



737-300/400/500 AIRCRAFT MAINTENANCE MANUAL

TASK 27-09-91-206-005

4. Elevator and Elevator Tab - Inspection

(Figure 604, Figure 605, Figure 606)

NOTE: This procedure is a scheduled maintenance task.

A. General

- (1) The control surface movement in the specified limits is permitted if the worn areas are equal in all the mechanical parts of the system.
 - (a) If a local area wears more quickly than the other areas in the system, repair that part of the system (Figure 605).



CAUTION

DO NOT APPLY A SIDE LOAD TO THE MAST FITTING LUGS. THE BOLTS THAT ATTACH THE CONTROL RODS OF THE ELEVATOR TAB TO THE MAST FITTING MAY HAVE TO BE REMOVED TO GAIN ACCESS. BE CAREFUL WHEN REMOVING AND/OR INSTALLING THE BOLTS TO ENSURE THAT NO SIDE LOAD IS APPLIED. IF A SIDE LOAD IS APPLIED DAMAGE WILL OCCUR AT THE BASE OF THE MAST FITTING LUGS.

- (b) The limits are provided in Figure 601.
- (2) Measure the movement with the control surface in the approximate aligned position at the surface inboard trailing edge unless otherwise noted.
- (3) Each of the freeplay checks below correlates sequentially with the checks shown in Figure 606. Figure 606 shows the possible causes of wear indication for each freeplay check.

B. Standard Tools and Equipment

- (1) Dial Indicator - Accurate to 0.001 inch
- (2) Spring Force Scale, Push Type - Capable of 15.0 +/-0.2 pounds
- (3) Mounting Device (to hold the dial indicator against the elevator tab)

C. References

Reference	Title
27-31-00 P/B 201	ELEVATOR AND TAB CONTROL SYSTEM - MAINTENANCE PRACTICES
27-31-11 P/B 601	ELEVATOR - INSPECTION/CHECK
27-31-31	TABS - ELEVATOR
27-31-31-206-010	Elevator Tab Pushrod Mast Fitting Inspection (P/B 601)

D. Location Zones

Zone	Area
711	Left Elevator and Tab
712	Right Elevator and Tab

E. Procedure

SUBTASK 27-09-91-226-013

- (1) Do a check of the tab control rods and buss linkage of the elevator output torque tube:

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KEEP PERSONS AND EQUIPMENT AWAY FROM THE FLIGHT CONTROL SURFACES. THE AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, STABILIZER AND NOSE GEAR CAN MOVE SUDDENLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (a) Pressurize the elevator hydraulic system A (PAGEBLOCK 27-31-00/201).



USE SUFFICIENT PADDING ON THE FORCE SCALE TO PREVENT DAMAGE TO THE CONTROL SURFACE.

- (b) Put a piece of tape on the left side of the airplane tailcone adjacent to the elevator trailing edge, and do the step that follows:
- 1) Tape a pointer on the trailing edge of the elevator (Figure 604).
NOTE: Put the end of pointer close to the tape but without touching it.
- (c) Apply force to the elevator within 0.5 in. (12.7 mm) forward of the trailing edge and 1 in. (25 mm) outboard of inboard edge. Do these steps:
- 1) Push up with a force of 8.0 ± 0.5 pounds on the trailing edge of the left elevator.
 - 2) With the force applied, make a mark on the tape showing the upward limit of elevator travel.
 - 3) Slowly release the force on the elevator.
 - 4) Push down with a force of 8.0 ± 0.5 pounds on the trailing edge of the left elevator.
 - 5) With the force applied, make a mark on the tape showing the downward limit of elevator travel.
 - 6) Slowly release the force on the elevator.
 - 7) Measure the distance between the upward limit mark and the downward limit mark.
 - 8) Make sure the distance between the up and down limits is not more than 0.210 inch.
- (d) Release the pressure from the elevator hydraulic system A (PAGEBLOCK 27-31-00/201).



KEEP PERSONS AND EQUIPMENT CLEAR OF THE FLIGHT CONTROL SURFACES, THE THRUST REVERSERS, AND THE LANDING GEAR. THESE COMPONENTS CAN MOVE SUDDENLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

- (e) Pressurize the elevator hydraulic system B (PAGEBLOCK 27-31-00/201).
- (f) Put a piece of tape on the right side of the airplane tailcone adjacent to the elevator trailing edge, and do the step that follows:
- 1) Tape a pointer on the trailing edge of the elevator.
NOTE: Put the end of pointer close to the tape but without touching it.
 - 2) Push up with a force of 8.0 ± 0.5 pounds on the trailing edge of the right elevator.
 - 3) With the force applied, make a mark on the tape showing the upward limit of elevator travel.
 - 4) Slowly release the force on the elevator.



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- 5) Push down with a force of 8.0 ± 0.5 pounds on the trailing edge of the right elevator.
- 6) With the force applied, make a mark on the tape showing the downward limit of elevator travel.
- 7) Slowly release the force on the elevator.
- 8) Measure the distance between the upward limit mark and the downward limit mark.
- 9) Make sure the distance between the up and down positions is not more than 0.210 inch (PAGEBLOCK 27-31-11/601).

SUBTASK 27-09-91-226-043

- (2) Do a check of the elevator tab hinge line freeplay



KEEP PERSONS AND EQUIPMENT AWAY FROM THE FLIGHT CONTROL SURFACES. THE AILERONS, ELEVATORS, RUDDER, FLAPS, SLATS, SPOILERS, STABILIZER AND NOSE GEAR CAN MOVE SUDDENLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

DAL ALL POST SB 737-55A1070



BEFORE THE TAB HINGE FREE-PLAY CHECK IS DONE, THE NUT ON THE CLAMPED HINGE MUST BE SECURED AND TIGHTENED TO 50 - 80 INCH-POUNDS.

DAL ALL

- (a) Pressurize the elevator hydraulic systems A and B (PAGEBLOCK 27-31-00/201).
- (b) Set the stabilizer at 3.0 ± 0.5 units of trim.



BE VERY CAREFUL WHEN YOU INSTALL A DEVICE TO CAUSE A BLOCKAGE OF THE ELEVATOR. THE ELEVATOR IS MADE OF COMPOSITE MATERIALS. THE DEVICE CAN CAUSE DAMAGE TO THE ELEVATOR IF YOU ARE NOT CAREFUL.

- (c) Use a device that can cause a blockage of the elevator to prevent its motion during the check.

NOTE: You can put a wood wedge covered with duct tape, between the elevator and the airplane structure to prevent elevator movement.



BE VERY CAREFUL WHEN YOU INSTALL THE MOUNTING DEVICE. THE ELEVATOR IS MADE OF COMPOSITE MATERIALS. THE MOUNTING DEVICE CAN CAUSE DAMAGE TO THE ELEVATOR IF YOU ARE NOT CAREFUL.

- (d) Attach a mounting device to the elevator in line with hinge number one (Figure 605).
- (e) Put the dial indicator plunger directly over the top of the hinge center line.
 - 1) Adjust the dial indicator to zero once there is contact with the elevator tab hinge.

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USE SUFFICIENT PADDING ON THE FORCE SCALE TO PREVENT DAMAGE TO THE CONTROL SURFACE.

- (f) Use a force scale to apply a 7.0 +/-0.5 pound force in the up direction. The force is to be applied in line with the plunger.
- (g) Make a record of the travel shown on the dial indicator.
- (h) Slowly remove the force.
- (i) Use a force scale to apply a 7.0 +/- 0.5 pound force in the down direction. The force is to be applied as close as possible to the plunger without disturbing it.

NOTE: Do not adjust the dial indicator.

- (j) Make a record of the travel shown on the dial indicator.
- (k) Slowly remove the force.

DAL ALL PRE SB 737-55A1070

- (l) Make sure that the sum of the two travel records is less than 0.030 inches.

NOTE: If the sum of the two travel records is 0.030 inches or more, repeat the check of the elevator tab free play until the recorded travel is not greater than 0.030 inches.

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- (m) Add the two travel records to produce the total tab hinge free-play sum.
 - 1) If the total tab hinge free-play sum is less than 0.030 inches, no action is required.
 - 2) If the total tab hinge free-play sum is 0.030 inches – 0.040 inches, the joint must be repaired within 30 days of the inspection. Refer to TABS - ELEVATOR, SUBJECT 27-31-31 and CMM 55-20-16 for repair procedures.
 - 3) If the total tab hinge free-play sum is more than 0.040 inches, the joint must be repaired before the next revenue flight. Refer to TABS - ELEVATOR, SUBJECT 27-31-31 and CMM 55-20-16 for repair procedures.
 - 4) If a hinge fitting nut is removed from any of the four hinge locations, replace it with a self-locking castellated nut and cotter pin.

NOTE: Determine the elevator tab configuration to ensure proper nut and bolt specification requirements (CMM 55–20–16).

DAL ALL

- (n) Repeat the previous 12 steps for each elevator tab hinge. This includes the 4 hinges on the opposite elevator.

SUBTASK 27-09-91-226-039

- (3) Do a check of the elevator tab free play

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KEEP PERSONS AND EQUIPMENT CLEAR OF THE FLIGHT CONTROL SURFACES, THE THRUST REVERSERS, AND THE LANDING GEAR. THESE COMPONENTS CAN MOVE SUDDENLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

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BEFORE THE ELEVATOR TAB FREE-PLAY CHECK IS DONE, THE NUT ON THE CLAMPED HINGE MUST BE SECURED AND TIGHTENED TO 50 - 80 INCH-POUNDS.

DAL ALL

- (a) Pressurize the elevator hydraulic systems A and B (PAGEBLOCK 27-31-00/201).
- (b) Set the stabilizer at 3.0 +/-0.5 units of trim.



BE VERY CAREFUL WHEN YOU INSTALL A WOODEN WEDGE TO CAUSE A BLOCKAGE OF THE ELEVATOR. THE ELEVATOR IS MADE OF COMPOSITE MATERIALS. THE WEDGE CAN CAUSE DAMAGE TO THE ELEVATOR IF YOU ARE NOT CAREFUL.

- (c) Use a device that can cause a blockage of the elevator to prevent its motion during the check.

NOTE: You can put a piece of wood between the elevator and the airplane structure to prevent elevator movement.



BE VERY CAREFUL WHEN YOU INSTALL THE MOUNTING DEVICE. THE ELEVATOR IS MADE OF COMPOSITE MATERIALS. THE MOUNTING DEVICE CAN CAUSE DAMAGE TO THE ELEVATOR IF YOU ARE NOT CAREFUL.

- (d) Attach a mounting device to the elevator trailing edge.
 - 1) Put the dial indicator plunger on the top of the elevator tab, approximately 0.1 inch forward of the trailing edge and aft of the inboard hinge.
 - 2) Adjust the dial indicator to zero.



USE SUFFICIENT PADDING ON THE FORCE SCALE TO PREVENT DAMAGE TO THE CONTROL SURFACE.

- (e) Use a force scale to push the top of the elevator tab with a force of 5.0 +/- 0.5 pounds.

NOTE: Push this force aft of the inboard hinge, in 0.5 inch or less of the indicator plunger.

 - 1) Make a record of the travel shown on the dial indicator.
 - 2) Slowly remove the force.
- (f) Push on the bottom surface of the elevator tab with a force of 5.0 +/-0.5 pounds, directly below the force applied before.

NOTE: Do not adjust the dial indicator.

 - 1) Make a record of the travel shown on the dial indicator.

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- 2) Slowly remove the force.

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- (g) Make sure the sum of the two travel records is not more than 0.036 inch.

NOTE: If the sum of the two travel records is more than 0.036 inches, repeat the check of the elevator tab free play until the recorded travel is not greater than 0.036 inches.

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- (h) Make sure that the sum of the two travel records is not more than 0.036 inches. If the sum of the two travel records is more than 0.036 inches refer to TABS - ELEVATOR, SUBJECT 27-31-31 and CMM 55-20-16 for repair procedures.

- 1) If hinge fitting nut is removed from any of the four hinge locations, replace it with castellated nut and cotter pin.

NOTE: Determine the elevator tab configuration to determine nut and bolt specification requirements (CMM 55-20-16).

DAL ALL

- (i) Remove the dial indicator.
(j) Remove the mounting device.
(k) Remove the wedge that you used to cause a blockage on the elevator.

SUBTASK 27-09-91-226-041

- (4) Do a check of the elevator tab hinge axial freeplay (inboard-outboard direction):

NOTE: This check is to make sure that the axial freeplay does not exceed 0.030 inch.

- (a) Hold the elevator tab around the trailing edge and move it outboard using hand pressure.
(b) Use a feeler gage to measure the clearance between the elevator and the outboard end of the elevator tab and make a record of this clearance.

NOTE: It may be necessary to insert a flat metal filler block between the elevator and the elevator tab to help in this measurement.

- (c) Hold the elevator tab around the trailing edge and move it inboard using hand pressure.
(d) Measure the clearance between the elevator and the outboard end of the elevator tab.

NOTE: The axial play is the difference in clearance measurements recorded in this step and the clearance recorded before.

- (e) Do the same hinge axial freeplay check on the tab of the opposite elevator.
(f) Do this check. Elevator Tab Pushrod Mast Fitting Inspection, TASK 27-31-31-206-010

F. Put the Airplane Back to Its Usual Condition

SUBTASK 27-09-91-846-029

- (1) Remove the pressure from hydraulic systems A and B (PAGEBLOCK 27-31-00/201).

————— **END OF TASK** —————

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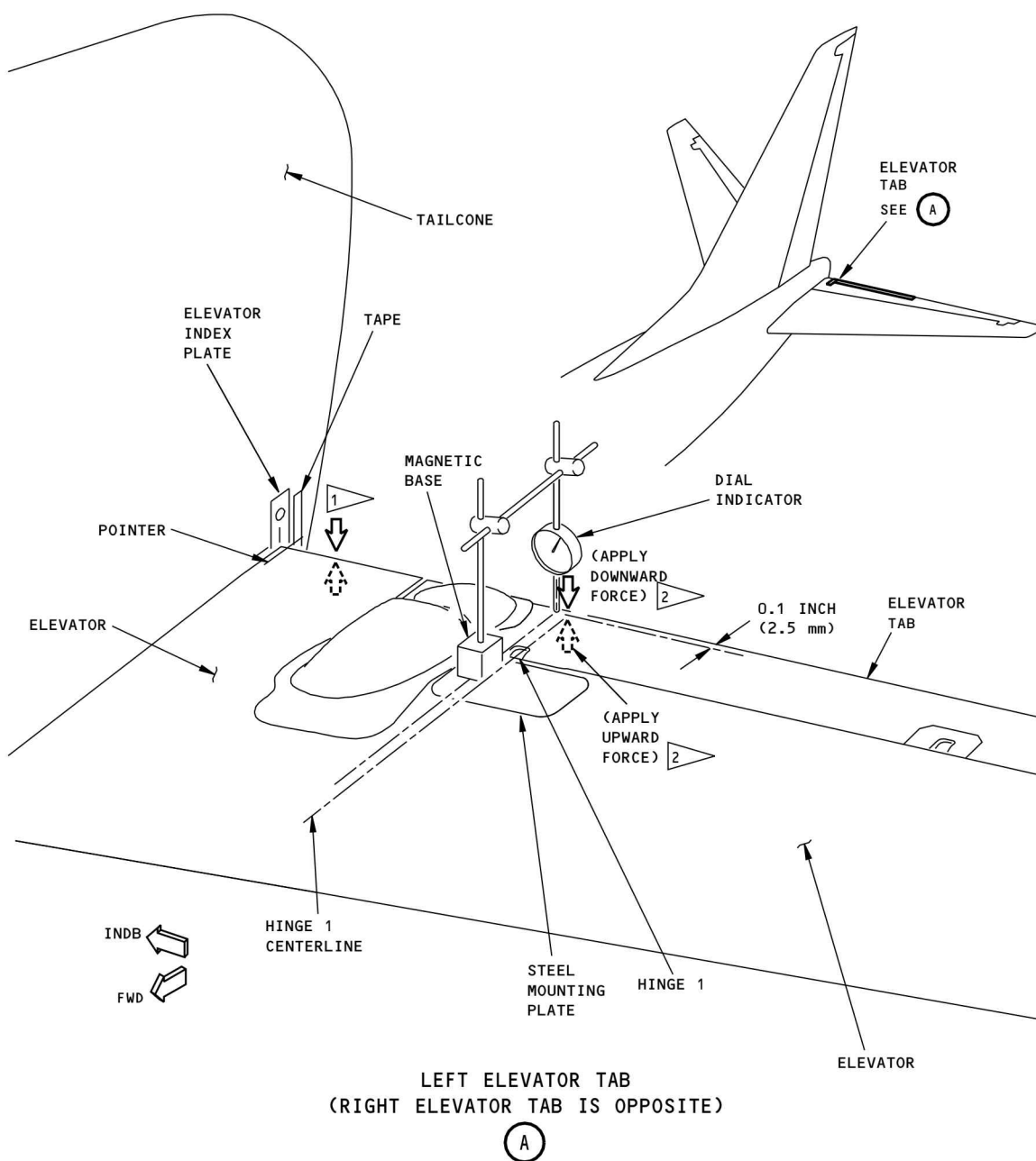
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1 APPLY UP AND DOWN FORCES HERE FOR THE TAB CONTROL RODS AND BUSS LINKAGE FREEPLAY CHECK. APPLY THE FORCE WITH IN 0.5 INCH FORWARD OF THE ELEVATOR TRAILING EDGE AND 1.0 INCH OUTBOARD OF THE INBOARD EDGE.

2 APPLY UP AND DOWN FORCES HERE FOR THE ELEVATOR TAB TRAILING EDGE FREEPLAY CHECKS.

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Elevator and Elevator Tab Trailing Edge Free-Play Checks
Figure 604/27-09-91-990-804

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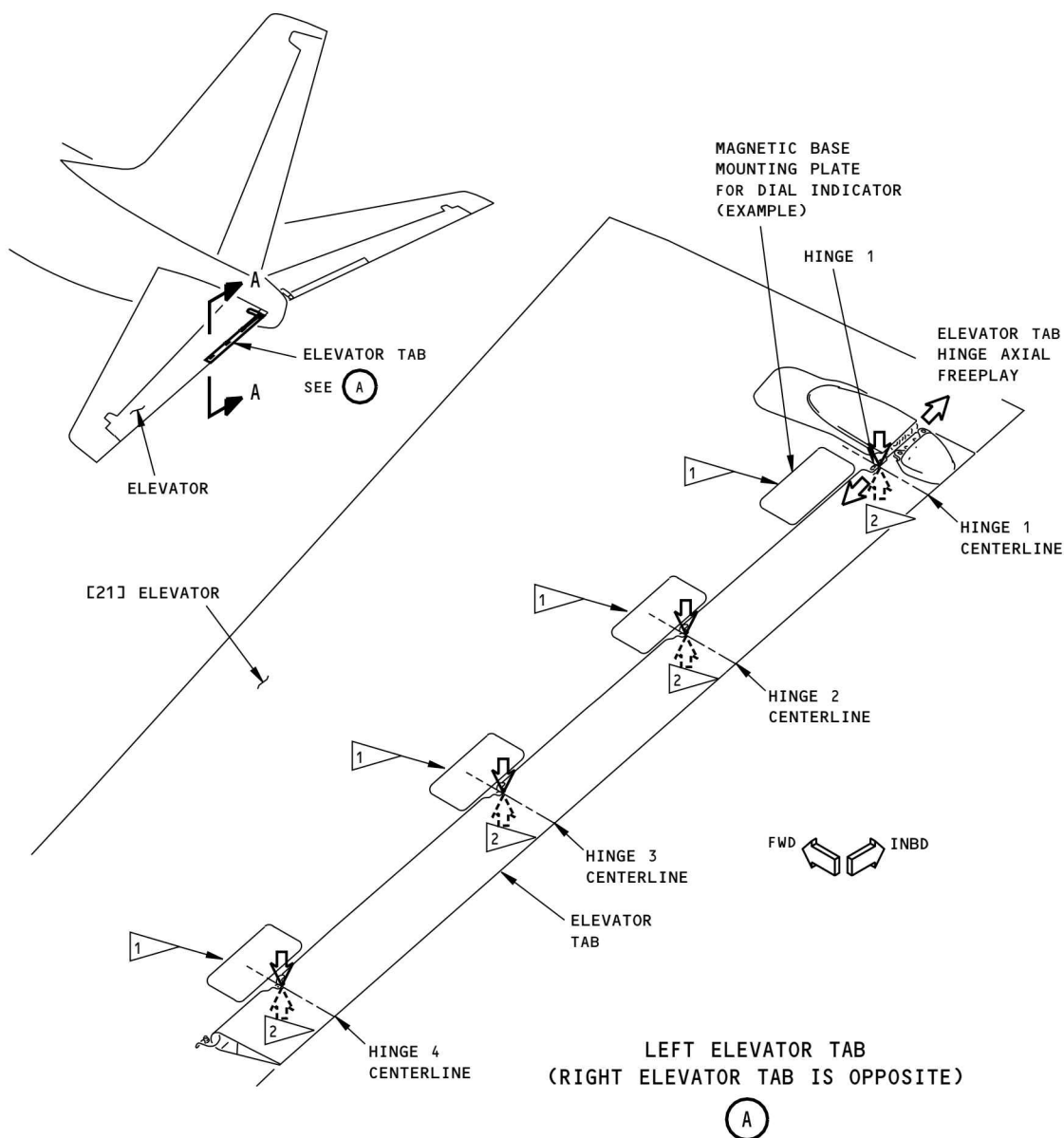
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- 1 APPROXIMATE LOCATION OF THE MOUNTING PLATE FOR THE ELEVATOR TAB HINGE LINE FREEPLAY. FOR THE MOUNTING PLATE, USE A STEEL PLATE AT LEAST 1/8 INCH THICK.
- 2 APPLY FORCE FOR TAB HINGE LINE FREEPLAY AT HINGES 1, 2, 3 AND 4, AS CLOSE TO THE HINGE LUG CENTERLINE, AS POSSIBLE.

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Elevator Tab Hinge Free-Play Checks
Figure 605/27-09-91-990-805 (Sheet 1 of 2)

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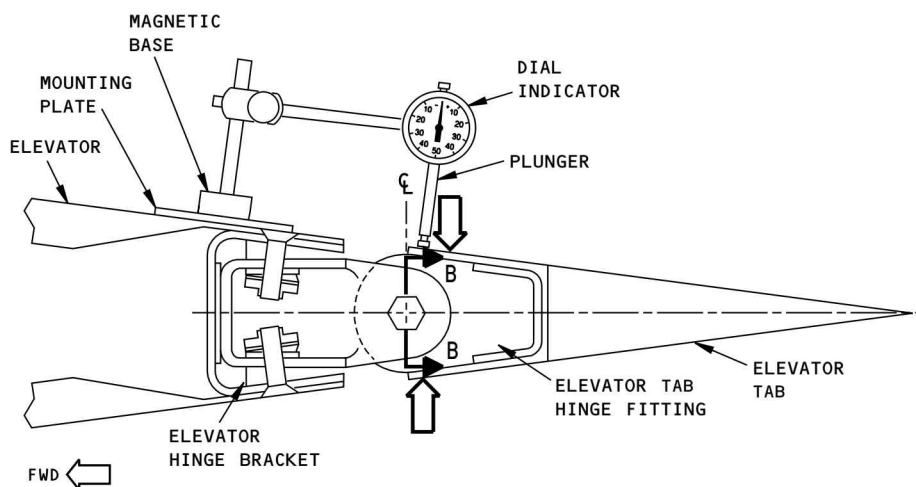
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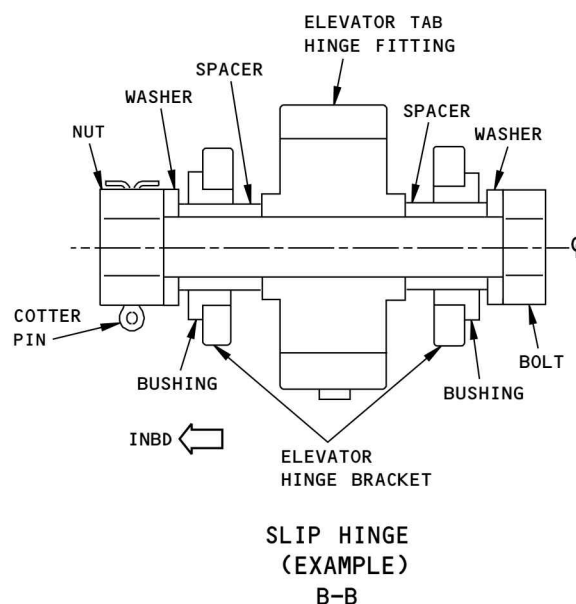
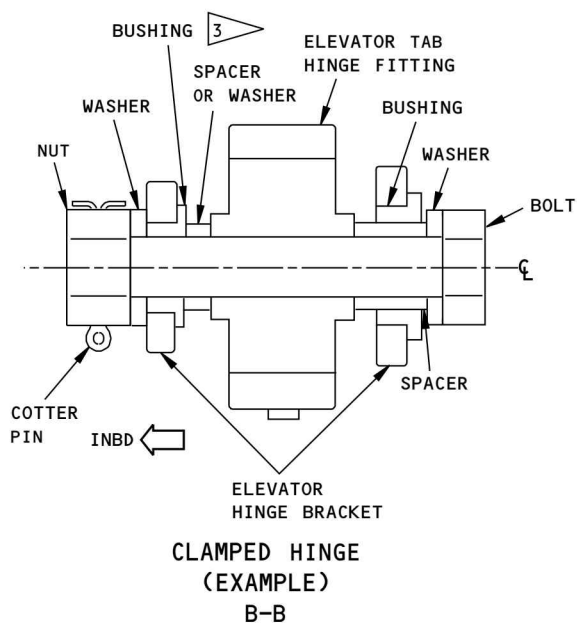
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GRAPHITE ELEVATOR TAB/GRAPHITE ELEVATOR
(EXAMPLE, ALL HINGES)
A-A



3 THIS IS THE FLANGED BUSHING THAT IDENTIFIES
THE HINGE AS A CLAMPED HINGE.

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Elevator Tab Hinge Free-Play Checks Figure 605/27-09-91-990-805 (Sheet 2 of 2)

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TYPE OF ELEVATOR TAB FREE-PLAY CHECK	HINGE CLAMP CONDITION	TYPE OF WEAR INDICATION	POSSIBLE CAUSE OF WEAR INDICATION
1. TAB CONTROL RODS AND BUSS LINKAGE	TIGHT	WEAR IN FORE/AFT DIRECTION AND VERTICAL DIRECTION	• ELONGATED TAB MAST FITTINGS • GROOVED CONTROL ROD BOLT • WORN CONTROL ROD END LUG • WORN CONTROL ROD BEARING • WORN CONTROL ROD END THREAD • ELONGATED CONTROL MECHANISM BUSHINGS • WORN CONTROL MECHANISM ATTACHMENT TO ELEVATOR SPAR • WORN ATTACHMENT OF TAB MAST FITTING TO TAB SPAR
	TIGHT	WEAR IN SIDE DIRECTION	• WORN TAB MAST CLEVIS CLAMP LUG BUSHING FLANGE • WORN TAB MAST SPACER WASHER BETWEEN BEARING AND CLAMP LUG BUSHING FLANGE • WORN CONTROL MECHANISM SPACER WASHER BETWEEN BEARING AND CLAMP LUG BUSHING FLANGE • WORN CONTROL ROD BEARING RETENTION • WORN CONTROL ROD END THREAD
2. ELEVATOR TAB HINGE LINE FREE-PLAY	LOOSE	WEAR IN VERTICAL DIRECTION	• GROOVED HINGE BOLT • HINGE SUPPORT FITTING CLEVIS CLAMP LUG - ELONGATED BUSHING BORE - ELONGATED LUG BORE • CAUSES LISTED FOR ITEM 3
3. ELEVATOR TAB HINGE LINE FREE-PLAY	TIGHT	WEAR IN VERTICAL DIRECTION	• WORN HINGE BEARING • HINGE SUPPORT FITTING CLEVIS SLIP LUG - WORN SLIP BUSHING - WORN LUG BORE • WORN HINGE SWIVEL SUPPORT DETAILS (APPLICABLE TO THE SWIVEL HINGES ONLY) • WORN HINGE FITTING ATTACHMENT TO TAB SPAR • CRACKED ELEVATOR REAR SPAR
4. ELEVATOR TAB TRAILING EDGE FREE-PLAY	LOOSE	WEAR IN FORE/AFT DIRECTION AND VERTICAL DIRECTION	• CAUSES LISTED FOR ITEM 1 • GROOVED HINGE BOLT • WORN HINGE BEARING • HINGE SUPPORT FITTING CLEVIS CLAMP LUG - ELONGATED BUSHING BORE - ELONGATED LUG BORE
5. ELEVATOR TAB TRAILING EDGE FREE-PLAY	TIGHT	WEAR IN FORE/AFT DIRECTION AND VERTICAL DIRECTION	• CAUSES LISTED FOR ITEM 1 • CAUSES LISTED FOR ITEM 3
6. ELEVATOR TAB HINGE AXIAL FREE-PLAY	TIGHT	WEAR IN SPANWISE DIRECTION (FIG. 605)	• WORN HINGE BEARING • WORN HINGE CLEVIS CLAMP LUG BUSHING FLANGE • WORN HINGE SPACER WASHER BETWEEN BEARING AND CLAMP LUG BUSHING FLANGE • WORN HINGE BEARING RETENTION

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Causes of Elevator Tab Free-Play
Figure 606/27-09-91-990-807

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