACTUATOR ROD WHEN YOU REMOVE THE HOLD-OPEN STAY AND WHEN YOU USE MAINTENANCE TOOLS NEAR THE PIVOT DOOR ACTUATOR.

- (8) Remove the hold-open stay device from the pivot door actuator rods.
- (9) Move the actuator rod in until it touches the secondary lock . Move the rod slightly out to engage it with the secondary lock. Then measure the distance L_1 as shown in ([Figure 402](#)) and write the value to adjust the new actuator.

EFFECTIVITY: ALL

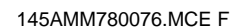
Thrust-Reverser Door Actuator - Removal/Installation

Figure 401 - Sheet 1



145AMM780075.MCE E

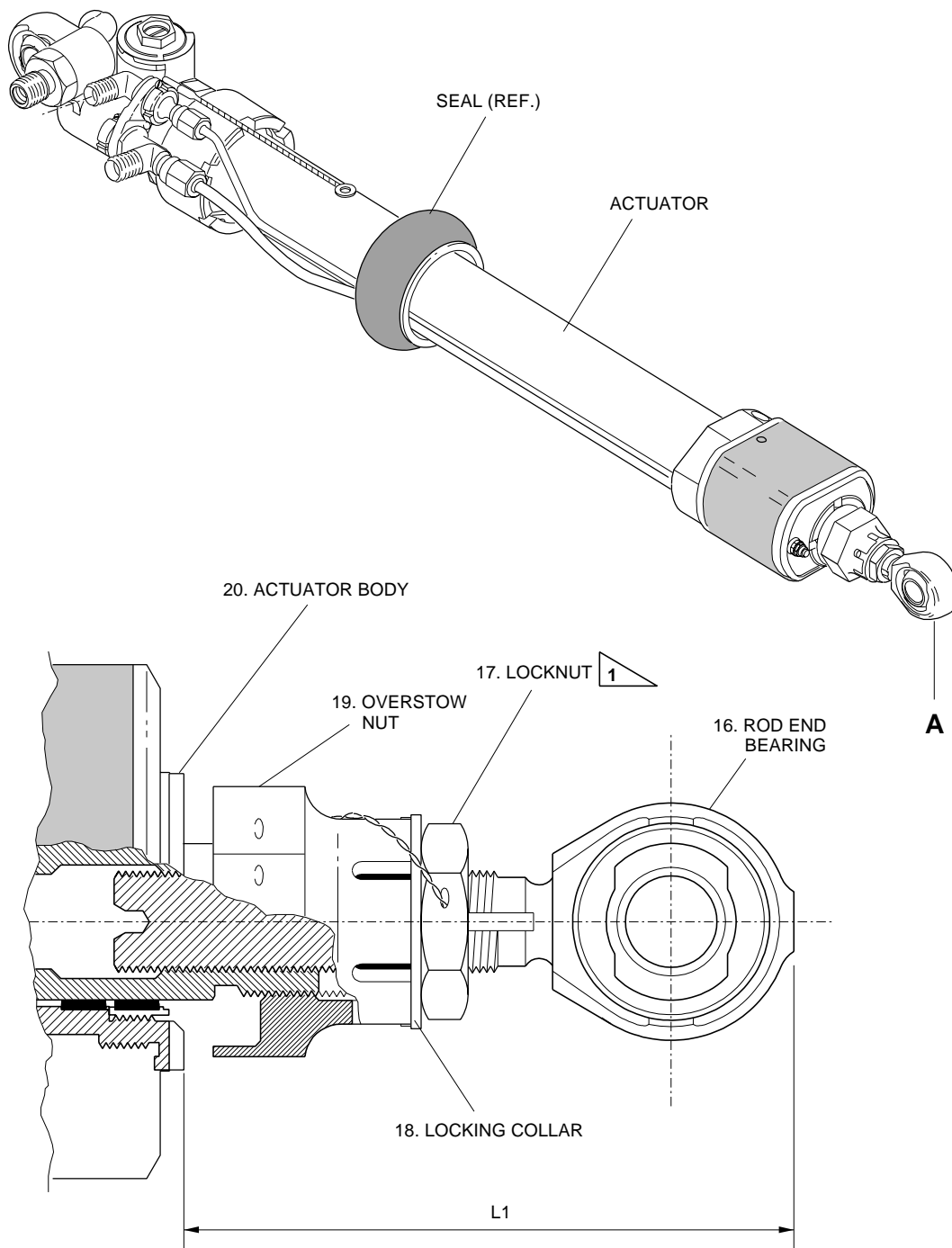
Figure 401 - Sheet 2




EFFECTIVITY: ALL

Thrust-Reverser Door Actuator Length - Removal/Installation

Figure 402



DET. A


TORQUE: 36.6 N.m to 44.7 N.m (27.0 lbf.ft to 33.0 lbf.ft)

EM145AMM780082I.DGN

TASK 78-32-01-400-801-A
EFFECTIVITY: ALL

3. THRUST-REVERSER DOOR ACTUATOR - INSTALLATION

A. General

(1) Obey the instructions below to install the thrust-reverser door actuator.

B. References

REFERENCE	DESIGNATION
78-32-01	-
AMM MPP 06-43-00/100	- COMPONENT LOCATION
AMM MPP 78-30-00/200	- MAINTENANCE PRACTICES
AMM TASK 78-31-01-820-801-A/500	THRUST REVERSER - RIGGING PROCEDURE
AMM TASK 78-31-01-820-802-A/500	THRUST REVERSER - MANUAL RIGGING PROCEDURE
AMM TASK 78-31-01-980-802-A/200	LOCK/UNLOCK THE TR EXHAUST DOOR - DEPLOYED POSITION

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
416	416LT	LH Thrust reverser
416	416QL	LH Thrust reverser
416	416DB	LH Thrust reverser
416	416HT	LH Thrust reverser
416	416BB	LH Thrust reverser
416	416MT	LH Thrust reverser
416	416NT	LH Thrust reverser
416	416FB	LH Thrust reverser
416	416GB	LH Thrust reverser
426	426LT	RH Thrust reverser
426	426QL	RH Thrust reverser
426	426DB	LH Thrust reverser
426	426HT	RH Thrust reverser
426	426BB	RH Thrust reverser
426	426MT	RH Thrust reverser
426	426NT	RH Thrust reverser
426	426FB	RH Thrust reverser
426	426GB	RH Thrust reverser

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	Workstand	To get access to the engine nacelle	
Commercially available	Torque wrench	To tighten the attachment nuts	
GSE 340	Door Retaining Rod	To keep the doors open and prevent damage to the deploy microswitches	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

SPECIFICATION (BRAND)	DESCRIPTION	QTY
ASTM-D-740	Methyl Ethyl Ketone (MEK)	AR
AS41088	Spiral Wrap (PTFE)	AR

G. Expendable Parts

ITEM	IPC REFERENCE (VENDOR REFERENCE)	QTY
Split pin	78-32-01	1
Split pin	78-32-01	1

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Thrust reverser

I. Installation (Figure 401) (Figure 402)

SUBTASK 420-002-A

- WARNING:**
- REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN [AMM MPP 78-30-00/200](#) WHEN YOU DO THE THRUST REVERSER MAINTENANCE PROCEDURES.
 - CLEANING PRODUCTS ARE TOXIC AND FLAMMABLE. A GOOD FLOW OF AIR MUST BE AVAILABLE WHEN THE WORK IS DONE IN A CLOSED AREA.
 - MAKE SURE THAT THE ELECTRICAL POWER SUPPLY IS REMOVED FROM THE THRUST REVERSERS. ENERGIZED CIRCUITS CAN CAUSE INJURY TO PERSONS.
 - MAKE SURE THAT THE HYDRAULIC TEST STAND IS NOT CONNECTED.

- CAUTION:**
- MAKE SURE THAT ALL THE HYDRAULIC LINES ARE CONNECTED NOT TO PERMIT THE HYDRAULIC OIL TO FALL OUT.
 - DO NOT PERMIT THE CLEANING PRODUCT TO TOUCH PAINT-FINISH SURFACES NOT TO CAUSE DAMAGE TO THEM.
 - USE CLEAN, SOFT (COTTON), NON-SYNTHETIC, LINT-FREE CLOTHS ONLY. DO NOT PUT REMAINING CLEANING MATERIAL BACK INTO THE ORIGINAL CONTAINERS TO PREVENT CONTAMINATION.
 - DO NOT POUR CLEANING PRODUCT DIRECTLY ONTO THE SURFACE THAT YOU WILL CLEAN.
 - DRY THE CLEANING PRODUCT BEFORE IT EVAPORATES.
 - DO NOT LUBRICATE THE ACTUATOR EYE END ASSEMBLY. IF NECESSARY, CLEAN THE ACTUATOR EYE END ASSEMBLY WITH A LINT-FREE CLOTH MOIST WITH METHYL ETHYL KETONE (MEK) OR EQUIVALENT. DO NOT PERMIT THE FLUID TO COME INTO CONTACT WITH THE BEARING.

- (1) Make sure that actuator seal (REF) is installed. Refer to (Figure 402).
- (2) Adjust L_1 with the value you got from the old actuator. To do this adjustment, do as follows. Refer to DET. A of (Figure 402):
 - (a) Cut the lockwire attached to the overstop nut (4).
 - (b) Loosen the lock nut (2) and locking collar (3).
 - (c) Turn the rod end (1) with the necessary number of turns to get the correct step ($\frac{1}{2}$ turn corresponds to 1.4 mm (0.055") step change). Make sure that, while the rod end turns, the actuator rod does not turn.
 - (d) Put the locking collar (3) and locknut (2) back into position. Then torque-tighten and safety them with lockwire.

NOTE: If you could not make this measurement at the old actuator, use the dimensions below for L_1 as a reference. Refer to (Figure 402).

1. Upper pivot door - 81,25 mm \pm 0,5 mm (3.199 in. \pm 0.02 in.).
 2. Lower pivot door - 81,80 mm \pm 0,5 mm (3.200 in. \pm 0.02 in.).
- (3) Align the actuator head with the attaching point on the torsion box fitting through the access hole, and install the sliding bearing (11), washer (10), and shouldered bolt (9).
 - (4) Make sure that the actuator is at its maximum length (deployed position).
 - (5) Align the pivot door actuator head with the attaching fitting point on the inner surface of the door.
 - (6) With the door fitting and the actuator end aligned, and through the circular access holes in the outer surface of the door, install the actuator bolt (4).

- (7) Install the sliding bearing (5), washers (3), and nut (2). Torque the bolt as shown in (Figure 401) and install the split pin (1).
- (8) Install the washer (8) and castellated nut (7). Torque the nut as shown in (Figure 401) and install the split pin (6).

CAUTION: DAMAGE TO THE PIVOT DOOR ACTUATOR ROD CAN DAMAGE THE ACTUATOR SEALS. THIS WILL RESULT IN LEAKAGE OF HYDRAULIC FLUID FROM THE ACTUATOR. TAKE CARE NOT TO DAMAGE THE ACTUATOR ROD WHEN YOU REMOVE THE HOLD-OPEN STAY AND WHEN YOU USE MAINTENANCE TOOLS NEAR THE PIVOT DOOR ACTUATOR.

- (9) Install the hold-open stay on the actuator ([AMM TASK 78-31-01-980-802-A/200](#)).

CAUTION: LEAKAGE IN THE THRUST REVERSER HYDRAULIC SYSTEM CAN OCCUR BECAUSE OF CHAFING OF THE ACTUATOR PIPES AGAINST THE ADJACENT PARTS OF THE TORSION BOX. MAKE SURE THAT SPIRAL WRAPS ARE INSTALLED ON THE DRAIN AND STOW HYDRAULIC PIPES OF THE ACTUATOR TO PREVENT DAMAGE TO THEM AND, THUS, LEAKAGE IN THE HYDRAULIC SYSTEM.

- (10) Apply spiral wraps to the thrust-reverser actuator hydraulic lines (13 and 14), if applicable.

WARNING: BE VERY CAREFUL WHEN YOU CONNECT HYDRAULIC LINES. SKYDROL FLUID IS VERY DANGEROUS.

- (11) Remove the caps from the actuator ports and hydraulic lines (13, 14, and 15). Connect and torque them. Refer to (Figure 401) Sheet 2 for torque values.

J. Follow-on

SUBTASK 842-002-A

CAUTION: EXAMINE ALL THE WORK AREAS TO MAKE SURE THAT YOU DID NOT LET TOOLS OR OTHER EQUIPMENT STAY BEHIND.

- (1) Remove GSE 340.
- (2) Install access panels 416LT, 416HT, 416MT and 416NT or 426LT, 426HT, 426MT, and 426NT ([AMM MPP 06-43-00/100](#) - upper actuator) or access panels 416DB, 416BB, 416FB and 416GB or 426DB, 426BB, 426FB, and 426GB ([AMM MPP 06-43-00/100](#) - lower actuator), as applicable.

CAUTION: DAMAGE TO THE PIVOT DOOR ACTUATOR ROD CAN DAMAGE THE ACTUATOR SEALS. THIS WILL RESULT IN LEAKAGE OF HYDRAULIC FLUID FROM THE ACTUATOR. TAKE CARE NOT TO DAMAGE THE ACTUATOR ROD WHEN YOU REMOVE THE HOLD-OPEN STAY AND WHEN YOU USE MAINTENANCE TOOLS NEAR THE PIVOT DOOR ACTUATOR.

- (3) Remove the hold-open stay from the actuator and install it to the torsion-box firewall.
- (4) Manually close the thrust-reverser doors.

CAUTION: THRUST REVERSER RIGGING IS NECESSARY TO MAKE SURE OF THE CORRECT THRUST REVERSER OPERATION. IF THE THRUST REVERSER IS NOT CORRECTLY RIGGED, FAILURE MESSAGES WILL COME INTO VIEW ON THE EICAS AND CMC, AND CAUSE INTERRUPTIONS IN THE AIRCRAFT OPERATION.

- (5) Do the thrust-reverser rigging procedure ([AMM TASK 78-31-01-820-801-A/500](#)) or ([AMM TASK 78-31-01-820-802-A/500](#)), as applicable. Also, examine the system for leaks.

TASK 78-32-01-000-802-A
EFFECTIVITY: ALL

4. THRUST-REVERSER ACTUATOR ROD END - REMOVAL

A. General

(1) Obey these instructions to remove the thrust-reverser actuator rod end.

B. References

REFERENCE	DESIGNATION
AMM TASK 78-32-01-000-801-A/400	THRUST-REVERSER DOOR ACTUATOR - REMOVAL

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

Not Applicable

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	In the work area

I. Preparation

SUBTASK 841-003-A

(1) Remove the thrust-reverser door actuator ([AMM TASK 78-32-01-000-801-A/400](#)).

J. Removal ([Figure 403](#))

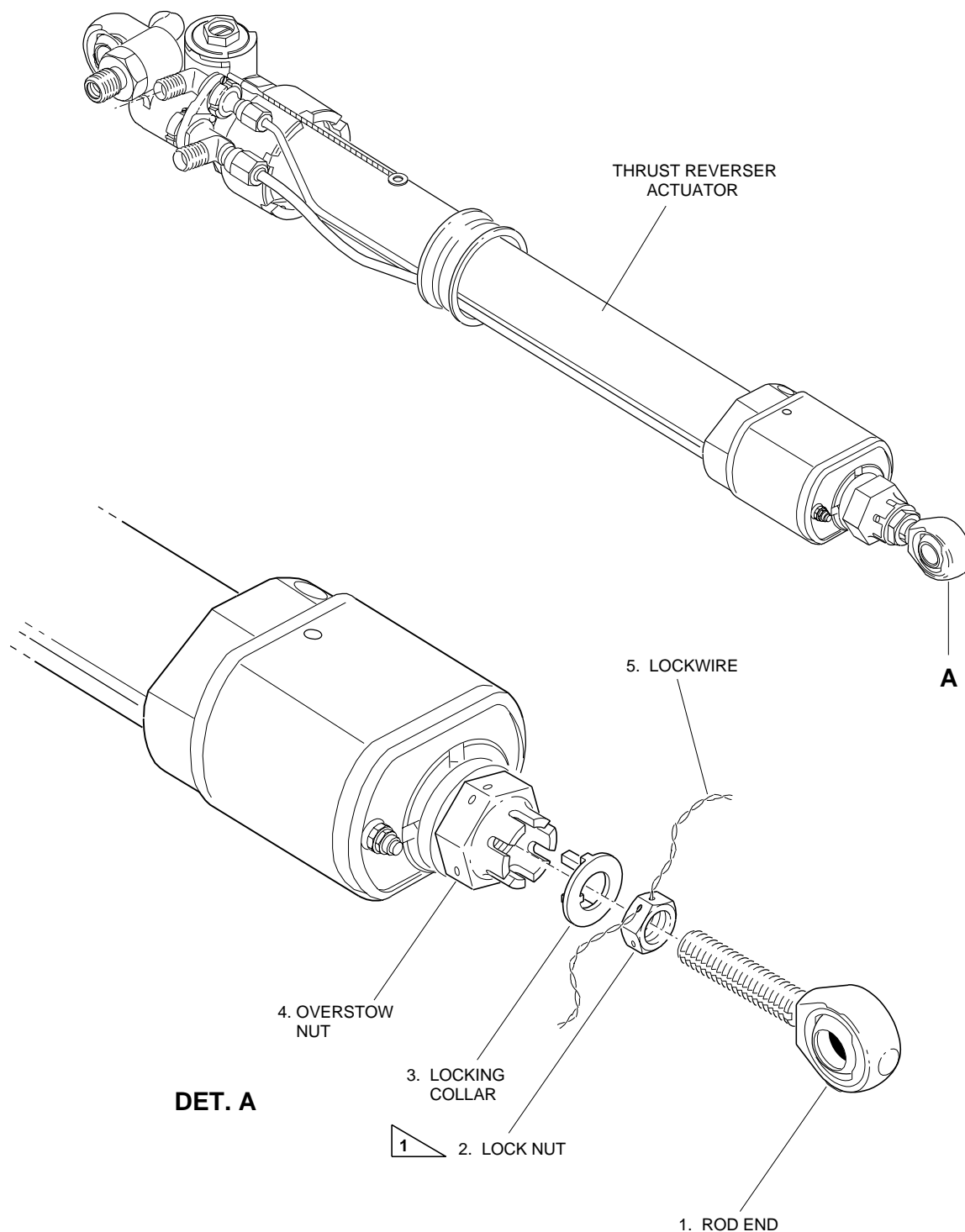
SUBTASK 020-003-A

- (1) Cut the lockwire (5). Hold the overstop nut (4) and release the locknut (2).
- (2) Remove the rod end (1).
- (3) Remove the locknut (2) and the locking washer (3) from the rod end.

EFFECTIVITY: ALL

Thrust-Reverser Actuator Rod End - Removal/Installation

Figure 403



1 TORQUE: 36.6 N.m to 44.7 N.m (27.0 lbf.ft to 33.0 lbf.ft)

145AMM780109.MCE B

TASK 78-32-01-400-802-A

EFFECTIVITY: ALL

5. THRUST-REVERSER ACTUATOR ROD END - INSTALLATION

A. General

(1) Obey these instructions to install the thrust-reverser actuator rod end.

B. References

REFERENCE	DESIGNATION
AMM TASK 78-32-01-400-801-A/400	THRUST-REVERSER DOOR ACTUATOR - INSTALLATION

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

Not Applicable

E. Auxiliary Items

Not Applicable

F. Consumable Materials

SPECIFICATION (BRAND)	DESCRIPTION	QTY
DTD900/4586 - Hylomar PL32/M	Jointing Compound	AR
ASTM-D-740	Methyl Ethyl Ketone (MEK)	AR
MS20995C32	Lockwire	AR

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	In the work area

I. Installation (Figure 403)

SUBTASK 420-003-A

- (1) Clean the affected parts with a clean cloth wet with methyl-ethyl-ketone (MEK) or similar.

WARNING: HYLOMAR PL 32/M IS DANGEROUS. REFER TO THE MANUFACTURER'S INSTRUCTIONS AND OBEY THE LOCAL HEALTH AND SAFETY PRECAUTIONS BEFORE YOU USE THIS MATERIAL.

- (2) Apply sufficient jointing compound to make a thin equal seal between the items to be assembled.

- (3) Install the locknut (2) and the locking collar (3) on the rod end (1).
- (4) Install the rod end (1) in the actuator.
- (5) Attach the overstop nut (4) and the locking collar (3) with the locknut (2). Torque the locknut and safety it with lockwire.
- (6) After assembly, make sure that there is a thin equal bead of jointing compound around the wet-assembled items.

J. Follow-on

SUBTASK 842-003-A

- (1) Install the thrust-reverser door actuator ([AMM TASK 78-32-01-400-801-A/400](#)).

