CHAPTER

27

FLIGHT CONTROLS

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CHAPTER 27 - FLIGHT CONTROLS
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CHAPTER 27 - FLIGHT CONTROL
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FLIGHT CONTROLS - DESCRIPTION AND OPERATION

1. General

A. The main flight control system controls the airplane in three axes. All primary controls aileron, rudder and elevator are manually operated by conventional control columns and rudder pedals, pulleys, cables, quadrants and rods.
Complete dual controls are provided for the pilot and copilot: each set of rudder pedals is individually adjustable for maximum comfort. The ailerons placed outboard on the trailing edge of the wings are for lateral control, while both the longitudinal and directional controls are configured in a T-tail empennage.

B. The secondary flight controls consist of a three-axis trim system and a flap system all electrically driven by an electromechanical actuator system.

C. The autopilot system has servo actuators connected by cables, to the aileron and rudder controls. Longitudinal trim is by a moveable stabilizer controlled by a screwjack.

D. Control Surfaces

(1) The airplane is controlled in flight by the following control surfaces:

CONTROL SURFACE	LOCATION (Ref. to Fig. 1)
Ailerons	Outboard trailing edge of each wing.
Elevators	Trailing edge of horizontal stabilizer.
Rudder	Trailing edge of vertical stabilizer.
Horizontal Stabilizer	Top of and perpendicular to vertical stabilizer.
Aileron Trim Tab	Trailing edge of RH aileron.
Rudder Trim Tab	Trailing edge of rudder.
Flaps	Trailing edge of each main wing, outboard (MWOF = main wing outboard flap) and inboard (MWIF = main wing inboard flap) of engine nacelle. Trailing edge of each forward wing (FWRF, FWLF = forward wing right and left flaps respectively).

(2) Lateral control is accomplished by sealed, aerodynamically and mass balanced ailerons. An aileron trim tab is installed only on the right aileron for lateral trimming of the airplane.

(3) Longitudinal control is accomplished by aerodynamically and mass balanced elevators hinged on the horizontal stabilizer trailing edge and on top of the vertical fin.

(4) Directional control is provided by an aerodynamically and mass balanced rudder. A rudder trim tab is provided at the center of the rudder trailing edge for directional trimming of the airplane.

(5) The horizontal stabilizer provides pitch trim control. A horizontal tail trim actuator (HTTA) electrically driven in the horizontal plane for both pilot (manual) and autopilot operations, moves the stabilizer. There is also a back-up mode for emergency pitch control.

(6) Flaps provide increased main and forward wing lift when partially extended during takeoff or landing approach. The higher increased lift provided by the fully extended flaps allows a lower airspeed when landing.
The electrically operated main and forward wing flaps are simultaneously controlled by a 3-position control lever through an electronic control unit (ECU). Four individual position indicators are provided on the Multi Function Display (MFD) System Page.

E. Trim Control

(1) The aileron trim tab provides roll trim for the airplane. Aileron trim is normally obtained through the trim and trim arming switch on each control wheel. An aileron trim indicator is located on the flight compartment control pedestal.

(2) The movable horizontal stabilizer serves as a pitch trim controller. Pitch trim is obtained through the pitch trim switch on the control wheels when the primary (PRI) mode is selected on the trim switch panel. For emergency operations, when the secondary (SEC) mode is selected on the trim switch panel, secondary pitch trim is controlled through the switches on the control pedestal. A stabilizer trim indicator is located on the cockpit control pedestal. The horizontal stabilizer is also used in the autopilot trim system via the HTTA secondary motor when both the autopilot mode and trim switch PRI mode are selected. (Refer to 22-00-00.)

(3) The rudder trim tab provides yaw trim for the airplane. Rudder trim is obtained through the yaw trim switch on the flight compartment control pedestal. A rudder trim indicator is located on the control pedestal.

F. Flap Control

(1) By operation of the FLAP selector lever on the control pedestal, the flap surfaces may be positioned in three different configurations:

FLAP LEVER POSITION		CONFIGURATION
UP	=	CLEAN
MID	=	TAKE-OFF / APPROACH
DOWN	=	LANDING

The position of the four (MWOF, MWIF, FWRF, FWLF) surfaces is controlled by a dedicated ECU through position microswitches and logic circuits. The flap position indicator is displayed on the Multi Function Display (MFD) System Page.

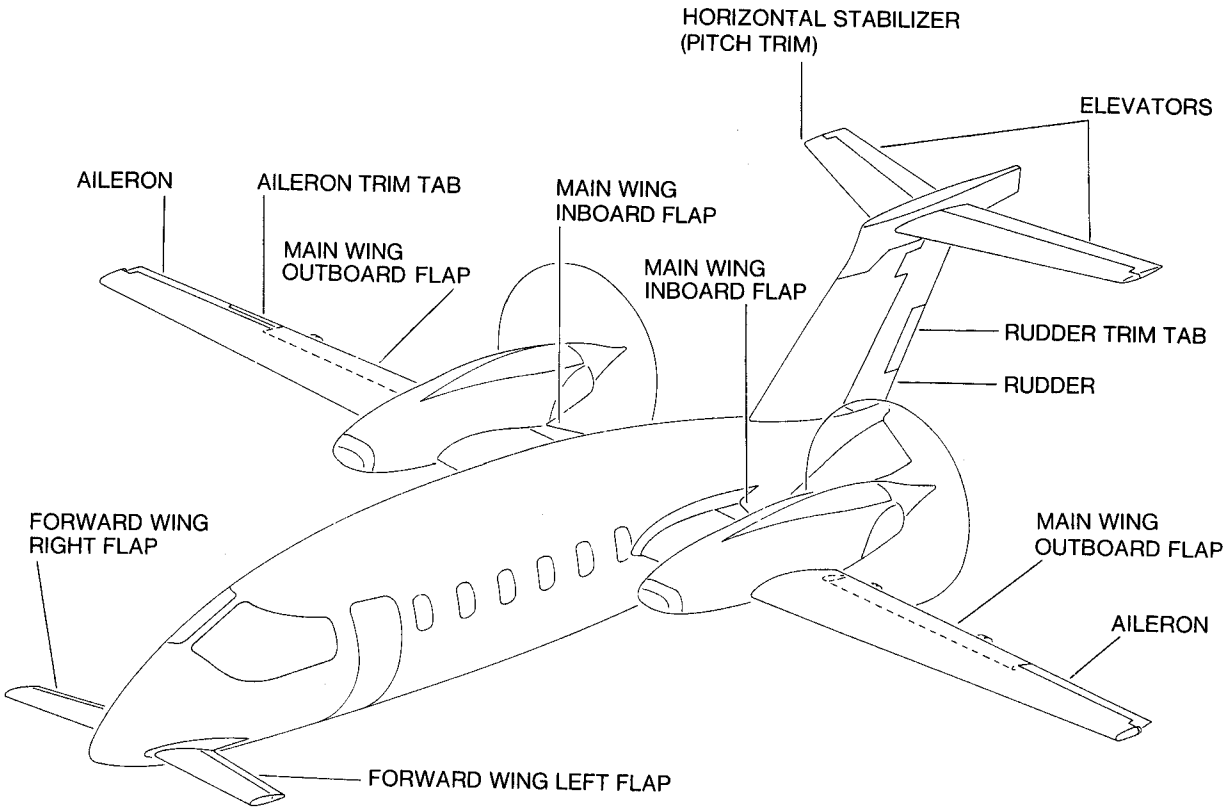

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Fig. 1 - Flight Control Surfaces

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FLIGHT CONTROLS - MAINTENANCE PRACTICES

1. General

A. Maintenance practices for the flight control system consist of:

- rigging and tensioning the control cables (in accordance with the temperature correction chart)
- checking control cables for damage
- checking the control systems for stroke, friction and play
- control surface balance check and control surface balancing
- checking control surfaces for play, mechanical stop setting, range and effectiveness.

B. Temperature-load correction is required when checking cable tension (Ref. to Para. 2).

C. Control cable damage limits are necessary to determine when cables should be replaced. Failure of cables is rarely sudden but is progressive over periods of extended use.

D. Control surface balancing is required whenever a new control surface is to be installed, has undergone major repairs, has been painted, or otherwise does not meet balance limits.

E. Six stainless steel control cables, two for each of the three control systems (elevator, aileron and rudder), pass through the bulkhead FS 6000 and are pressure sealed with a fairlead held in place by a two-piece phenolic block. The fairlead is designed to eliminate the need for control cable removal when replacing fairleads. If cabin pressure leakage becomes excessive or noise develops from air escaping around the cables, the seals should be replaced.

F. When replacement aileron, elevator, or rudder cables are installed, the control cables must be prestretched and seated-in. To accomplish this, install the control cables, adjust the tension to between 86.2 kg and 95.3 kg (190 and 200 lb), cycle the system 25 times and reduce the tension to approximately 34 kg (75 lb). Proceed with control system rigging.

G. When replacement autopilot cables are installed, adjust the cable tension to 45.4 kg (100 lb). Operate the system 25 times through the full range. Tension the cables again to 9 kg (20 lb).

2. Temperature-Load (Ref. to Fig. 201)

A. All flight control rigging procedures should be done in a hangar when possible, because of cable/temperature variation. The relationship between cable temperature and tension is shown in Fig. 201.

B. Temperatures shown in Figure 201 are for ambient air, not airframe compartments.

C. If the airplane has recently flown at altitude, allow 40 to 60 minutes for stabilization of airframe temperatures before checking/adjusting cable tensions.

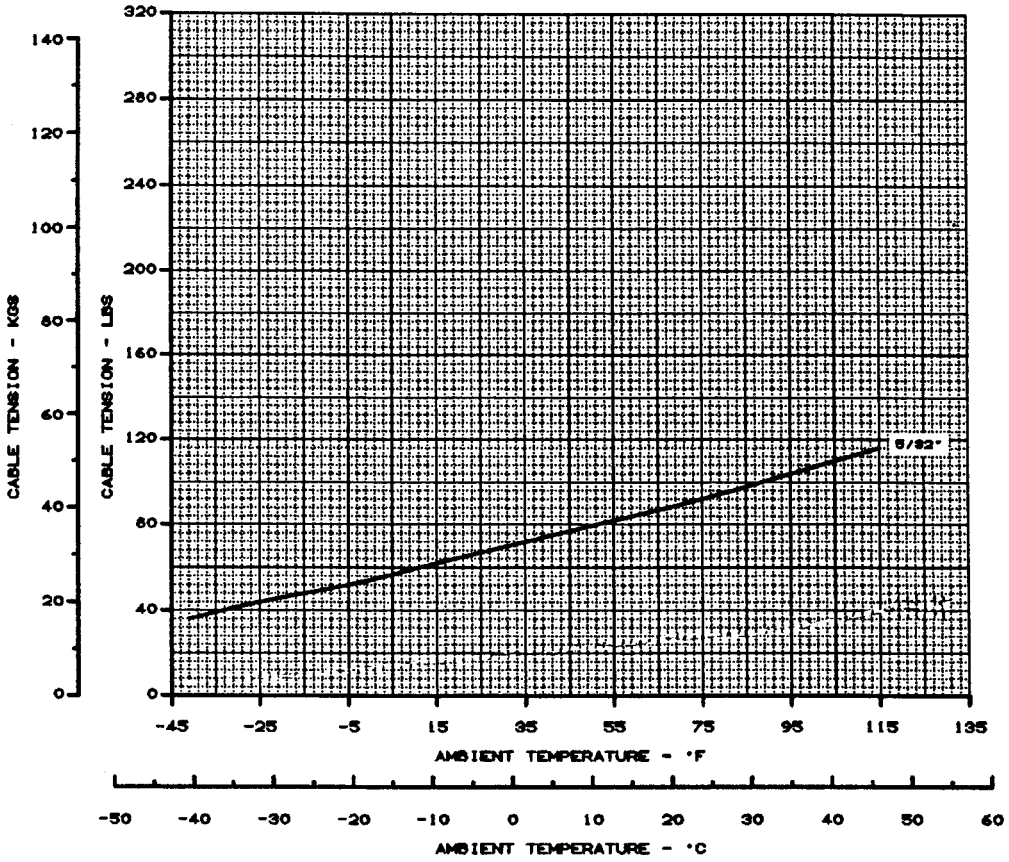
D. Rigging may be done with the airplane on jacks without affecting cable tensions.

E. Any approved airplane loading configuration will not affect cable tension rigging.

F. The elevator control cable rigging must be accomplished with the stabilizer reference angle set to zero.

G. In Fig. 201:

– the curve for 5/32" applies to primary control cables.



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GENERAL NOTES:

(1) During measurements the controls must be in neutral position to prevent external loads on the cables, which would alter the results of the measurements.

(2) A tolerance of plus or minus 2.3 kg (5 lb) is allowed on the tension reading for all ambient temperatures.

Fig. 201 - Temperature-Load

3. Control Cable Damage Limits (Ref. to Fig. 202)

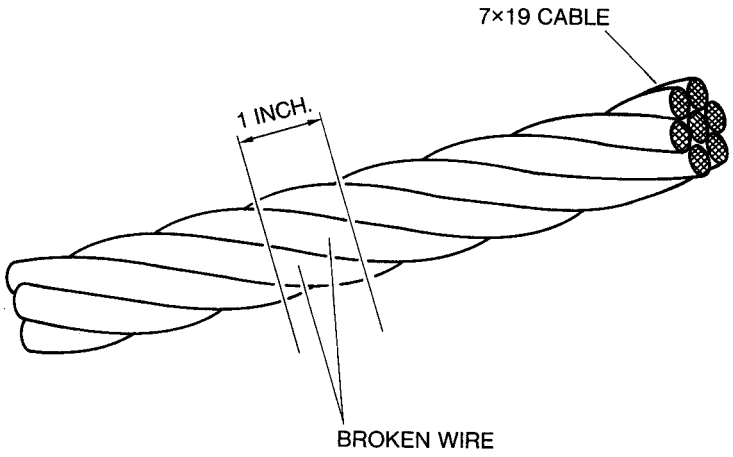
A. Failure of control cables is progressive over periods of extended use. Some broken wires may be seen early in service. During normal service, a few additional broken wires will be seen after overstressed or overhard wires have broken.

B. Cables of 5/32 and 3/32 inch diameter are made of 7 strands of 19 wires each, totaling 133 wires.

C. In accordance with current inspection intervals, check for frayed cables. Cables may be inspected for broken wires by passing a cloth along the length of cable. Broken wires will be indicated where the cloth is snagged.

D. Make sure a close inspection is made in the length of cable normally passing over a pulley or through a fairlead.

E. Refer to the NOTE on Fig. 202 for specific damage limits.



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NOTE: Replace any cable that shows more than 6 wires broken in any 1-inch (25.4 mm) length of cable. Wear is permitted provided not more than six wires are worn not more than half of the wire diameter in any 1-inch (25.4 mm) length of cable.

Fig. 202 - Control Cable Damage Limits

4. Control Cable Pressure Seal - Replacement (Ref. to Fig. 203)

NOTE: Fig. 203 shows the removal/installation of both phenolic blocks/rubber seals. Remove only one, or both blocks/rubber seals as required.

A. Fairlead - Removal

(1) Remove the carpet to get access to floor panel 231RLF close to the rear pressure bulkhead (FS 6000).
(2) Remove floor panel 231RLF.
(3) Remove the screws (4) attaching the phenolic block (3) to the rear pressure bulkhead (1).
(4) Move the phenolic block (3) away from the rubber seal (2).
(5) Pull the fairlead (5) from the rubber seal (2).
(6) Separate and remove the fairlead (5) halves.

B. Fairlead - Installation

(1) Install the two fairlead (5) halves around the cable.
(2) Push the fairlead (5) into the rubber seal (2); make sure that the fairlead engages correctly and positively into the seat of the rubber seal.

CAUTION: DO NOT APPLY SEALANT TO A PRESSURE SEAL.

(3) Put the rubber seal (2) and the phenolic block (3) into position against the rear pressure bulkhead (1) then install the screws (4).
(4) Make sure that the area is free from foreign objects then install floor panel 231RLF and the carpet.

C. Rubber Seal - Removal

(1) Remove the carpet to gain access to the floor panel 231RLF close to the rear pressure bulkhead (FS 6000).
(2) Remove floor panel 231RLF.
(3) Remove the screws (4) attaching the phenolic block (3) to the rear pressure bulkhead.
(4) Move the phenolic block (3) away from the rubber seal (2).
(5) Pull the fairleads (5) from the rubber seal (2).
(6) Separate and remove the fairlead (5) halves.
(7) Disconnect then pull out the three primary control cables from the rear pressure bulkhead (1) (Refer to 27-10-00, 27-20-00 and 27-30-00).
(8) Remove the and rubber seal (2) and phenolic block (3).

D. Rubber Seal - Installation

(1) Put the three primary control cables through the the phenolic block (3) and the rubber seal (2) at the rear pressure bulkhead (1).
(2) Connect the primary control cables
(Refer to 27-10-00, 27-20-00 and 27-30-00).
(3) Install the two fairlead (5) halves around each cable.
(4) Push the fairleads (5) into the rubber seal (2); make sure that the fairlead (5) engages correctly and positively into the seat of the rubber seal (2).

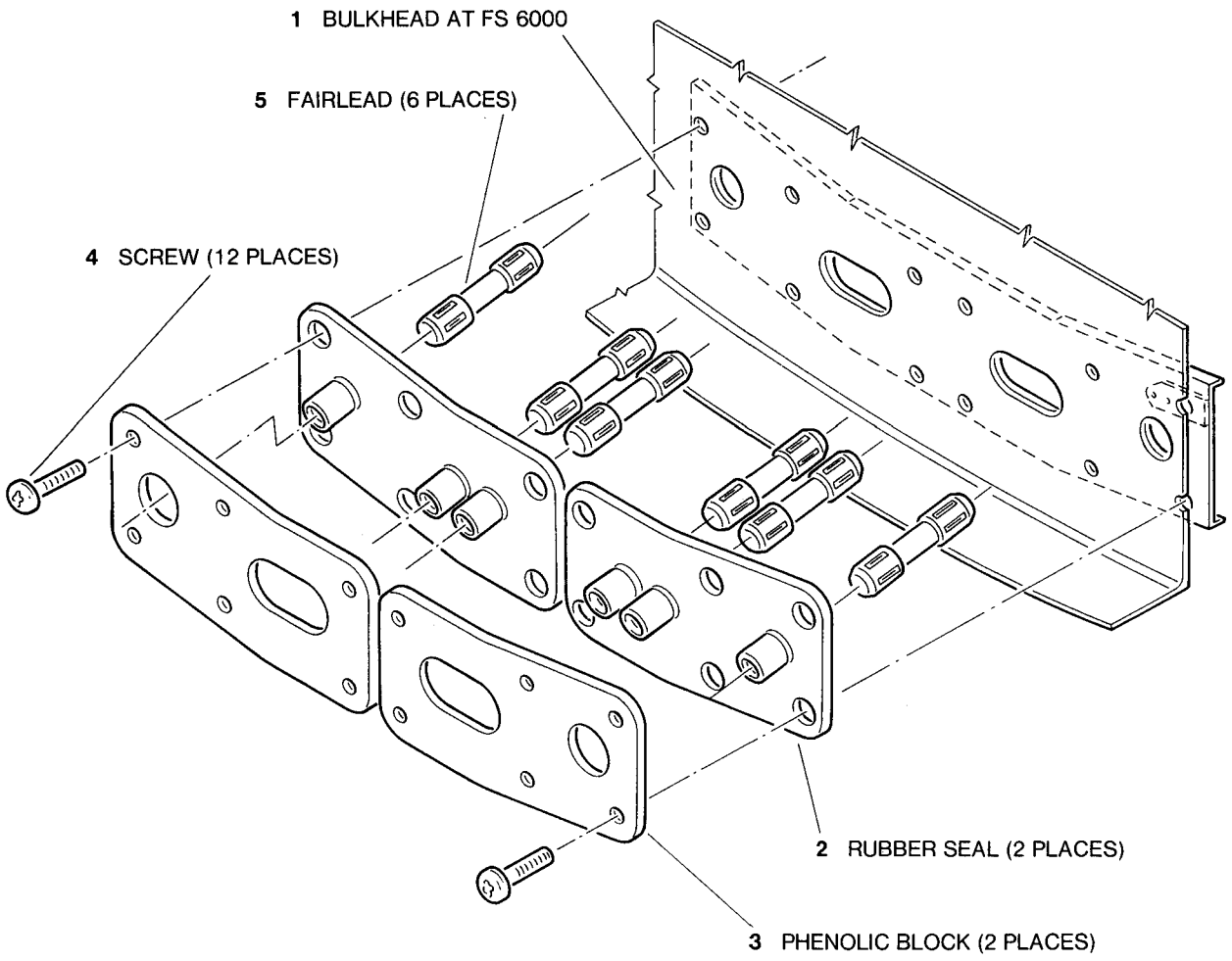

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Fig. 203 - Control Cable Pressure Seal

CAUTION: DO NOT APPLY SEALANT TO A PRESSURE SEAL.

(5) Put the rubber seal (2) and the phenolic block (3) into position against the pressure bulkhead (1) then install the fastening screws (4).
(6) Stretch then rig the primary control cables.
(Refer to 27-10-00, 27-20-00 and 27-30-00).
(7) Install the floor panel 231RLF and the carpet.

5. Trim Control Panel - Removal (Ref. to Fig. 204)

A. Procedure

(1) Open, tag and safety these circuit breakers:

Pilot CB panel:
PRI PITCH
SEC PITCH
YAW
ROLL

(2) Remove the screws (3, 4).
(3) Ease the trim control panel (2) away from the control pedestal.
(4) Tag all connectors.
(5) Disconnect the electrical connectors (1).

6. Trim Control Panel - Installation (Ref. to Fig. 204)

A. Procedure

(1) Make sure the applicable circuit breakers are open, safetied and tagged.
(2) Position the trim control panel (2) on the control pedestal so that switches can be connected.
(3) Connect the electrical connectors (1).
(4) Remove tags from the electrical connectors.
(5) Position the control panel in the control pedestal.
(6) Install and tighten the two securing screws (3, 4).
(7) Remove the safety tags and close these circuit breakers:

Pilot CB panel:
PRI PITCH
SEC PITCH
YAW
ROLL

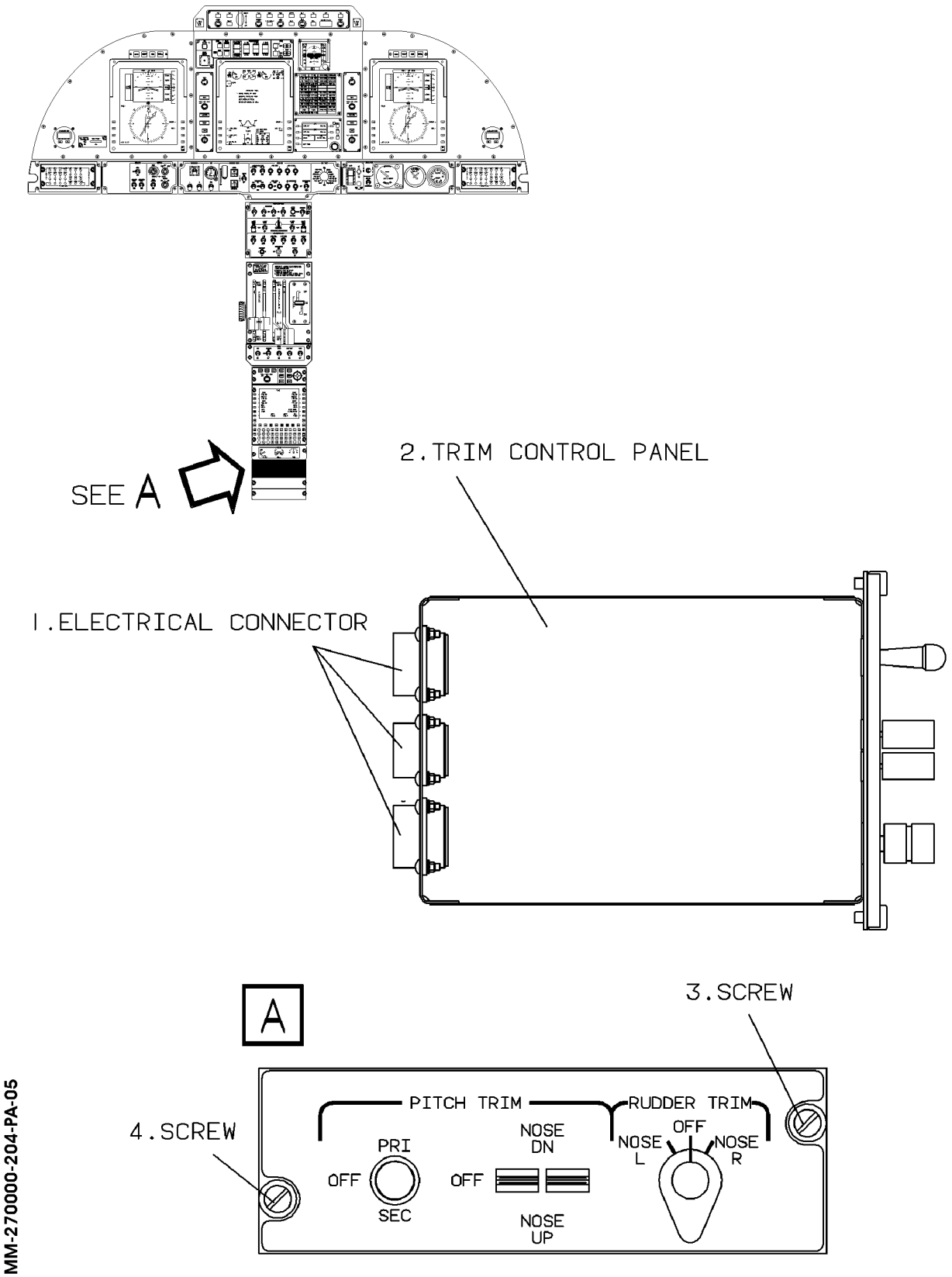

Fig. 204 - Trim Control Panel - Removal/Installation

FLIGHT CONTROLS - INSPECTION/CHECK

1. General

A. This page block gives the general inspection/check procedures for all of the flight control systems. Where inspection/check procedures are included in test procedures within the individual sections of this chapter, the procedure will not be repeated in this page block; instead, reference will be made to the test procedures as applicable.

B. To prevent repetitious steps of procedure, it is assumed throughout this page block that all necessary access and inspection panels, etc. have been removed in preparation for inspection/checks and that these panels etc. will be installed on satisfactory completion of the inspection/checks.

2. Control Cables - Inspection/Check

WARNING: MAKE SURE THAT RIGGING PINS ARE INSTALLED IN THE CONTROL SECTORS OF THE CABLES DURING THIS PROCEDURE. INJURY TO PERSONS CAN OCCUR IF CONTROL CABLES MOVE DURING INSPECTION OF THE CABLES.

A. Examine the control cables for damage and broken wires. Replace damaged cables if damage or the number of broken wires exceeds the limits given in Page Block 201 of this section.

B. Check that all turnbuckles (including those inside the control column) are securely installed with safety clips in place. Check that there is sufficient thread engagement by making sure that a small-gage wire will not pass through the safety hole at each end of the turnbuckle.

C. Check at the control wheels that the cable ends are not damaged and are correctly wound round the sectors.

D. Examine cable pulleys for damage and check for correct location of the cable in the groove. Make sure that cable retaining pins are correctly installed.

E. At the rear pressure bulkhead (FS 6000), inspect the cable pressure seals for damage, wear and general condition. Replace any damaged or worn fairlead or rubber seal.

F. Check that cable tension is within the limits given for the ambient temperature (refer to the temperature/tension correlation graph given in Page Block 201 of this section).

3. Primary Control and Trim Systems - Standard Inspection Procedures

A. Examine (to the maximum extent possible without removal) all components of the primary control and trim systems for the following:

– security of installation
– evidence of damage, corrosion etc.
– adequate clearance between moving parts and adjacent stationary parts/ structure - at control surfaces make sure there is a clearance of at least 5 mm (0.2 inch) between the end of the surface and the adjacent structure
– general condition, cleanliness.

Repair or replace damaged/corroded parts as necessary.

4. Primary Control Systems - Check for Proper Operation and for Friction

A. The check of the aileron control system for proper operation and for friction is included in 27-10-00, Page Block 501.

B. The check of the rudder control system for proper operation and for friction is included in 27-20-00, Page Block 501.

C. The check of the elevator control system for proper operation and for friction is included in 27-30-00, Page Block 501.

5. Trim Systems - Check for Full Stroke Operation and Indication

A. The check of the aileron trim tab travel etc. is included in 27-10-00, Page Block 501.

B. The check of the rudder trim tab travel etc. is included in 27-20-00, Page Block 501.

C. The check of the horizontal stabilizer travel etc. is included in 27-40-00, Page Block 501.

6. Aileron Trim Tab - Check and Record Play

A. The check and recording of aileron trim tab play is included in 27-10-00, Page Block 501.

7. Rudder Trim Tab - Check for Play

A. Fixtures, Test and Support Equipment

Rudder Trim Tab Travel Board	80-909167-401
Spring Balance (0-11 lb/0-5 kg)	Not Specified
Rigging Pin	Not Specified
Pencil	Not Specified

B. Procedure

(1) Remove access panel 320AL or 320AR.
(2) Install the rigging pin in the rudder rear sector.
(3) Install the rudder trim tab travel board.
(4) Apply a force of 11 lb (5 kg) to the left side of the rudder trim tab trailing edge and mark (with a pencil) on the travel board the position of the tab.
(5) Apply a force of 11 lb (5 kg) to the right side of the tab and mark on the travel board the position of the tab.
(6) Measure the distance between the two marks. If the measurement is more than 3 mm. (0.12 inch) there is wear in the system. Investigate and rectify the fault.
(7) Remove the travel board.
(8) Remove the rigging pin from the rudder rear sector.
(9) Install access panel 320AL or 320AR as applicable.

8. Horizontal Stabilizer - Check for Play

A. Fixtures, Test and Support Equipment

DTI	Not specified
Spring Balance	Not Specified

B. Procedure

(1) Set the DTI against the forward part of the bellcrank adjacent the actuator attachment point.
(2) Apply a force of 110 lb (50 kg) upward at the inboard leading edge of the horizontal stabilizer. Set the DTI to zero while the force is applied.
(3) Apply a force of 110 lb (50 kg) downward at the inboard leading edge of the horizontal stabilizer. Read the value on the DTI while the force is applied. If the value is more than 0.0079 (0.2 mm) degrees, there is wear in the system. Investigate and rectify the fault.
(4) Remove the DTI.

9. Control Wheels - Inspection and Check for Proper Operation

A. Examine the control wheels for general condition and security of installation.

B. The check for proper operation, play etc., is included in the aileron control system check referred to in Para. 4.A. of this Page Block.

10. Rudder Pedals - Inspection and Check for Proper Operation

A. Examine the rudder pedals for general condition and security of installation.

B. The check for proper operation is included in the rudder control system check referred to in Para. 4.B. of this Page Block.

11. Control Columns - Inspection and Check for Proper Operation

A. Examine the control columns for general condition and security of installation.

B. The check for proper operation, play etc., is included in the elevator control system check referred to in Para. 4.C. of this Page Block.

12. Rudder Pedals - Check for Play

A. Fixtures, Test and Support Equipment

Spring Balance	Not Specified
Rigging Pin	Not Specified
Dial Test Indicator	Not Specified

B. Procedure

(1) Remove either of the side panels of the control pedestal.
(2) Install the rigging pin in the rudder front sector.
(3) Install the dial test indicator (DTI) so that the sensing point is touching the inboard end of the rudder pedal pivot housing of any one of the pedals.
(4) Apply a forward force of 22.05 lb (10 kg) to the outboard end of the rudder pedal pivot housing.
(5) Zero the DTI while the force is applied.
(6) Apply a rearward force of 22.05 lb (10 kg) to the outboard end of the rudder pedal pivot housing.
(7) Read the value on the DTI scale while the force is applied. If the value is more than 0.16 inch (4 mm), there is wear in the system. Investigate and rectify the fault.
(8) Repeat the procedure for the other three pedals.
(9) Remove the rigging pin from the rudder front sector.
(10) Install the side panel of the control pedestal.

13. Control Columns - Check for Play

A. Fixtures, Test and Support Equipment

Spring Balance	Not Specified
Rigging Pin	Not Specified
Dial Test Indicator	Not Specified

B. Procedure

(1) Set the horizontal stabilizer at -4°30' inclination.
(2) Remove either of the side panels of the control pedestal.
(3) Install the rigging pin in the elevator front sector.
(4) Install the dial test indicator (DTI) so that the sensing point is touching the escutcheon at the control wheel axis of the left control column.
(5) Apply a forward force of 11.02 lb (5 kg) to the upper part of the escutcheon.
(6) Zero the DTI while the force is applied.
(7) Apply a rearward force of 11.02 lb (5 kg) to the upper part of the escutcheon.
(8) Read the value on the DTI scale while the force is applied. If the value is more than 0.16 inch (4 mm), there is wear in the system. Investigate and rectify the fault.
(9) Repeat the procedure for the right control column.
(10) Remove the rigging pin from the elevator front sector.
(11) Install the side panel of the control pedestal.

14. Horizontal Stabilizer Actuator - Functional Test

A. The functional test of the horizontal stabilizer actuator is included in 27-40-00, Page Block 501.

15. Forward Wing Flap Actuating System - Inspection and Check for Play

A. Fixtures, Test and Support Equipment

Inclinometer	Not Specified
Spring Balance	Not Specified

B. Procedure

(1) Set the flaps to the MID position.
(2) Install the inclinometer on the forward wing flap skin, normal to the hinge axis.
(3) Apply a downward force of 11.02 lb (5 kg) to the flap trailing edge.
(4) Zero the DTI while the force is applied.
(5) Apply an upward force of 11.02 lb (5 kg) to the flap trailing edge.
(6) Read the value on the inclinometer while the force is applied. If the value is more than 0.5°, there is wear in the system. Investigate and rectify the fault.

(7) On satisfactory completion of the play check, remove the inclinometer from the forward wing.
(8) Set the flaps in the DOWN position, inspect the push-pull rods and linkages for general condition.

16. Gust Locks - Inspection

A. If installed, inspect the gust locks for general condition and correct installation (Refer to 27-70-00).

17. Angle-of-Attack (AOA) Transmitter - Inspection and Check for Freedom of Movement

A. Examine the AOA transmitter for security of installation and make sure that the two slots are clean.

B. The check for freedom of movement is included in 27-31-00, Page Block 201.

18. Horizontal Stabilizer (Pitch Trim) Actuator - Inspection

A. Remove the front fairing at the top of the vertical stabilizer.

B. Visually examine the stabilizer actuator and its attachment fittings for general condition, wear and cracks.

C. Check that the attachment bolts are tight and that the bolts are safetied correctly with lockwire.

D. Visually examine the actuator motors for signs of discoloration which would indicate motor overheating.

E. Install the front fairing at the top of the vertical stabilizer.

AILERON AND TAB - DESCRIPTION AND OPERATION

1. General

A. The aileron control system is actuated manually, or automatically through the autopilot system. The aileron system consists of two subsystems: an aileron control system and an aileron trim control system.

B. The aileron control system provides lateral control of the airplane manually through the control wheels. The ailerons are balanced to 100 percent by lead weights in the leading edge.

C. The aileron trim tab is an integral part, hinged on the right aileron; its deflections allow lateral trimming of the airplane. The trim tab is actuated by an electromechanical actuator. A trim and trim arming switch, on each control wheel, controls the trim tab actuator. An aileron trim indicator on the flight compartment control pedestal indicates trim tab position.

2. Component Description (Ref. to Fig. 1)

A. Ailerons

(1) The ailerons are hinged at three places on the rear spar of each main wing outboard of the flaps.

(2) Each aileron is actuated by a bellcrank driven by a push pull rod system running along the main wing rear spar.

(3) The two ailerons are interconnected by a rod between the two control sectors (quadrants) on the bulkhead at the FS 6710.

B. Aileron Trim Tab

(1) The aileron trim tab is hinged to the inboard trailing edge of the right aileron by a continuous-type hinge. The trim tab is controlled by a double actuating rod connected to a rotary-type actuator through a linkage system. The actuator is located on the rear side of the main wing rear spar.

C. Aileron Control Wheel and System

(1) A U-shaped control wheel, hinged on top of each control column, controls the ailerons. Control wheel motion is transferred to the ailerons through a cable loop, up to the two interconnected control sectors on the bulkhead and two symmetrical push-pull rod systems, which transmit the motion to the aileron bellcranks. Maximum control wheel movement is 61 degrees both right and left of neutral. With the ailerons in the neutral position, the control wheel neutral position is 1.5 to 3.5 degrees counterclockwise from central; this is due to the flying characteristics of the airplane. A trim and trim arming switch is located on each control wheel. Refer to 20-10-00 for maintenance practices of the control wheel.

D. Aileron Trim Position Indicator

(1) The aileron trim position indicator, located on the flight compartment control pedestal, indicates aileron trim tab travel. Indicator input is from a potentiometer inside the aileron trim tab actuator.

(2) Calibration of the aileron trim indicator is performed at the position indicator calibration assembly located inside the trim indicator panel.

3. Operation

A. Aileron Control System (Ref. to Fig. 1)

(1) When either aileron control wheel is rotated, the crossover cable rotates the other control wheel and the control cables rotate the aileron control sectors located at FS 6710. The control sectors are interconnected by a push-pull rod. A push-pull rod system transmits the rotation from each control sector to the related aileron bellcrank. The aileron bellcrank moves the aileron through an actuating rod. Maximum control wheel movement is 61 degrees both left and right of neutral. Maximun aileron movement is 19 (+0 -1) degrees up and 15.5 (+0 -1) degrees down.

B. Aileron Trim Tab System

(1) The trim and trim arming switch on the control wheel controls the aileron trim tab actuator on the right main wing rear spar. Pressing the trim and trim arming switch energizes the actuator; while pressed, the switch can be moved with the thumb in the required direction to move the tab up or down. The actuator is provided with an integral trim tab position transmitter which provides input for the aileron trim tab position indicator on the flight compartment control pedestal. Trim tab travel is a 20 degrees up and 19(±1) degrees down.

(2) A schematic of the aileron trim tab electrical control system is shown in Fig. 2.

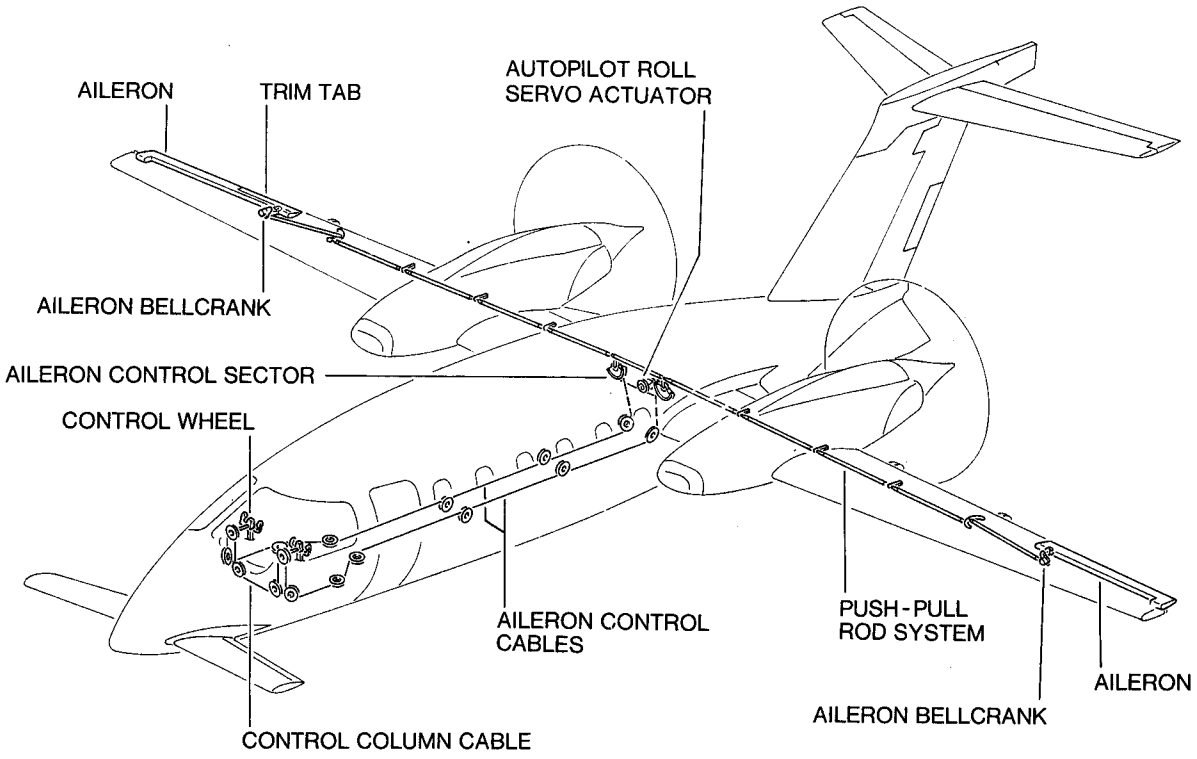

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Fig. 1 - Aileron Control System Installation

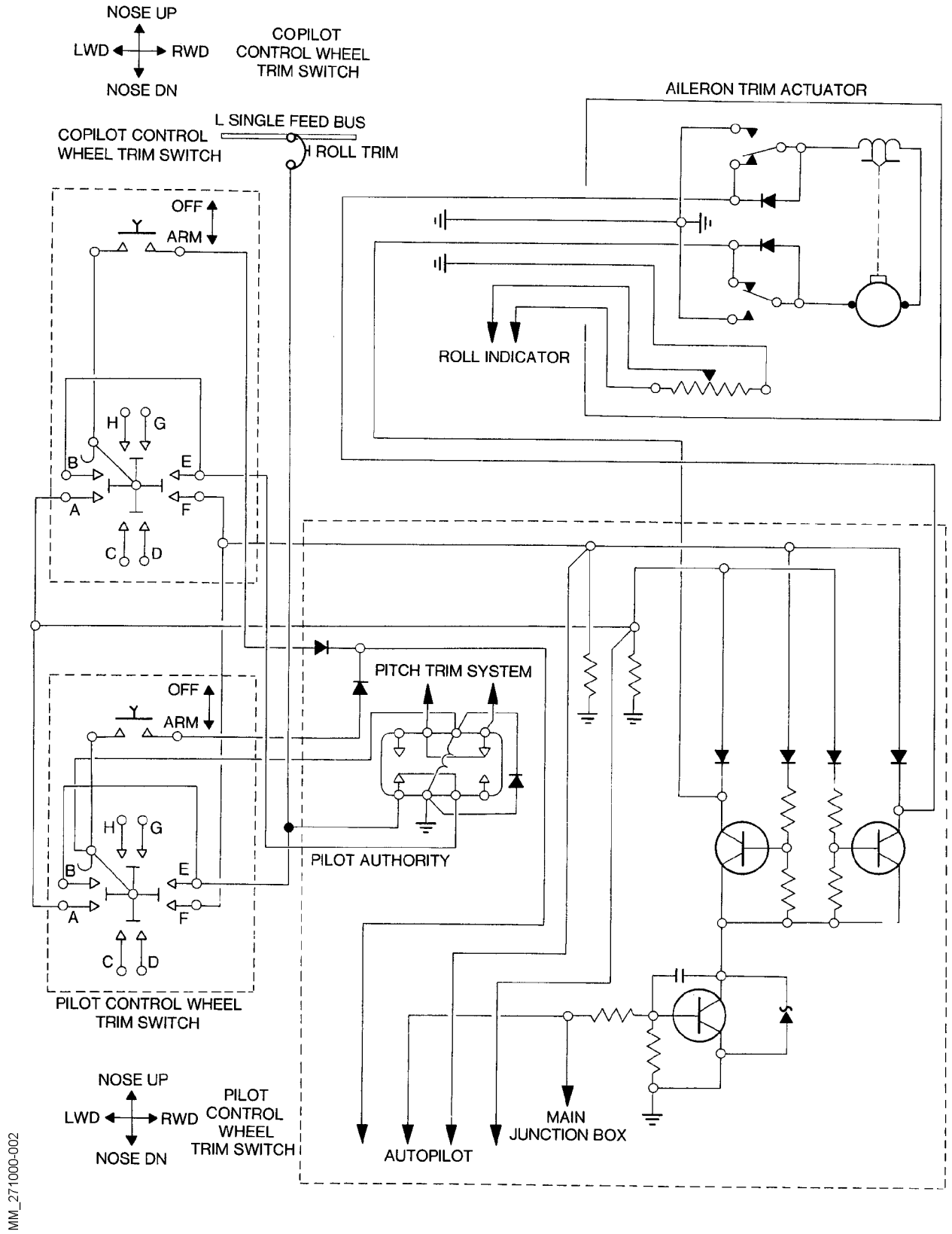

Fig. 2 - Aileron Trim Tab Electrical Control Schematic

AILERON AND TAB - MAINTENANCE PRACTICES

1. General

A. This page block contains the following maintenance practices:

- removal/installation of the control wheel
- removal/installation of the control column cable
- removal/installation of the aileron control cables
- removal/installation of the aileron push-pull rod system
- removal/installation of the aileron control sector interconnecting rod
- removal/installation of the aileron
- removal/installation of the aileron trim tab
- removal/installation of the aileron trim tab actuator
- removal/installation of the aileron trim position indicator.

B. If there is a possibility that the aileron controls could be moved inadvertently while the system is being worked on, put a notice in the flight compartment/at the ailerons to tell other persons not to move the controls.

2. Control Wheel Assembly - Removal (Ref. to Fig. 201 and 202)

NOTE: The control wheel assembly is only to be disassembled to the extent necessary to complete the desired repairs.

A. Referenced Information

Maintenance Manual Chapter 52-82-00

B. Procedure

(1) Remove control wheel sector cover (22) and control wheel escutcheon (2).

(2) Remove the cotter pin (5), nut (3) and washer (4) which attach the control wheel (1) to the shaft (6) and pull the control wheel from the assembly.

(3) If the control wheel is not to be removed further, safety the control wheel to the control column with temporary ties; make sure that there is no strain on the electrical wiring and proceed to step (4). If the control wheel is to be replaced proceed as follows:

(a) Loosen the set screw of each switch on the control wheel (1).

(b) Pull out all switches from the control wheel (1).

(c) Attach temporary identification tags to identify the wires for installation.

(d) Disconnect wires from each switch.

(e) Pull the control wheel (1) from the electrical wiring.

(4) Remove the access cover (11) from the right control column (9).

(5) Loosen the turnbuckle (12) of the control column cable.

(6) Open the main landing gear rear door (Refer to 52-82-00).

(7) Loosen one of the turnbuckles of the aileron control cable close to the control sectors.

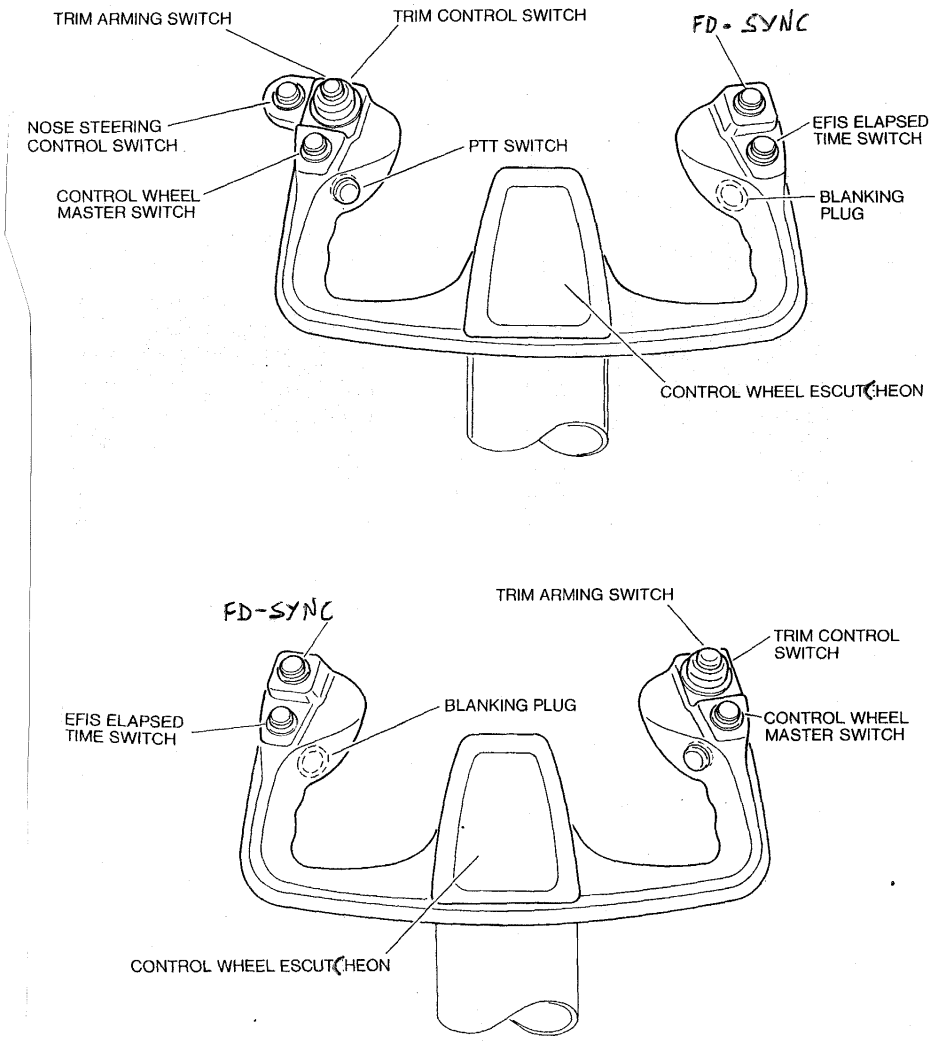

Fig. 201 - Pilot and Copilot Control Wheel

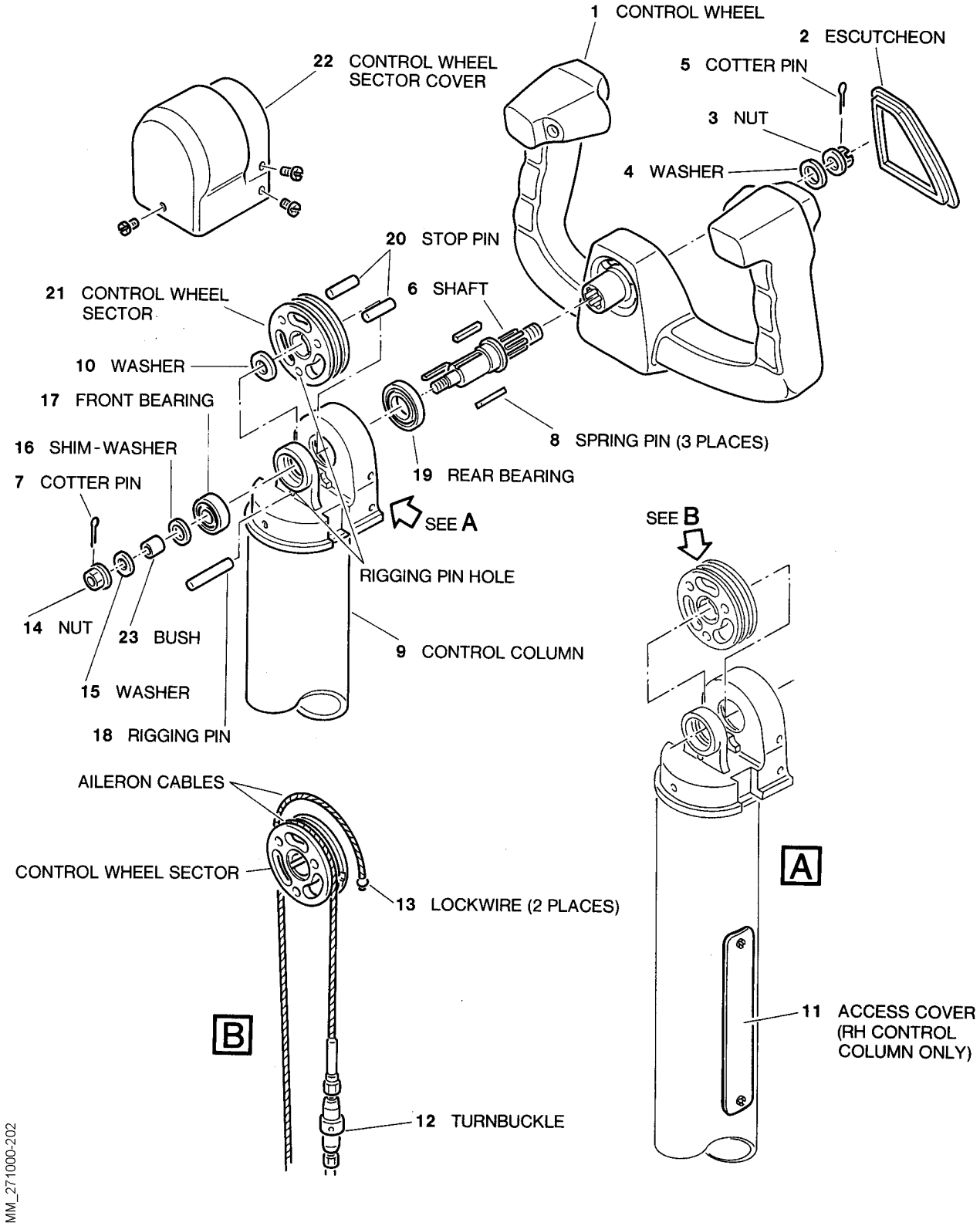

Fig. 202 - Control Wheel - Removal/Installation

(8) Remove the cable lockwire (13) from the control wheel sector (21).
(9) Attach temporary identification tags to help the installation.
(10) Remove the cotter pin (7), nut (14), washers (15), bush (23) and shim washer (16), that hold the control wheel shaft (6) in the control column assembly.
(11) Install a temporary cover on the hole in the control column (9) to stop the entry of foreign objects.
(12) Remove the shaft (6) from the control column (9).
(13) Remove control wheel sector (21), with the three fitting spring pins (8) and the washer (10).
(14) Remove the front bearing (17) if required.
(15) Remove the rear bearing (19) if required.

3. Control Wheel Assembly - Installation (Ref. to Fig. 201 and 202)

A. Consumable Materials

Loctite Retaining Compound	01-005
Trichloroethane	02-014
MEK	02-009
Lockwire	04-008
Lint Free Cloth	04-013

B. Expendable Parts

Cotter pin	MS 24665-285 Qty2

C. Referenced Information

Maintenance Manual Chapter 20-10-01
Maintenance Manual Chapter 51-36-00
Maintenance Manual Chapter 20-20-01
Maintenance Manual Chapter 52-82-00

D. Procedure

WARNING: BE CAREFUL WHEN YOU USE THE CONSUMABLE MATERIALS. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN 20-20-01.

NOTE: Steps (1) and (2) are applicable only if the bearing(s) has(have) been removed.

(1) Clean the bearing seats with MEK. Wipe dry with a clean dry lint-free cloth. Do not let parts become dry in the air.

CAUTION: WHEN INSTALLING BEARINGS, MAKE SURE THAT THE LOCTITE RETAINING COMPOUND IS NOT APPLIED TO THE INNER SURFACES OF THE BEARINGS.

(2) Apply a thin coating of Loctite Retaining Compound to the outer surfaces of the bearings (17, 19) and the mating surfaces of the control column fork and install bearings (17, 19) into the corresponding seats. Remove excess retaining compound with a cloth moistened with trichloroethane. Allow retaining compound to cure (Refer to 51-36-00).

(3) Install the three spring pins (8) into the hub seats of the control wheel sector (21).

(4) Install the washer (10) into the seat at the forward face of the control wheel sector (21).

(5) Position and hold the control wheel sector (21) in the control column fork.

NOTE: The stop pins (20) must be installed to the rear (control wheel side) and to the top.

(6) Install the shaft (6) from the rear to the front through the control column fork and the control wheel sector(21).

NOTE: Make sure that the grooves in the shaft (6) align with the spring pins (8) in the control wheel sector.

(7) Install the shim washer (16), bush (23), washer (15), and nut (14) on the shaft.

(8) Tighten the nut and safety the nut with a new cotter pin (7).

(9) If the control wheel was not removed from the assembly, proceed to the step (10). If the control wheel was removed from the control column assembly, proceed as follows:

(a) Route the electrical wiring through the appropriate holes in the wheel according to the temporary identification tags.

(b) Connect the electrical wiring to the appropriate switches (Refer to 20-20-01).

(c) Put each switch into position then secure with the set screw on the control wheel (1).

(10) Install the rig pin (18) through the control column and into the control wheel sector (21).

(11) When installing the control wheel, loop the wiring approximately 1-1/2 turns forward of the control wheel, then 1-1/2 turns inside the control wheel hub. Install the control wheel and make sure that the control wheel is in neutral position.

(12) Secure the control wheel (1) with washer (4), nut (3) and a new cotter pin (5). Install control wheel escutcheon (2).

(13) Install the aileron control cables in the control wheel sector (21) as marked in the removal procedure and secure with lockwire (13).

(14) Remove the temporary identification tags.

(15) Rig, inspect and test the aileron control system as described in page block 501.

(16) Test all functions of the control wheel to ensure that all electrical connections are installed correctly.

(17) Install the control wheel sector cover (22), the access cover (11) on the right control column and close the main landing gear rear door (Refer to 52-82-00).

4. Control Column Cable - Removal (Ref. to Fig. 203)

A. Fixtures, Test and Support Equipment

Rigging pins	Not Specified

B. Consumable Materials

String, approximately 15 ft (5 m) long	Not Specified

C. Procedure

(1) Remove the control wheel sector cover (1) from both control wheels (12).
(2) Remove the turnbuckle access cover (7) from the right control column (8).
(3) Remove the floorboards at the base of both control columns.
(4) Remove the covers from the base of both contol columns.
(5) Install rigging pins (9, 11) through both control wheel sectors (2, 13).
(6) Remove the cable retaining pins (4) from the control column cable pulleys (5, 6).

NOTE: Do not drop the turnbuckle (10) down through the column (8).

(7) Loosen and disconnect the turnbuckle (10) on the right control column (8).

NOTE: The control column cable is locked on the outer side of each sector.

(8) Remove the lockwire from control wheel sectors (2, 13).
(9) Attach a length of string to the ball end (3) of the cable at left control wheel (12).
(10) Pull the cable out through the turnbuckle access at the right control column (8). When the end of the length of string is in position (outside the turnbuckle access hole) detach and remove the control cable.
(11) Pull the short portion of the control column cable out through the turnbuckle access at right control column (8).

5. Control Column Cable - Installation (Ref. to Fig. 203)

A. Consumable Materials

Lockwire	04-008

B. Referenced Information

Maintenance Manual Chapter 27-00-00

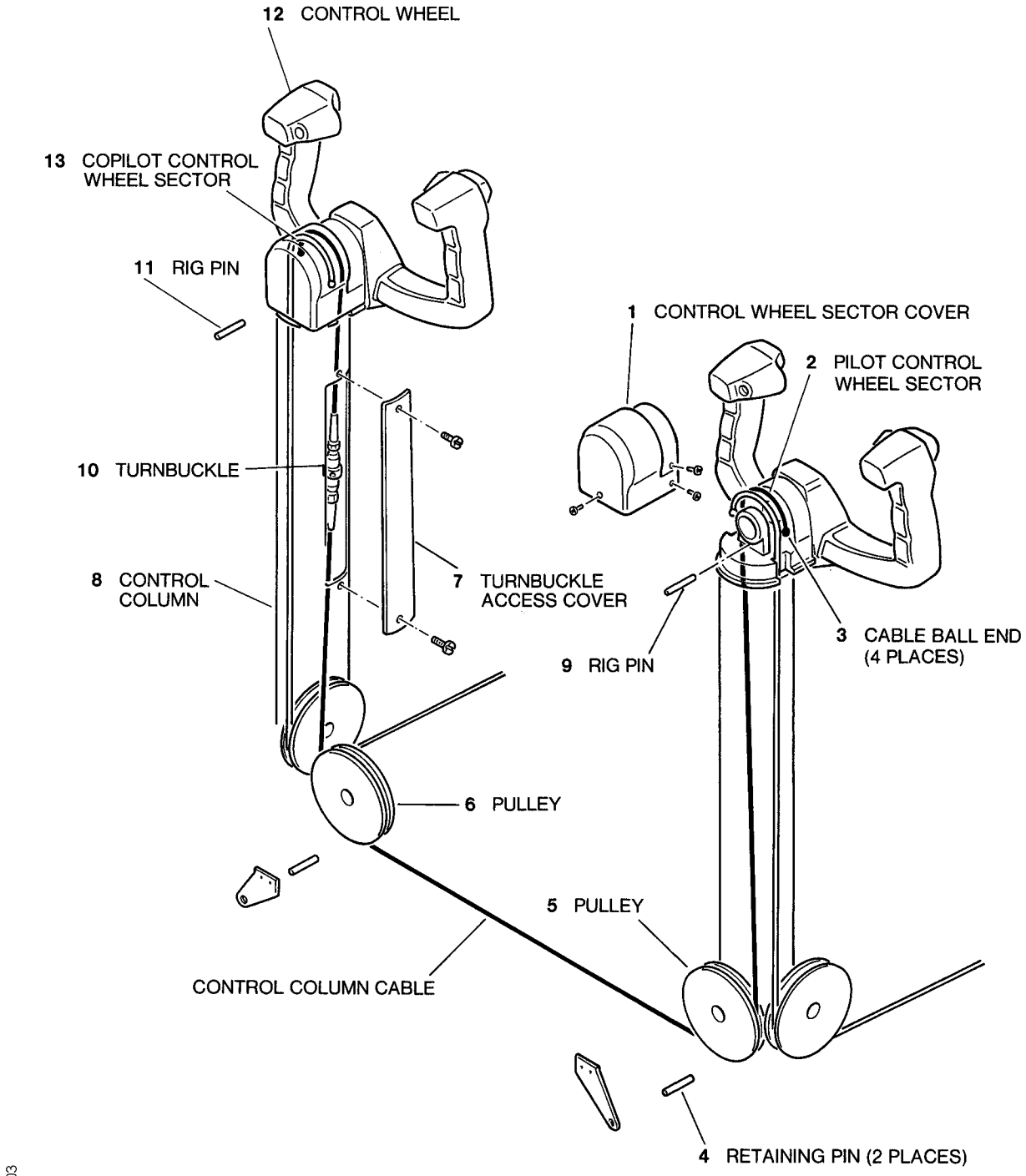

Fig. 203 - Control Column Cable - Removal/Installation

C. Procedure

(1) Attach the ball end (3) of the long portion of the control column cable to the end of the length of string at the turnbuckle access hole.
(2) Pull the cable in through the hole into position.
(3) Wrap the cable 1/2 turn on the control wheel sector (2) and position the ball end into the seat. Safety the cable end with lockwire.

NOTE: The control column cable is locked on the outer side of the sector.

(4) Put the cable on the groove of each pulley (5, 6) at the base of the control column and install the retaining pins (4).
(5) Put the short portion of the cable into position at the copilot control wheel sector (13) through the turnbuckle access hole.
(6) Wrap the cable 1/2 turn on the control wheel sector (13) and position the ball end (3) into the seat. Safety the cable end with lockwire.

NOTE: The control column cable is locked on the outer side of the sector.

(7) Connect the cable at the turnbuckle (10).

CAUTION: CHECK THE CABLE FOR CORRECT ENGAGEMENT ON THE PULLEYS AND FREEDOM OF MOVEMENT.

(8) Stretch the cable to the prescribed 5/32" cable tension (Refer to 27-00-00).
(9) Remove the rigging pins (9, 11) from the control wheel sectors (2, 13).
(10) Rig, inspect and check the aileron control system as described in page block 501.
(11) Install the covers on the base of both contol columns.
(12) Install the floorboards at the base of both control columns.
(13) Install the control wheel sector cover (1) on both control wheels.
(14) Install the turnbuckle access cover on the right control column (8).

6. Aileron Control Cable - Removal (Ref. to Fig. 204)

NOTE: This removal procedure applies to the left cable; the procedure for the right cable is the same.

A. Fixtures, Test and Support Equipment

Rigging pins	Not Specified

B. Consumable Material

String, approximately 50 ft (15 m) long	Not Specified

C. Referenced Information

Maintenance Manual Chapter 25-10-00
Maintenance Manual Chapter 25-20-00
Maintenance Manual Chapter 52-82-00
Maintenance Manual Chapter 27-00-00

D. Procedure

(1) Remove the pilot seat (Refer to).
(2) Remove the floorboards of the flight compartment.
(3) Remove the cover from the base of control column.
(4) Remove the center floorboard of the passenger cabin.
(5) Remove carpet to gain access to the rear center floorboard (floor panel 231RLF) close to the rear pressure bulkhead (Refer to 25-20-00).
(6) Remove the rear center floorboard.
(7) Open the main landing gear rear door (Refer to 52-82-00).
(8) Remove the retaining pins from these pulleys:
- At control column base (11,12)
- At FS 1130 (5,6)
- At FS 1550 (3,4)
- At FS 3320 (2)
- At FS 5792 (1)
- At FS 6710 (15)

(9) Remove the control column sector cover (7).
(10) Install the rig pins (9,13) through the control wheel sector (8) and the aileron control sector (12) at FS 6710.
(11) Loosen and disconnect the cable turnbuckle (14) at FS 6710.
(12) Remove the cable lockwire from the control wheel sector (8).

NOTE: The aileron control cable is locked on the inner side of the sector.

(13) Attach the ball end (10) of the cable to the end of the length of string.
(14) Remove the pressure seal at FS 6000 as described in Chapter 27-00-00.
(15) Pull the cable out through the rear main landing gear well. When the end of the length of string is in position outside the landing gear well detach and remove the control cable.
(16) Remove the short portion of the aileron control cable by removing the cable retaining spring pin (19) and the bolt (6), washer (17) and nut (18) which fasten the cable to the control sector (12).

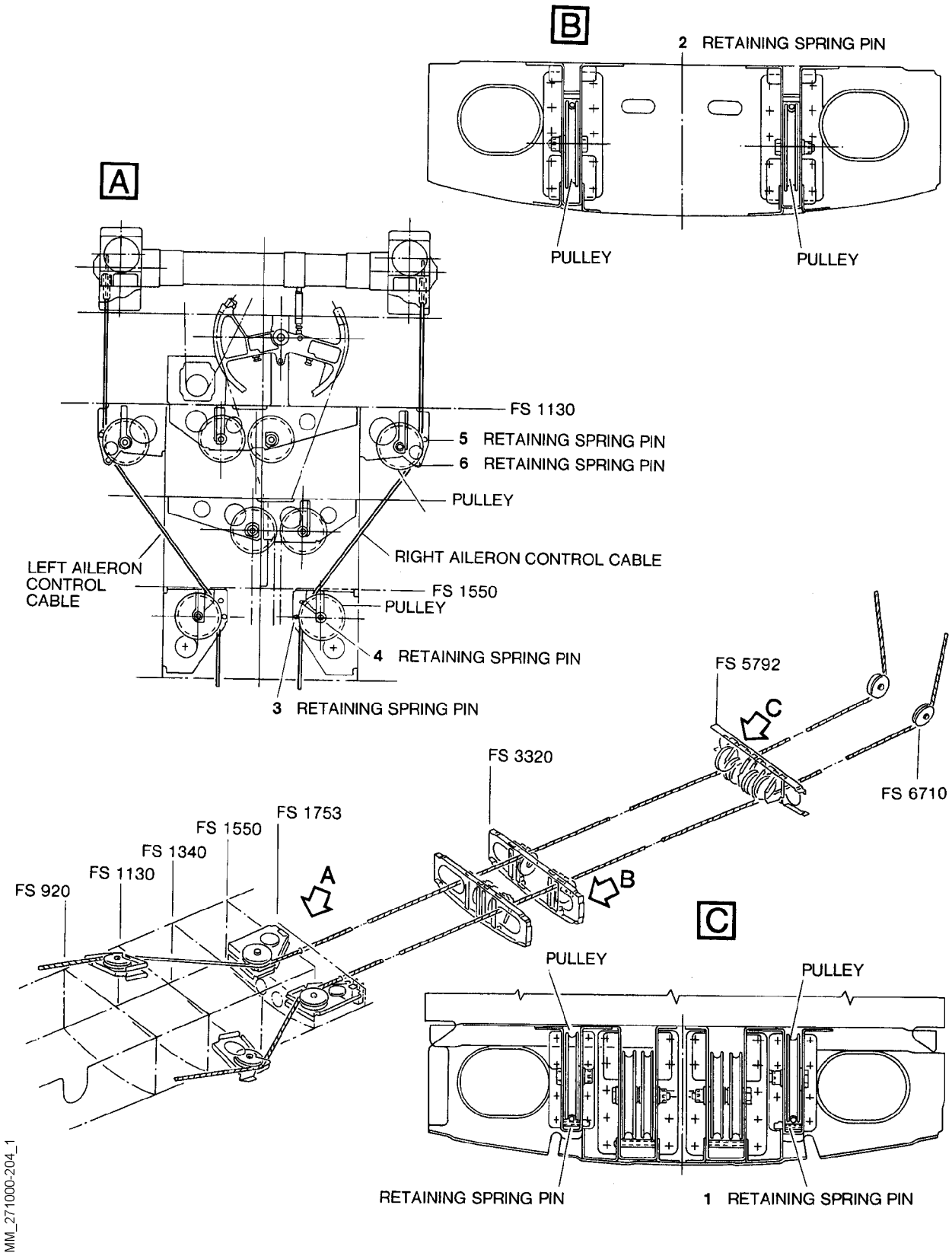

Fig. 204 - Control Cable - Removal/Installation (Sheet 1 of 3)

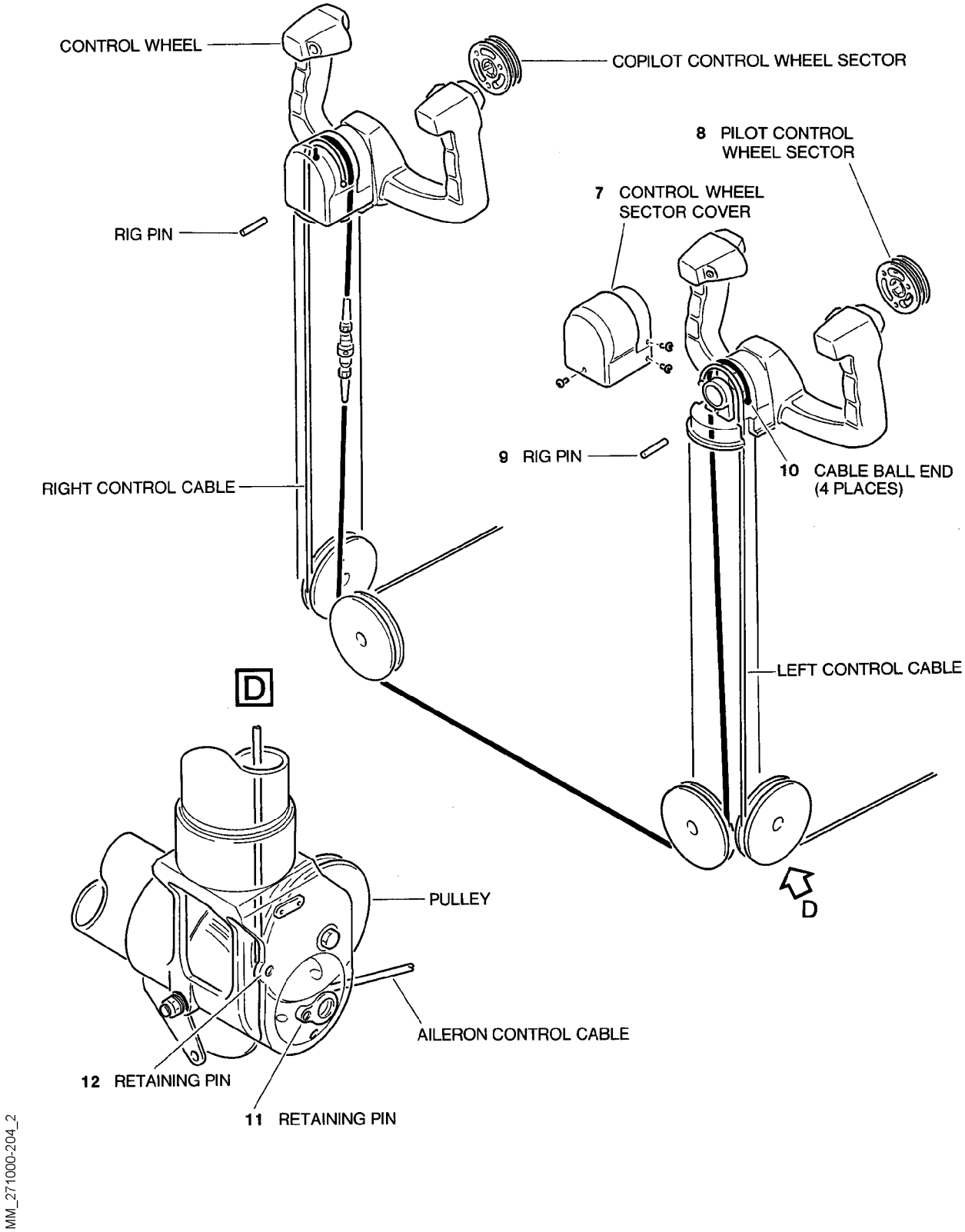

Fig. 204 - Control Cable - Removal/Installation (Sheet 2 of 3)

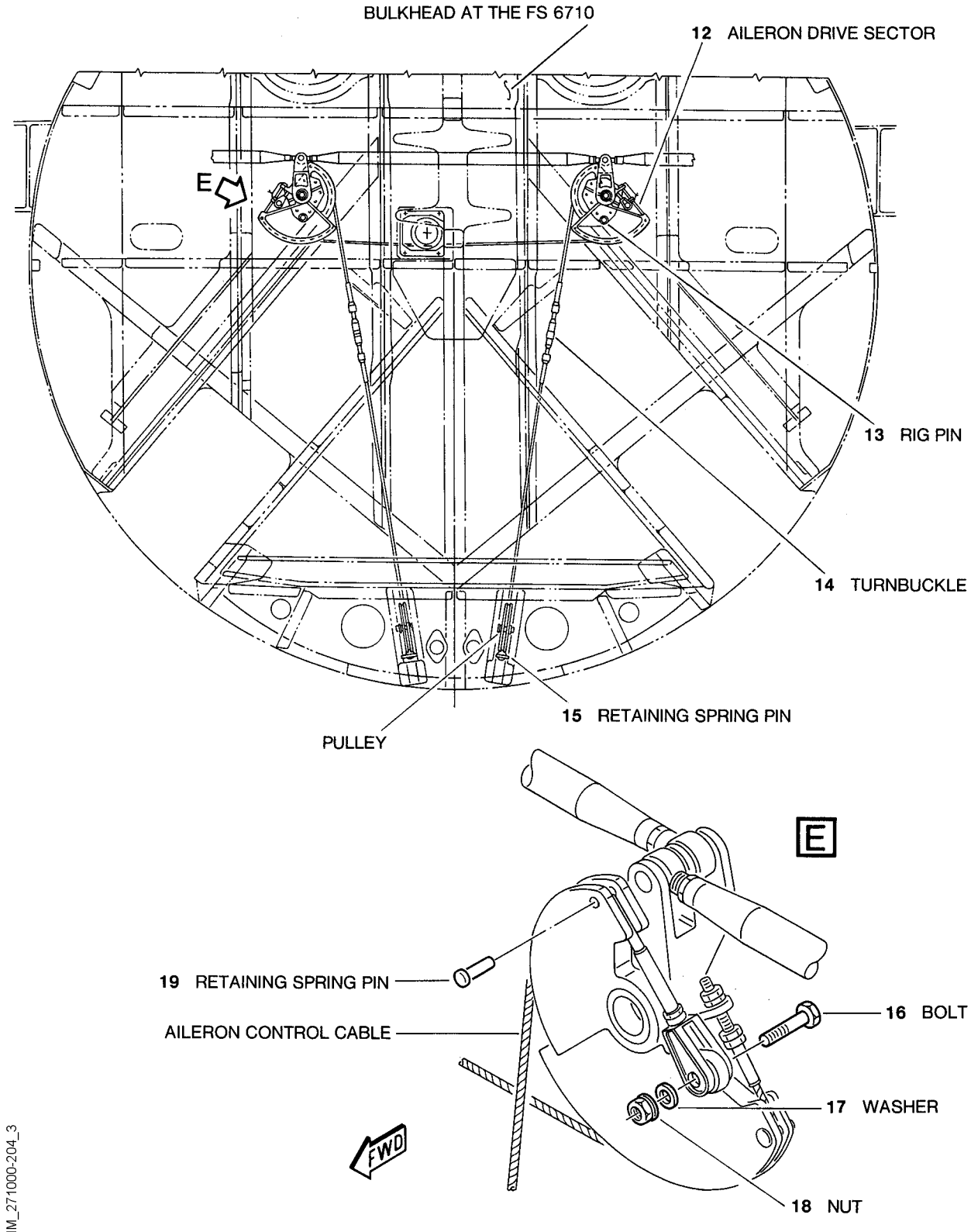

Fig. 204 - Control Cable - Removal/Installation (Sheet 3 of 3)

7. Aileron Control Cable - Installation (Ref. to Fig. 204)

A. Consumable Materials

Lockwire	04-008

B. Referenced Information

Maintenance Manual Chapter 27-00-00
Maintenance Manual Chapter 25-10-00
Maintenance Manual Chapter 25-00-00
Maintenance Manual Chapter 52-82-00

C. Procedure

(1) Attach the ball end (10) of the aileron control cable to the end of the length of string at the rear main landing gear well.
(2) Put the cable into position by pulling the line from the control column. When the cable is in position detach the line.
(3) Install the cable retaining pins on all pulleys (12, 11, 5, 6, 4, 3, 2, 1, 15).

NOTE: Check correct engagement of the cable on all pulleys and correct installation of the retaining pins.

(4) Wrap the cable 1/2 turn on the control wheel sector (8) and position the ball end (10) into the seat. Safety the cable end with lockwire.

NOTE: The aileron control cable is locked on the inner side of the sector.

(5) Place the short portion of the cable on the control sector at FS 6710.
(6) Install the bolt (16), washer (17), and nut (18) which attach the cable to the control sector(12). Install the cable retaining pin (19).
(7) Connect the cable at turnbuckle (14).
(8) Install the pressure seal at FS 6000 as described in chapter 27-00-00.
(9) Remove the rig pins (13,9) from the control wheel sector (8) and the aileron control sector (12).
(10) Rig, inspect and check the aileron control system as described in page block 501.
(11) Install the control column sector cover (7).
(12) Install the cover at the base of control column.
(13) Install the floorboards of the flight compartment.
(14) Install the center floorboard of the passenger cabin.
(15) Install the rear center floorboard (floor panel 231RLF) close to the rear pressure bulkhead.
(16) Install the carpet (Refer to 25-20-00).
(17) Install the pilot seat (Refer to 25-20-00).
(18) Close the rear main landing gear door (Refer to 52-82-00).

8. Aileron Push-Pull Rod System - Removal (Ref. to Fig. 205)

NOTE: The procedure for the LH and RH parts of the system is identical. The removal of the LH part is described.

A. Referenced Information

Maintenance Manual Chapter 27-50-00
Maintenance Manual Chapter 52-82-00

B. Procedure

Rod No.	External Diameter mm.	Rod Ends	Length mm.
2	25.4	Adjustable Eye and Fixed Clevis	1092.26
3	25.4	Fixed Eye and Fixed Clevis	1051.74
4	25.4	Fixed Eye and Fixed Clevis	1051.74
5	25.4	Fixed Eye and Fixed Clevis	1051.23
6	19.05	Fixed Eye and Adjustable Eye	492.88
1	22.2	Fixed Eye and Fixed Eye	630.17

Table 201 - Aileron Rods

(1) Open the main landing gear rear door (Refer to 52-82-00).
(2) Remove the three access panels 522AT, 522BT and 522CT on the left wing (622AT, 622BT and 622CT) on the right wing upper side between the engine nacelle and the fuselage.
(3) Remove the trailing edge cover close to the outside of the engine nacelle at WS 2328.
(4) Remove the wing trailing edge outboard the engine nacelle.
(5) Set the flaps to the full down position. (Refer to 27-50-00).
(6) Install the rigging pin (12) into the aileron control sector (13).
(7) Loosen the turnbuckle (14) adjacent to the aileron control sector (13).
(8) Support both ailerons.
(9) Remove the nut, washer, bolt and bushing (15, 16, 17 and 18) which connect No.1 (1) and No.2 (2) rods to the aileron control sector (13).

NOTE: Keep the bushings (18) in position with temporary ties.

(10) Remove the nut, washer and bolt (19, 20 and 21) which connect the No.2 rod (2) to the No.1 bellcrank (7).
(11) Remove the nut, washer and bolt (22, 23, and 24) which connect the No.2 rod (2) to the No.3 rod (3).
(12) Move the No.2 rod through the housing of the No.1 bellcrank (towards the No.4 rod) until you can remove it.
(13) Remove the nut, washer and bolt (25, 26 and 27) which connect the No.3 rod (3) to the No.2 bellcrank (8).

(14) Remove the nut, washer and bolt (28, 29 and 30) which connect the No.3 rod (3) to the No.4 rod (4).

NOTE: For accessibility reasons this bolt is "HI LOK" type.

(15) Move the No.3 rod towards the No. 5 rod until you can remove it.

(16) Remove the nut, washer and bolt (31, 32 and 33) which connect the No.4 rod (4) to the No.3 bellcrank (9).

(17) Remove the nut, washer and bolt (34, 35 and 36) which connect the No.4 rod (4) to the No.5 rod (5).

(18) Remove the No.4 rod.

(19) Remove the nut, washer, bolt and bushing (37, 38, 39 and 46) which connect the No.5 rod (5) to the No.4 bellcrank (10).

(20) Remove the No.5 rod.

(21) Remove the nut, washer, bolt and bushing (40, 41, 42 and 47) which connect the No.6 rod (6) to the No.4 bellcrank (10).

NOTE: Keep the bushings (46, 47, and 48) in position with temporary ties.

(22) Remove the nut, washer, bolt and bushing (43, 44, 45 and 48) which connect the No.6 rod (6) to the aileron bellcrank (11).

(23) Remove the No.6 rod.

9. Aileron Push-Pull Rod System - Installation (Ref. to Fig. 205)

A. Fixtures, Test and Support Equipment

Rigging pins	Not Specified
Aileron Travel Board	80-909164-001

B. Referenced Information

Maintenance Manual Chapter 27-40-00
Maintenance Manual Chapter 52-82-00

C. Procedure

NOTE: Make sure the rigging pin is still installed in the aileron control sector.

(1) Install the rigging pin at No.2 bellcrank (8).

(2) Install the aileron travel board.

(3) Set and lock the aileron at neutral against the travel board.

(4) Install the No.2 rod through the No.2 bellcrank support and engage it with the aileron drive sector (13).

NOTE: Position adjustable rod end to connect with the aileron drive sector (13).

(5) Install the bolt, washer and nut (21, 20 and 19) to connect the No.2 rod (2) to No.1 bellcrank (7). Tighten the nut.

(6) Put the No.3 rod into position, then install the bolt, washer and nut (24, 23 and 22) which connect the No.3 rod (3) to No.2 rod (2). Tighten the nut.

(7) Connect the No.3 rod (3) to No.2 bellcrank (8) by installing the bolt, washer and nut (27, 26 and 25). Tighten the nut.

(8) Adjust the No.2 rod end (31) to align with the aileron control sector (13). Safety the rod end.

(9) Remove the temporary ties from the bushing (18).

(10) Install the bushing, bolt, washer and nut (18, 17, 16 and 15) to connect No.1 (1) and No.2 (2) rods to the aileron control sector (13) as shown in detail F of Fig. 205. Tighten the nut.

(11) Put the No.4 rod into position.

(12) Install the bolt, washer and nut (30, 29 and 28) to connect the No.4 rod (4) to No.3 rod (3). Tighten the nut.

(13) Install the bolt, washer and nut (33, 32 and 31) to connect the No.4 rod (4) to No.3 bellcrank (9). Tighten the nut.

(14) Put the No.5 rod into position.

(15) Install the bolt, washer and nut (36, 35 and 34) to connect the No.5 rod (5) to No.4 rod (4). Tighten the nut.

(16) Remove the temporary tie from the bushing (46).

(17) Install the bushing, bolt, washer and nut (39, 46, 38 and 37) to connect the No.5 (5) rod to No.4 bellcrank (10). Tighten the nut.

NOTE: No.5 rod must connect to the longer (outer) radius of No.4 bellcrank.

(18) Put the No.6 rod into position.

(19) Remove the temporary tie from the bushing (47) then install the bushing, bolt, washer and nut (47, 42, 41 and 40) to connect the No.6 rod (6) to the No.4 bellcrank. Tighten the nut.

NOTE: Position the adjustable rod end to align with the aileron bellcrank.

(20) Adjust the No.6 rod (6) end to connect with the aileron bellcrank (11). Lock and safety the rod end.

(21) Remove the temporary tie from the bushing (48).

(22) Install the bushing, bolt, washer and nut (48, 45, 44 and 43). Tighten the nut.

(23) Remove the rigging pin (12 and 49) from the aileron control sector (13) and No.2 bellcrank (8).

(24) Unlock the aileron.

NOTE: The turnbuckle (14) which was loosened during the removal procedure will be tightened during the rigging procedure.

(25) Rig, inspect and check the aileron control system (Refer to page block 501).

(26) Install the wing trailing edge outboard of the engine nacelle.

(27) Install the trailing edge cover close to the outside of the engine nacelle at the WS 2328.

(28) Install the three access panel 522AT, 522BT and 522CT (622AT, 622BT and 622CT on the right wing) on the wing upper side between engine nacelle and fuselage.

(29) Close the main landing gear rear door (Refer to 52-82-00).

(30) Set the flaps to full up position. (Refer to 27-50-00).

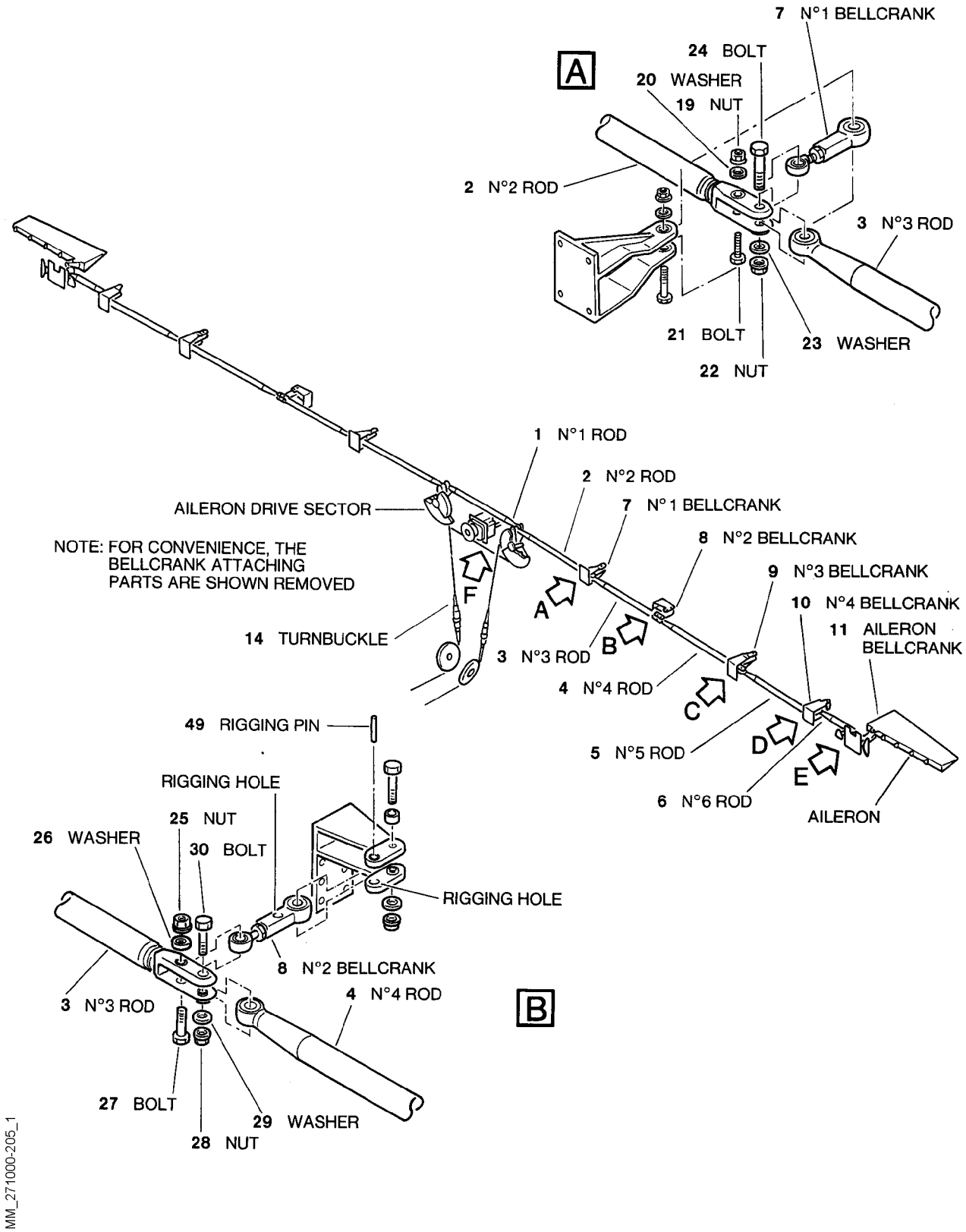

Fig. 205 - Push-Pull Rod System - Removal/Installation (Sheet 1 of 3)

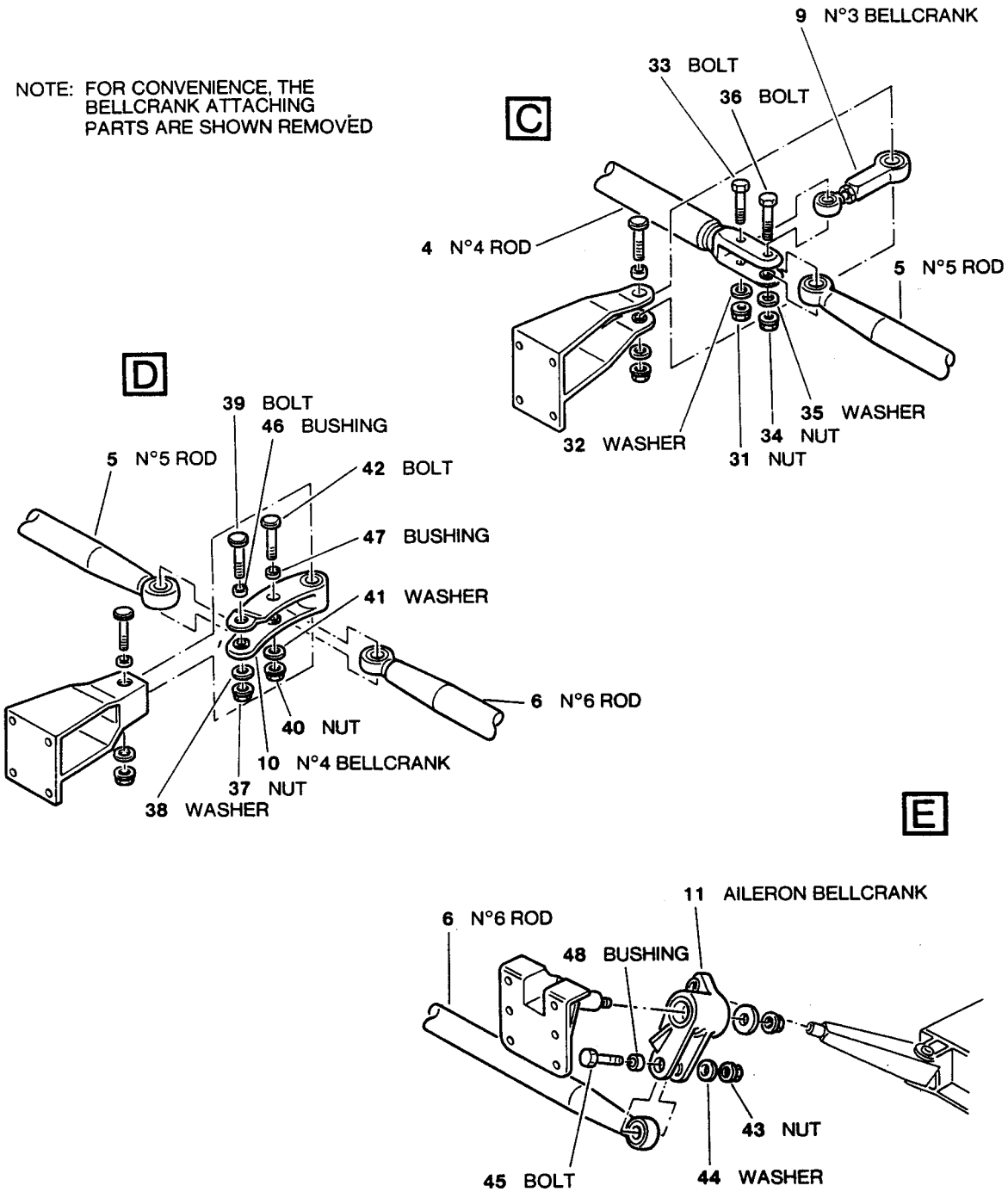

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Fig. 205 - Push-Pull Rod System - Removal/Installation (Sheet 2 of 3)

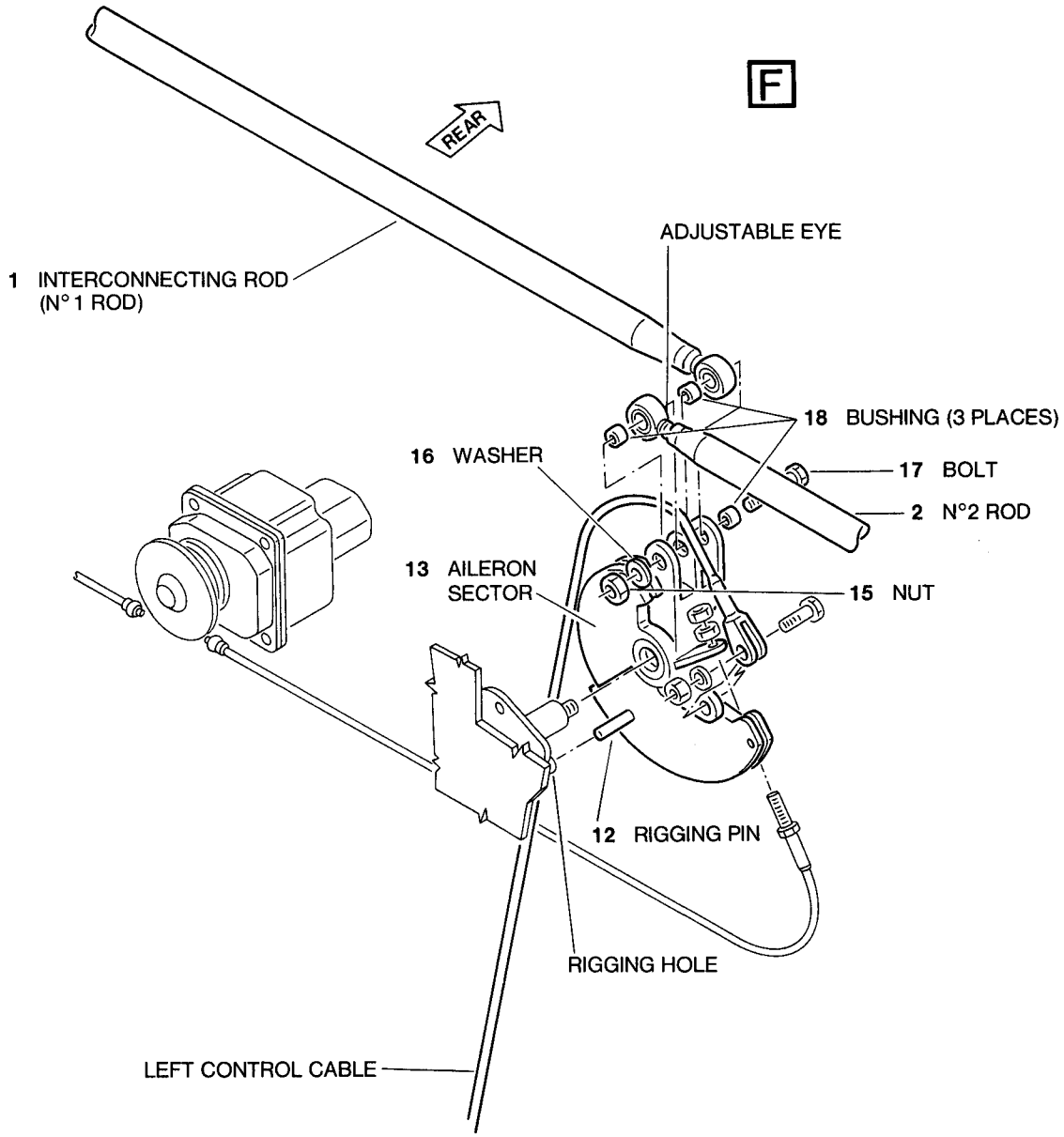

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Fig. 205 - Push-Pull Rod System - Removal/Installation (Sheet 3 of 3)

10. Control Sectors Interconnecting Rod - Removal (Ref. to Fig. 205)

A. Fixtures, Test and Support Equipment

Rigging pins	Qty 2	Not Specified

B. Referenced Information

Maintenance Manual Chapter 52-82-00

C. Procedure

(1) Remove the trailing edge cover close to the outside of the engine nacelle of each main wing at the FS 2328.
(2) Open the main landing gear rear doors (Refer to 52-82-00).
(3) Install a rigging pin (12) in both of the aileron control sectors (13).
(4) Loosen the turnbuckles (14) close to both aileron control sectors (13).
(5) Remove the nuts, washers, bolts and bushings (15, 16, 17 and 18) which connect the No.2 rods (2) and the interconnecting (No.1) rod (1) to the aileron control sectors (13).

NOTE: Keep the bushings (18) in position with temporary ties.

(6) Remove the interconnecting rod (1).

11. Control Sectors Interconnecting Rod - Installation (Ref. to Fig. 205)

A. Fixtures, Test and Support Equipment

Rigging pins	Qty 2	Not Specified

B. Referenced Information

Maintenance Manual Chapter 52-82-00

C. Procedure

(1) Position the left No.2 rod (2) and the interconnecting No.1 rod (1) at the left aileron control sector (13).
(2) Remove the temporary ties from the bushings (18) and install the bushings, bolt, washer and nut (18, 17, 16 and 15) to connect the left side of the No.1 rod and the left No.2 rod to the left aileron control sector (Ref. Detail F of Fig. 205).
(3) Connect the right No.2 rod (2) and the right side of the No.1 interconnecting rod (1) to the right aileron control sector (13) in the same way as for the left; make sure that the No.1 rod is installed in the rearmost clevis of the control sector as illustrated.

NOTE: The turnbuckles (14) which were loosened during the removal procedure will be tightened during the rigging procedure. The rigging pins which were installed during the removal procedure will be removed after rigging.

(4) Rig, inspect and check the aileron control system (Refer to page block 501).
(5) Install the trailing edge cover close to the outside of the engine nacelle of each main wing at the WS 2328.
(6) Close the main landing gear rear doors (Refer to 52-82-00).

12. Aileron - Removal (Ref. to Fig. 206)

A. Procedure

(1) Remove the three hinge bolt access covers (3, 7, 9) below the aileron.
(2) When removing the left aileron (2) proceed to next step, otherwise, to remove the right aileron (1), do the following:
– Disconnect both trim actuator connecting rods (23, 24) at the rocker arm (22, 21) in the aileron leading edge by removing the nuts, washers, bushings and bolts (13, 14, 15, 16, 17, 18, 19, 20).

NOTE: Keep the bushing (16, 20) of each bolt. Write down the position of the bushings for installation.

(3) Support the aileron.
(4) Disconnect the aileron bonding jumpers (4) from the fittings close to the inboard and outboard hinges of the aileron by removing the attaching nuts.
(5) Remove the nut and washer (12, 34) that connect the aileron actuating bellcrank (11) to the aileron yoke (10).
(6) Remove the bolts, washers, bushings and nuts (5, 6, 29, 30, 8, 31, 32, 33, 25, 26, 27, 28) that connect the aileron to the three hinges.

NOTE: Keep the bushing (30, 33, 28) of each bolt. Write down the position of bushings for correct installation.

(7) Remove the aileron from the aileron actuating bellcrank (11).

13. Aileron - Installation (Ref. to Fig. 206)

A. Procedure

CAUTION: USE NEW SELF-LOCKING NUTS EACH TIME THE AILERON IS INSTALLED

(1) Install the aileron yoke (10) into the aileron actuating bellcrank (11).
(2) Align aileron on the wing and secure it with the three hinge bolts, washers and nuts (5, 6, 29, 8, 31, 32, 25, 26, 27). At the same time install the bushings (30, 33, 28) in the positions written down in the removal procedure.
(3) Install the washer and nut (12, 34) that connect the aileron actuating bellcrank (11) to the aileron yoke (10).
(4) Connect the aileron bonding jumpers (4) on the fittings close to the inboard and outboard hinges of the aileron by installing the attaching nuts.
(5) When installing the left aileron (2) proceed to next step, otherwise while installing the right aileron (1), do the following:

– Connect both trim actuator connecting rods (23, 24) at the rocker arm (22, 21) in the aileron leading edge by installing bolts, washers and nuts (13, 14, 15, 17, 18, 19). At the same time install the bushings (16, 20) in the positions written down in the removal procedure.

(6) Check the clearance between the aileron and the flap. There must be a clearance of at least 5 mm (0.2 in.). Refer to Detail C of Fig. 206.

(7) Check the aileron for proper operation.

(8) Check the aileron rigging (Refer to page block 501).

(9) Install the three hinge bolt access covers (3, 7, 9) below the aileron.

14. Aileron Trim Tab - Removal (Ref. to Fig. 207)

A. Procedure

(1) Make the airplane level (Refer to 08-20-00).

(2) Install the aileron/trim tab travel board to the right aileron.

(3) Set the aileron to the neutral position and check against the travel board.

(4) Install the inclinometer at the aileron trim tab.

(5) Make sure that the electrical power is available (Refer to 24-00-00).

(6) Operate the aileron trim switch as necessary to set the roll indicator pointer at the horizontal position.

(7) Make a note of the angle of the aileron trim tab as measured by the inclinometer.

CAUTION: THE AILERON TRIM TAB ANGLE, WHEN THE ROLL INDICATOR POINTER IS IN HORIZONTAL (NEUTRAL) POSITION, IS ADJUSTED BY THE MANUFACTURER. BEFORE REMOVAL OF THE TRIM TAB IT IS NECESSARY TO MAKE A NOTE OF THE TRIM TAB ANGLE, SO THAT THE SYSTEM RIGGING IS MAINTAINED AVOIDING PROBLEMS AT REINSTALLATION.

(8) Remove the travel board and the inclinometer.

(9) Remove the right aileron from the wing. Refer to Para.12.

(10) Disconnect both trim tab actuating rods (1,2) by removing the connecting nuts, washers and bolts (6, 7, 8, 10, 11, 12).

NOTE: Keep the shim washer (3, 4) and bushing (9, 13) of each bolt. Write down the position of each shim washer and the bushing for installation.

(11) Pull out the trim tab hinge wire (5).

NOTE: Turn the hinge wire and pull it at the same time to remove it.

(12) Remove the trim tab.

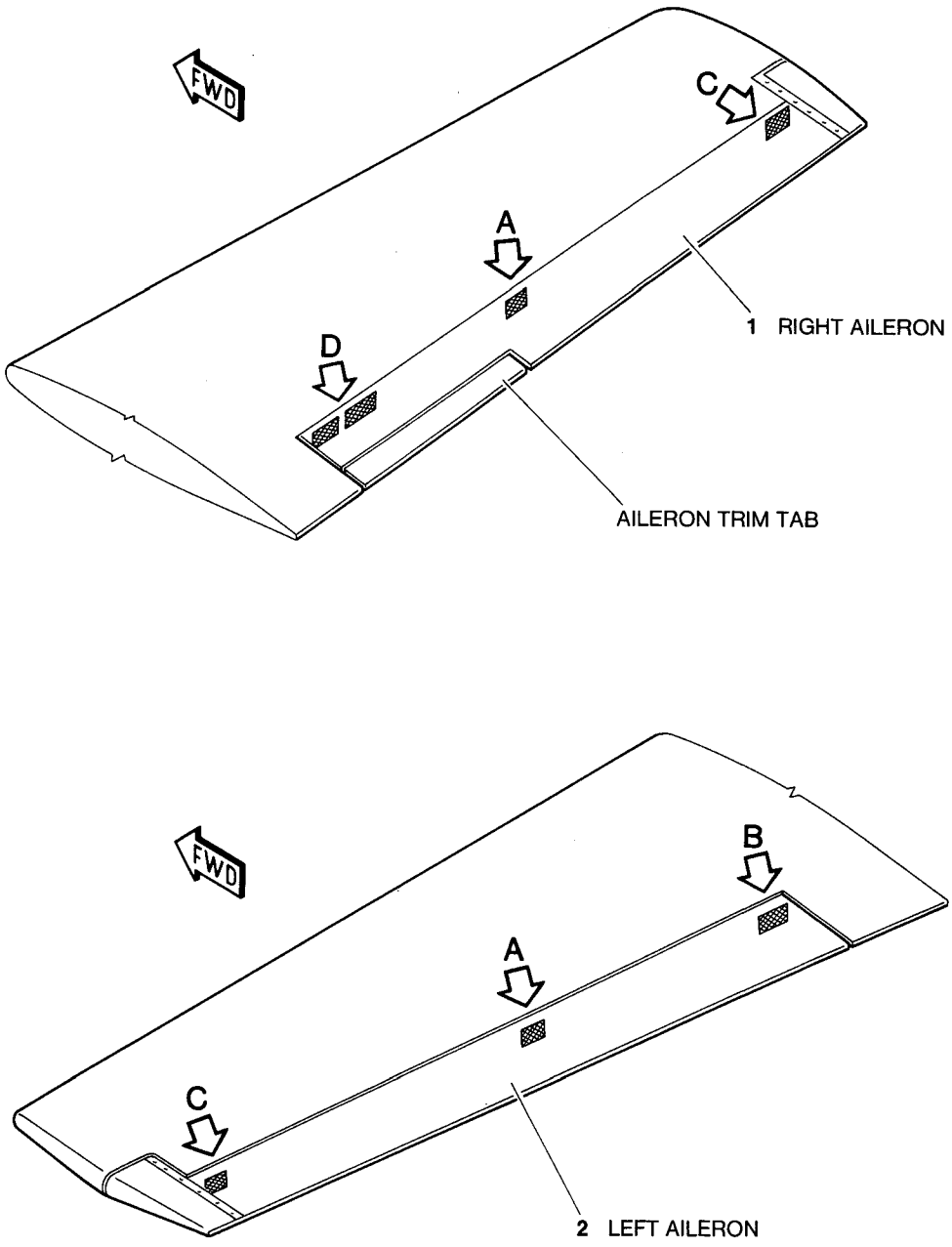

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Fig. 206 - Aileron - Removal/Installation (Sheet 1 of 4)

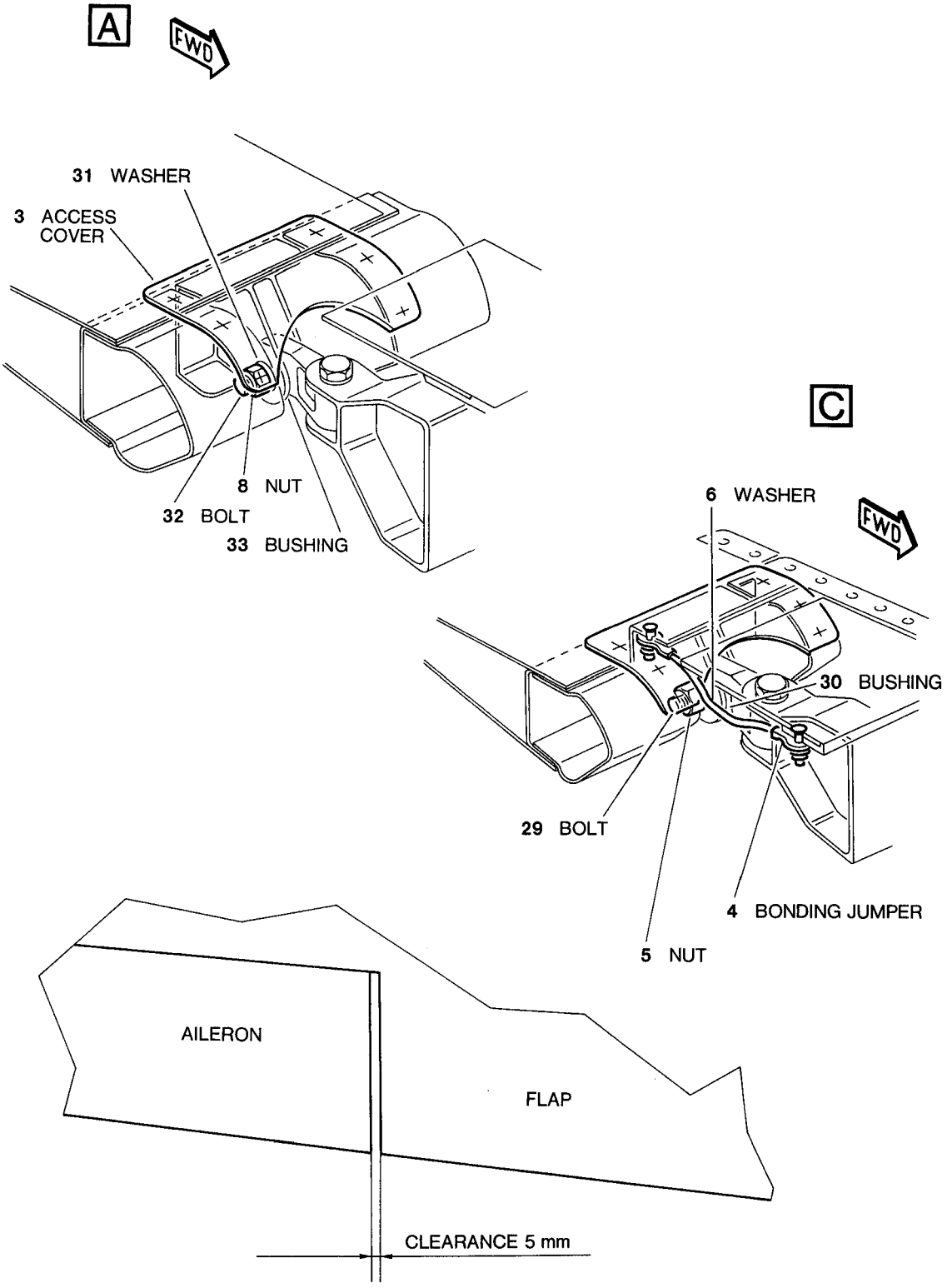

Fig. 206 - Aileron - Removal/Installation (Sheet 2 of 4)

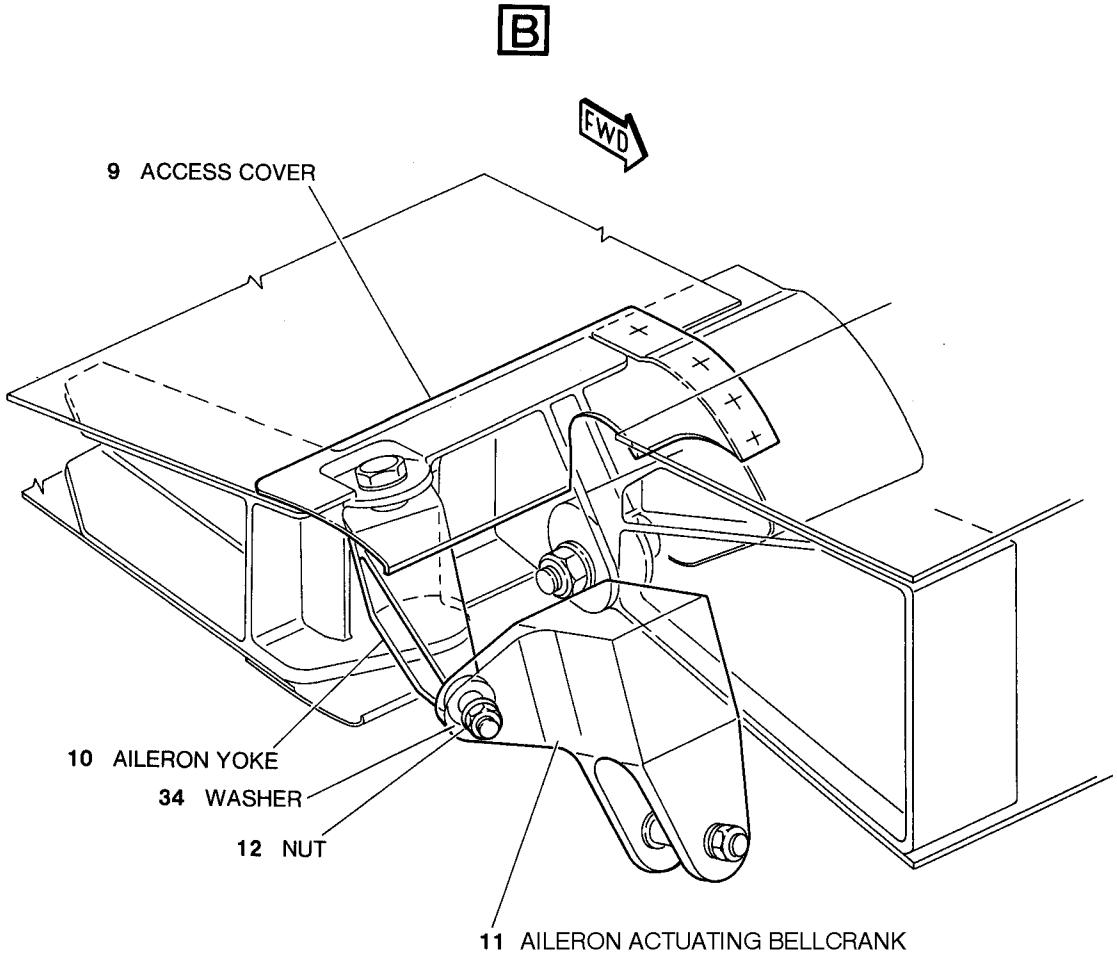

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Fig. 206 - Aileron - Removal/Installation (Sheet 3 of 4)

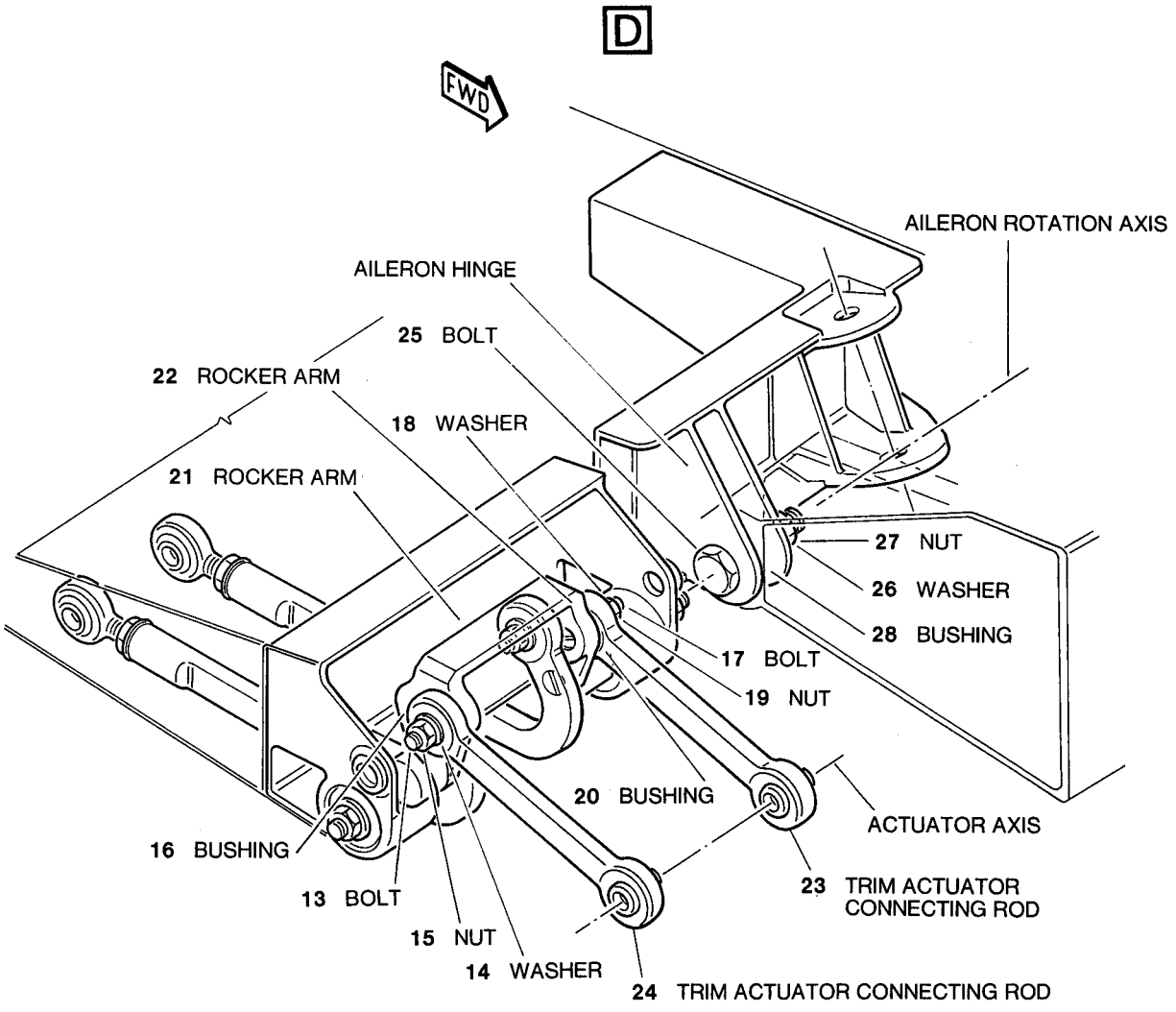

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Fig. 206 - Aileron - Removal/Installation (Sheet 4 of 4)

15. Aileron Trim Tab - Installation (Ref. to Fig. 207)

A. Consumable Materials

Grease	TBD

B. Referenced Information

Maintenance Manual Chapter 51-61-00

C. Procedure

(1) Lubricate hinge wire in preparation for installation.
(2) Put the trim tab into position on the aileron; align the hinge halves.
(3) Install the hinge wire (5).

NOTE: Turn the hinge wire and push it at the same time to install it.

(4) Support the hinge; use a centerpunch and slightly deform the end of the hinge to hold the hinge wire in position.
(5) Connect both trim tab actuating rods (1,2) with the connecting bolts, washers and nuts (6, 7, 8, 10, 11, 12). At the same time install the shim washers (3, 4) and the bushings (9, 13) in the positions written down in the removal procedure.

CAUTION: IF A NEW TRIM TAB IS TO BE INSTALLED, THE AILERON ASSEMBLY MUST BE BALANCED (REFER TO 51-61-00).

(6) Install the aileron. Refer to Para.13.
(7) Install the aileron/trim tab travel board to the right aileron.
(8) Set the aileron to the neutral position and check against the travel board.
(9) Install the inclinometer at the aileron trim tab.
(10) Check the angle of the aileron trim tab by the inclinometer. The angle value must be the same to the one noted during the removal procedure.

NOTE: If necessary, adjust the eye-ends of the two actuating rods to obtain the above mentioned angle.

(11) Check clearance between aileron and trim tab, and between the aileron trim tab and flap. There must be clearance of at least 5 mm at both ends.
(12) Check aileron and aileron trim tab rigging (Refer to page block 501).
(13) Measure the trim tab angular play (Refer to page block 501).
(14) Depending on the method used to make the airplane level:
(a) Lower the airplane and remove jacks
or
(b) inflate the shock absober and tires to the correct pressure.

16. LH Aileron Yoke - Removal (Ref. to Fig. 210)

A. Procedure

(1) Remove the aileron leading edge cover at the trim tab actuator.

(2) Remove aileron control wing gap cover below and above the wing.
(3) Remove the cotter pin (1), washer (2) and nut (3) that connect the Aileron Yoke (4) to the Aileron Actuating Bellcrank (5).
(4) Disengage the Aileron Actuating Bellcrank (5) from the Aileron Yoke (4) and remove the Left Aileron as described in this section.
(5) Remove the cotter pin (6), bolt (7), washers (8), nut (9) and withdraw the bushing (10).
(6) Remove the Aileron Yoke (4).

17. LH Aileron Yoke - Installation (Ref. to Fig. 210)

A. Procedure

(1) Place the Aileron Yoke (4) to its own position.
(2) Install the bushing (10), washer (8), bolt (7), nut (9) and cotter pin (6) that secure the Aileron Yoke to the aileron.
(3) Install the Left Aileron as described in this section and at the same time insert the Aileron Yoke terminal end into the Aileron Actuating Bellcrank hole.
(4) Install the washer (2), nut (3) and cotter pin (1) that secure the Aileron Yoke (4) to the Aileron Actuating Bellcrank(5).
(5) Install the aileron leading edge cover at the trim tab actuator.
(6) Install aileron control wing gap cover below and above the wing.

18. RH Aileron Yoke - Removal(Ref. to Fig. 211)

(1) Remove the RH aileron as described in this section.
(2) Remove the cotter pin (5), bolt (1), washers (2), nut (4) and withdraw the bushing (3).
(3) Remove the Aileron Yoke (6).

19. RH Aileron Yoke - Installation (Ref. to Fig. 211)

(1) Place the Aileron Yoke to its own position on the RH aileron.
(2) Install the bushing (3), washers (2), bolt (1), nut (4) and cotter pin (5) that secure the Aileron Yoke to the RH aileron.
(3) Install the RH aileron as described in this section.

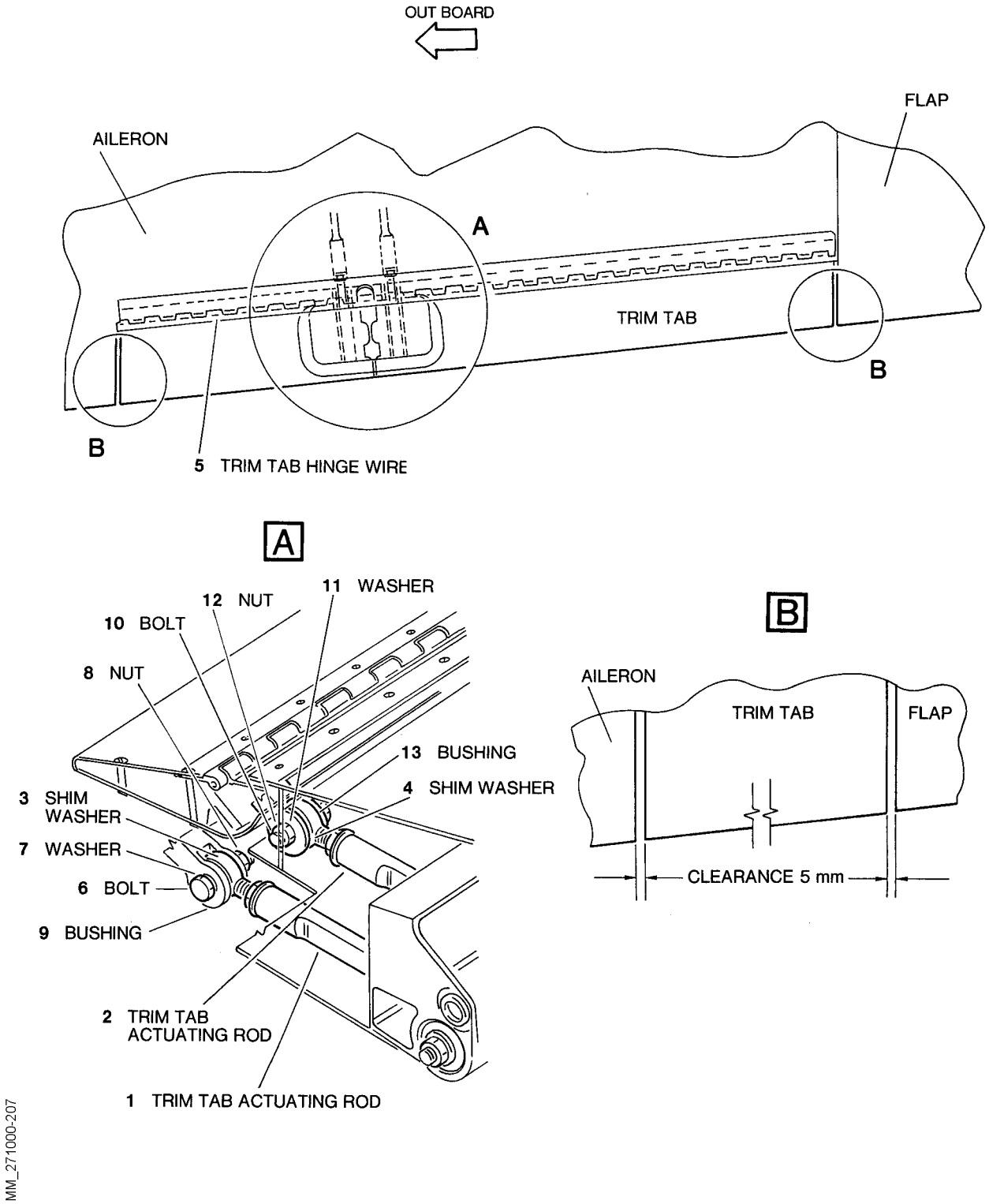

Fig. 207 - Aileron Trim Tab - Removal/Installation

20. Aileron Trim Tab Actuator - Removal (Ref. to Fig. 208)

A. Procedure

(1) Remove the aileron leading edge cover at the trim tab actuator.
(2) Remove aileron control wing gap cover below and above the wing.
(3) Disconnect the actuator electrical plug (15).
(4) Disconnect both trim actuator connecting rods (10, 11) at the rocker arm (12, 14) in the aileron leading edge by removing the bolts, washers and nuts (1, 2, 3, 5, 6, 7).

NOTE: Keep the bushings (4, 8). Write down the position of the bushings for installation.

(5) Remove the four bolts, washers and nuts (16, 17, 18, 20, 21, 22) which attach the trim tab actuator to the wing rear spar.

NOTE: Keep the shim washers (19, 23) of each bolt. Write down the position of each shim washer for installation.

(6) Remove the trim actuator.

21. Aileron Trim Tab Actuator - Installation (Ref. to Fig. 208)

A. Procedure

(1) Put the trim tab actuator into position against the supports on the wing rear spar.
(2) Install the four bolts, washers and nuts (16, 17, 18, 20, 21, 22) which attach the trim tab actuator to the wing spar.At the same time install shim washers (19, 23) in the position written down in the removal procedure.
(3) Connect both trim actuator connecting rods (10, 11) at the rocker arms (12, 14) in the aileron leading edge with the connecting bolts, washers and nuts (1, 2, 3, 5, 6, 7). At the same time install the bushings (4, 8) in the positions written down in the removal procedure.
(4) Connect the actuator electrical plug (15).
(5) Do a calibration of the aileron trim position indicator.
(6) Install the aileron leading edge cover.
(7) Install aileron control wing gap cover below and above the wing.
(8) Measure the trim tab angular play (Refer to page block 501).

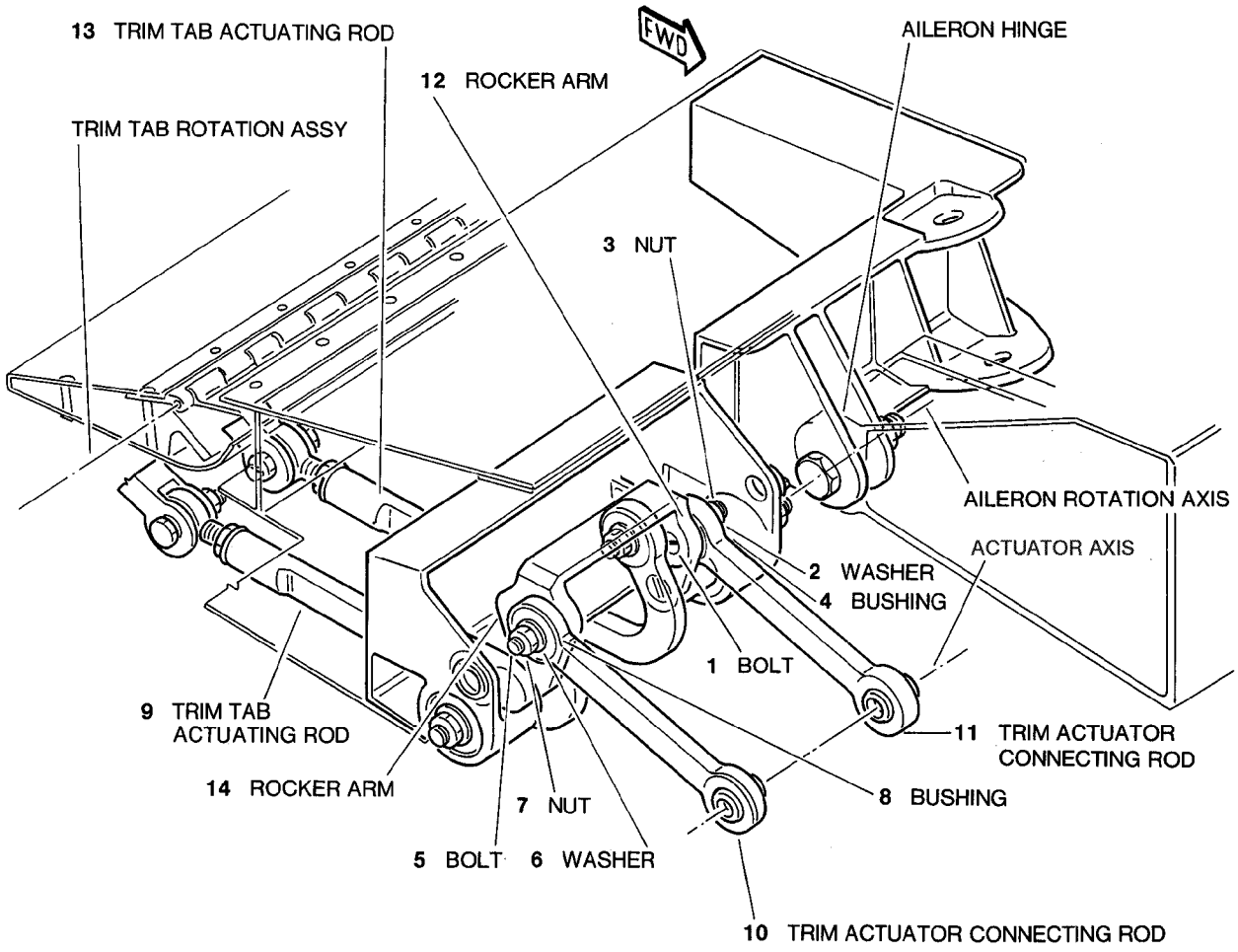

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Fig. 208 - Trim Tab Actuator - Removal/Installation (Sheet 1 of 2)

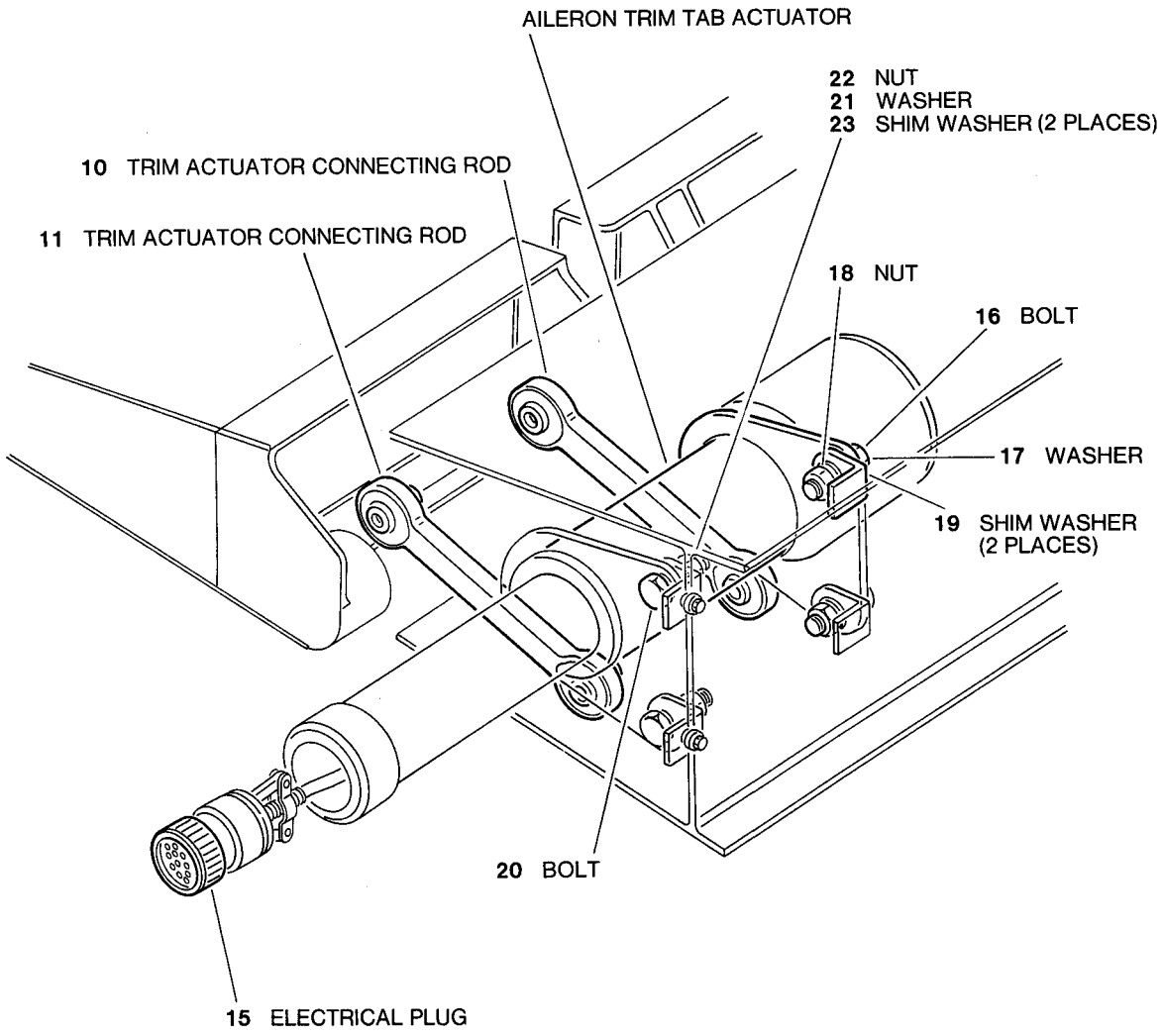

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Fig. 208 - Trim Tab Actuator - Removal/Installation (Sheet 2 of 2)

22. Aileron Trim Position Indicator - Removal (Ref. to Fig. 209)

A. Procedure

(1) Unlock the two fasteners of the trim indicator panel located on the flight compartment control pedestal.
(2) Pull the trim indicator panel from the pedestal to get access to the electrical plug at the rear.
(3) Disconnect the electrical plug and remove the trim indicator panel.

23. Aileron Trim Position Indicator - Installation (Ref. to Fig. 209)

A. Procedure

(1) Connect the electrical plug at the rear.
(2) Position the trim indicator panel in the pedestal and lock it in position with the fasteners.
(3) Do the indicator operational test (Refer to page block 501).

24. Aileron Actuating Bellcrank - Removal(Ref. to Fig. 212)

A. Procedure

(1) Remove the RH / LH aileron as described in this section.
(2) Remove the bolt (6), bushing (5), washer (3) and nut (2) that connect the Aileron Push-Pull Rod Eye End (4) to the Aileron Actuating Bellcrank (1).
(3) Remove the nut (8) and the washer (9) that connect the Aileron Actuating Bellcrank (1) to the Aileron Actuating Bellcrank Support (7).
(4) Remove the Aileron Actuating Bellcrank (1).

25. Aileron Actuating Bellcrank - Installation(Ref. to Fig. 212)

A. Procedure

(1) Insert and connect the Aileron Actuating Bellcrank (1) to the Aileron Actuating Bellcrank Support (7) with washer (9) and nut (8).
(2) Insert and connect the Aileron Push-Pull Rod Eye End (4) to the Aileron Actuating Bellcrank (1) with bolt (6), bushing (5), washer (3) and nut (2).
(3) Install the RH / LH aileron as described in this section.
(4) Check the aileron for freedom of movement in its full up/down travel as described in this section.
(5) Check that the minimum gap between the wing trailing edge and the Aileron Actuating Bellcrank in full up and full down position is at least 0,5 mm.

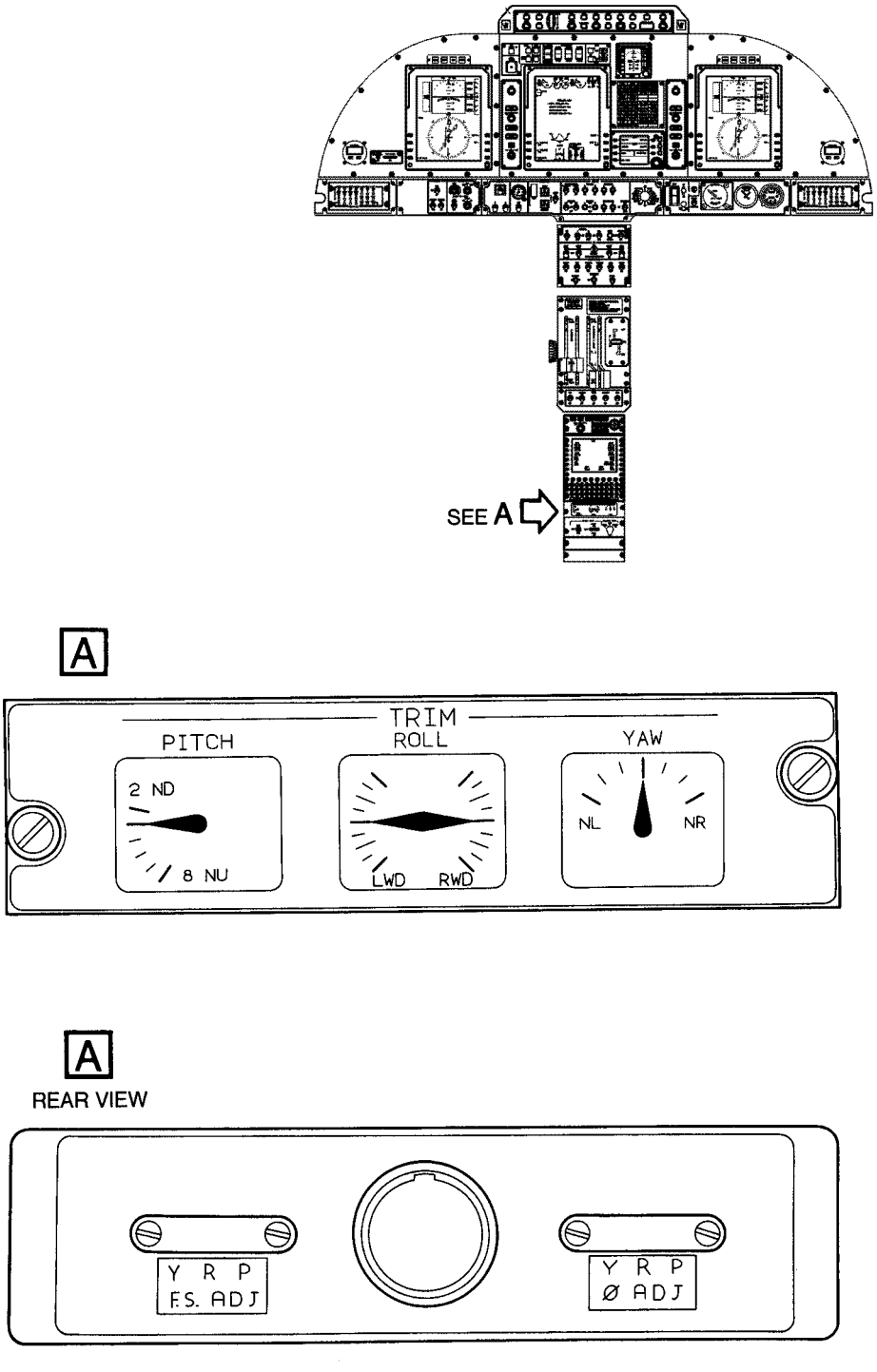

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Fig. 209 - Trim Position Indicator - Removal/Installation

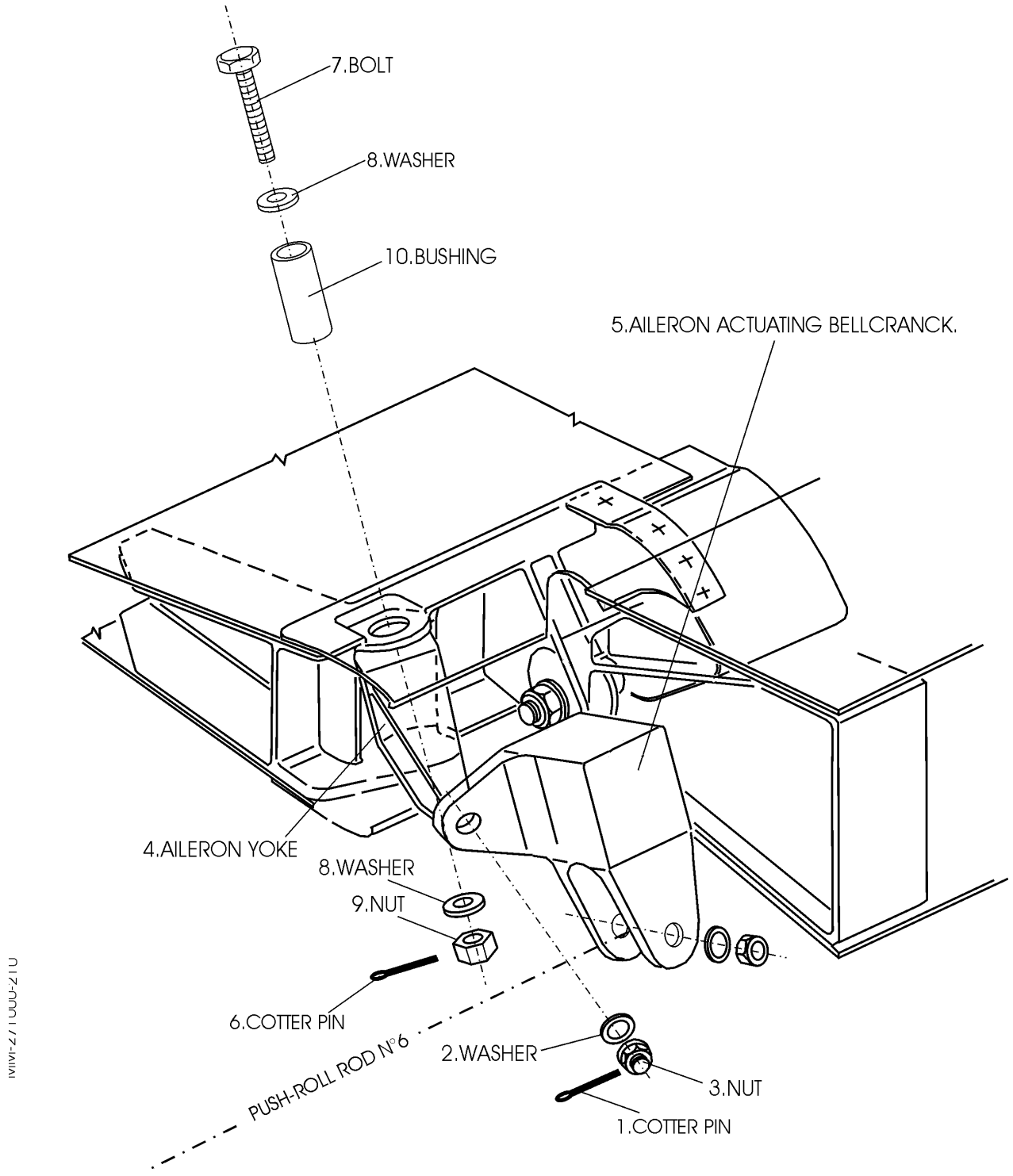

Fig. 210 - LH Aileron Yoke - Removal / Installation

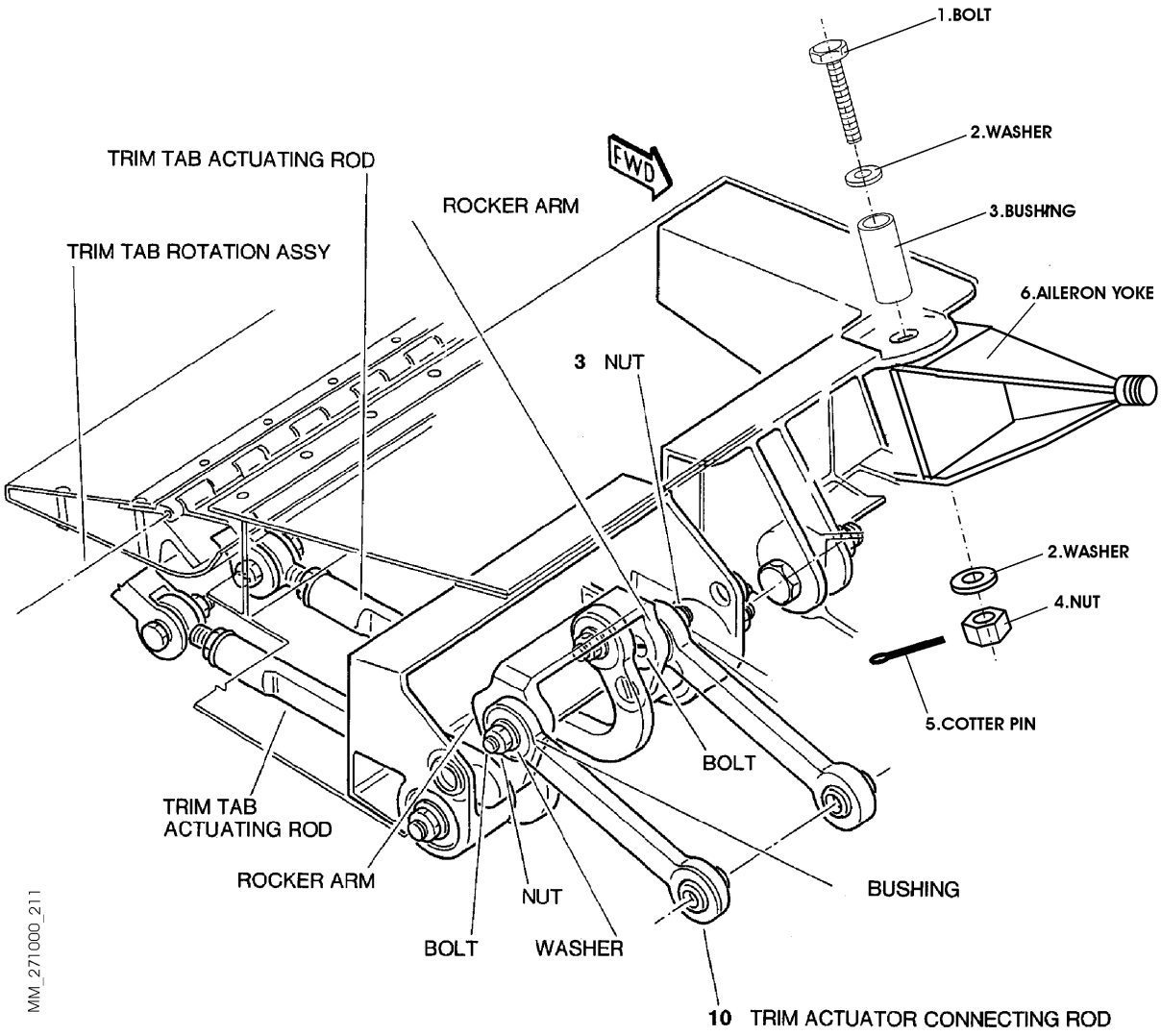

Fig. 211 - RH Aileron Yoke - Removal / Installation

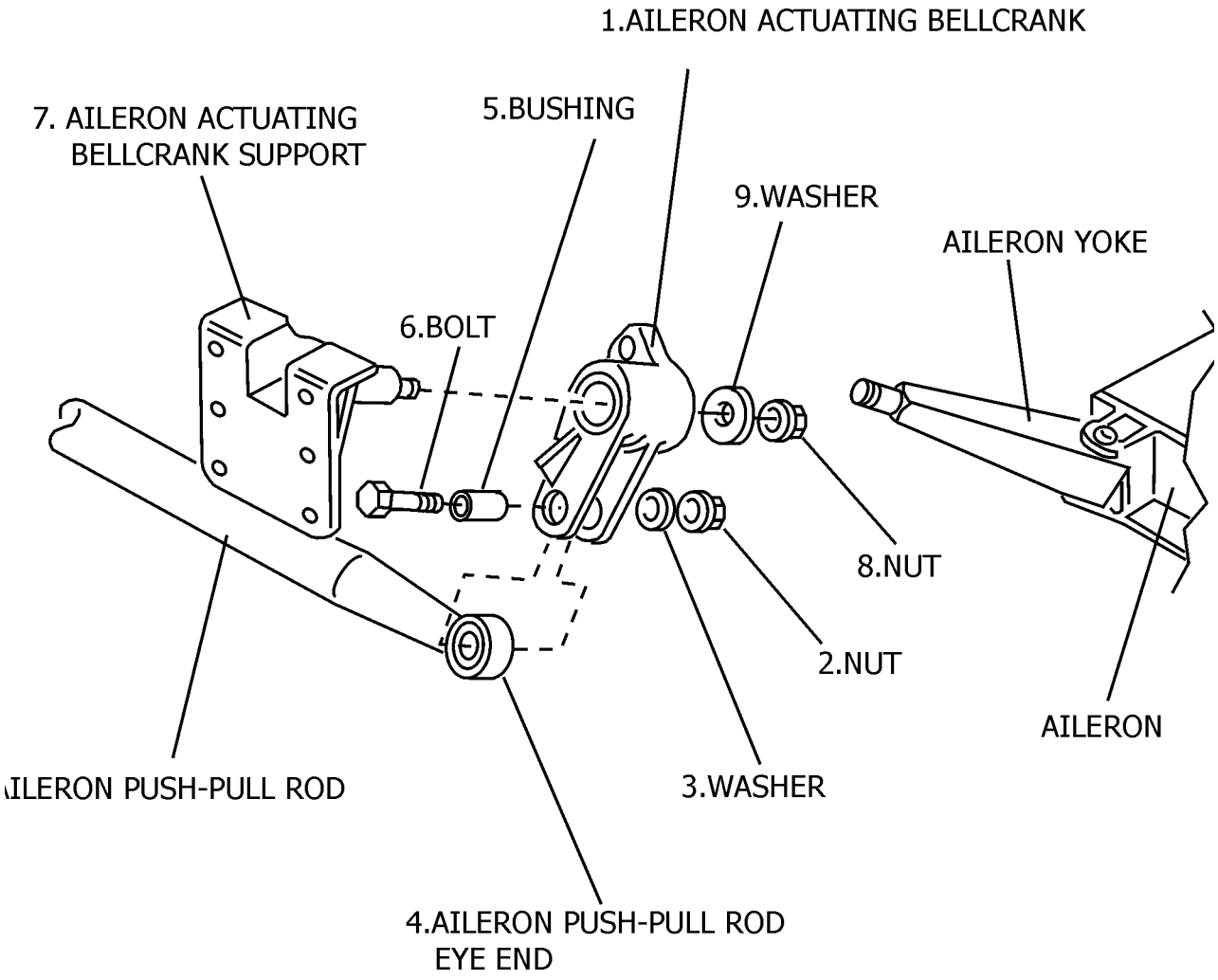

Fig. 212 - Aileron Actuating Bellcrank - Removal / Installation

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TEMPORARY REVISION NO. 0106

To Chapter 27-10-00

This Temporary Revision is now considered a part of P. 180 Avanti II MAINTENANCE MANUAL

NOTE: Record the incorporation of this Temporary Revision on the RECORD OF TEMPORARY REVISIONS sheet at the front of the manual

Insert: MAINTENANCE MANUAL
Report: 180-MAN-0200-01105 Rev. B2 Jan.16/12
After Page 217

Reason for issue : **Insert Aileron Trim Tab Actuator - Electrical Insulation**

1. Aileron Trim Tab Actuator - Electrical Insulation

A. Fixtures, Test and Support Equipment

Milliohmeter	Not Specified
Megahometer	Not Specified

B. Procedure

NOTE: The actuator being electrically disconnected from the aircraft check for:

- Insulation resistance, between isolated pins and earth; higher than 20 megahoms under a 48 VDC test voltage.
- Bonding; Resistance between grounded pin, casings and aircraft earth shall not exceed 20 milliohms.

AILERON AND TAB - ADJUSTMENT/TEST

1. General

A. The following procedures cover rigging of the aileron and aileron trim tab systems, and testing the systems for proper operation. Each rigging and test procedure is complete, including instructions for the removal and installation of access panels/ doors etc and the installation/removal of rigging pins etc. If more than one procedure is to be done at any one time, take note of the procedural requirements and minimize the number of times panels, pins etc. are removed/installed.

2. Adjustment (Rigging)

A. Fixtures, Test and Support Equipment

Aileron/Trim Tab Travel Board (Qty 2)	80-909164-001
Rigging Pin (Qty 6)	Not Specified
Tensiometer	T5-2002-104-00 (Pacific Scientific) or equivalent
Warning Notice	Not Specified

B. Referenced Information

Maintenance Manual 52-82-00
Maintenance Manual 22-00-00
Maintenance Manual 27-00-00 (Fig. 201)

C. Procedure - Aileron Control System Rigging (Ref. to Fig. 501)

(1) Put a warning notice in the flight compartment to tell other persons not to move the flight controls.
(2) Remove the access cover from the right (copilot) control column.
(3) Remove the sector cover of both control wheels.
(4) Install a rigging pin in both control wheel sectors.
(5) Open the left and right main landing gear rear doors (Ref. to 52-82-00).
(6) Disconnect the autopilot servo cables from the aileron control sectors (Refer to 22-00-00).
(7) Install a rigging pin in the left and right aileron control sectors.

NOTE: With the rigging pins installed in the control wheel sectors there should be no difficulty installing the pins in the control sectors. If the pins do not go in easily, adjust the inboard end of the No.2 rod as required.

(8) Remove the left and right wing trailing edge cover located close to the nacelle at WS 2328.
(9) Install a rigging pin in the No.2 bellcrank of the left and right aileron control rod systems.

(10) Install the aileron/trim tab travel board on both wings between the outboard flap and the aileron, at WS 5125.

(11) Check the position of each aileron against its travel board. The ailerons should be at the neutral position; if not, adjust the outboard end of the No.6 rod as required.

(12) Check the tension of the cable which connects the left and right control wheels and adjust the tension, as required, to within the limits on the temperature-load graph (Refer to 27-00-00, Fig. 201).

NOTE: The turnbuckle of the control wheel interconnect cable is accessible through the access hole in the right (copilot) control column.

(13) Check the tension of the left and right aileron control cables and adjust as required, to within the limits on the temperature-load graph.

NOTE: The turnbuckles of the control cables are accessible through the locations of the main landing gear rear doors.

(14) Remove the rigging pins from the left and right aileron control sectors, No.2 bellcranks and control wheel sectors.

NOTE: When cable turnbuckles are loosened or tightened to adjust cable tension, check that the control wheels and ailerons remain at neutral when the rigging pins are removed. If required, repeat the procedure until the system is at neutral, with the correct cable tension.

(15) Connect and rig the autopilot roll servo cables to the aileron control sectors (Refer to 22-00-00).

(16) After rigging of the autopilot cables, check again the tension of the aileron control cables.

(17) Safety the turnbuckles.

(18) Remove wing inspection panels 542AT and 642AT to gain access to the aileron up and down stop bolts at the aileron bellcrank.

(19) Adjust the up stop for both ailerons to get 19°(+0°/-1°) maximum up travel. Safety the stop bolts.

(20) Adjust the down stops to match the up stop of the opposite aileron and so that maximum down travel is 15°30' (+0°/-1°).

(21) Check that the fixed stops on the control column heads do not contact until after the up and down stops on the aileron.

(22) Install wing inspection panels 542AT and 642AT.

(23) Operate the ailerons several times by moving the control wheels; check for freedom and smoothness of movement.

(24) Do the aileron control system friction test (Refer to Para. 3 F).

(25) Install the access cover on the right control column.

(26) Install the sector covers of both control wheels.

(27) Install the left and right wing trailing edge covers at WS 2328.

(28) Close the left and right main landing gear rear doors (Refer to 52-82-00).

(29) Remove the aileron/trim tab travel board from both wings.

(30) Remove the warning notice from the flight compartment.

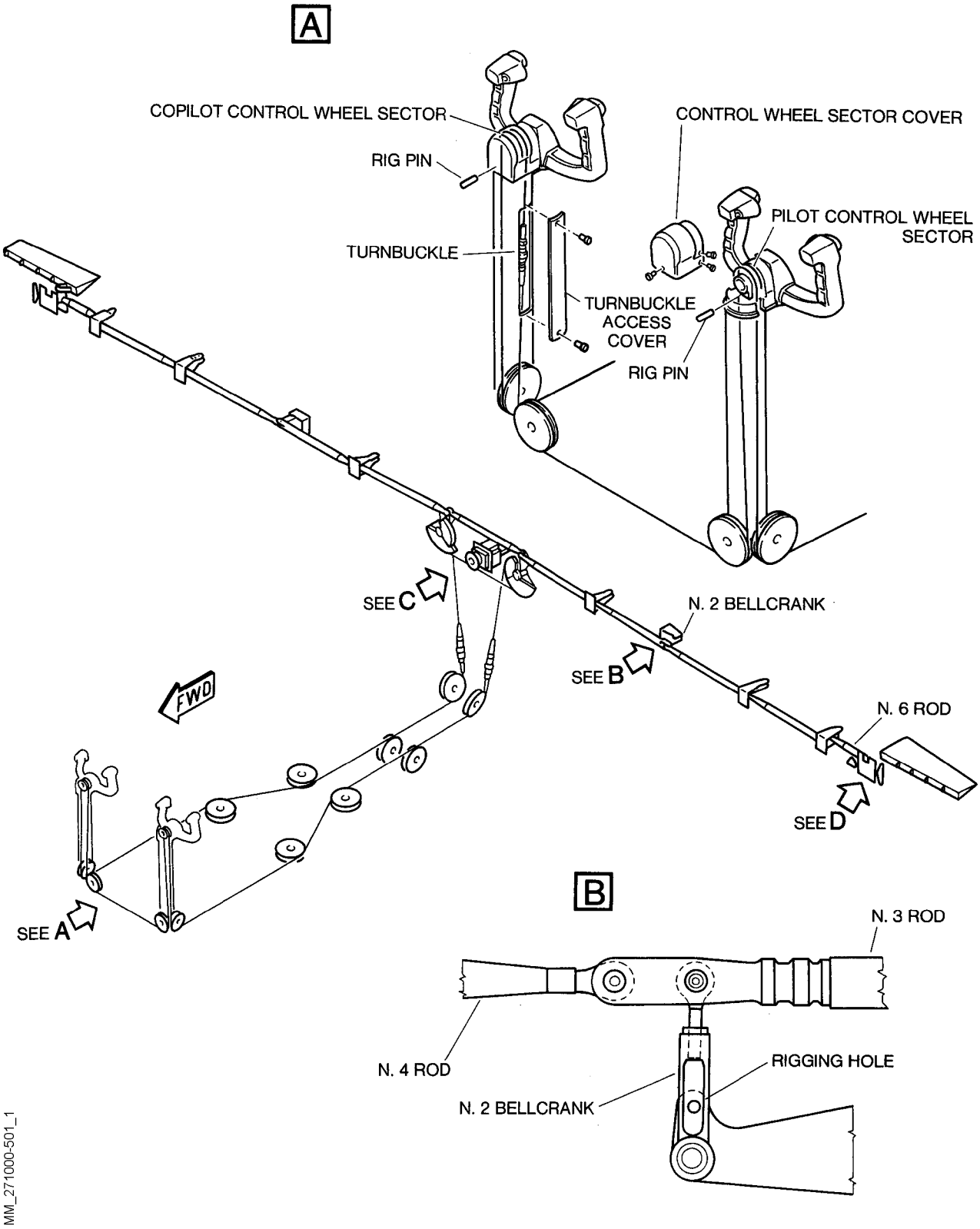

Fig. 501 - Aileron Control System - Rigging (Sheet 1 of 4)

C

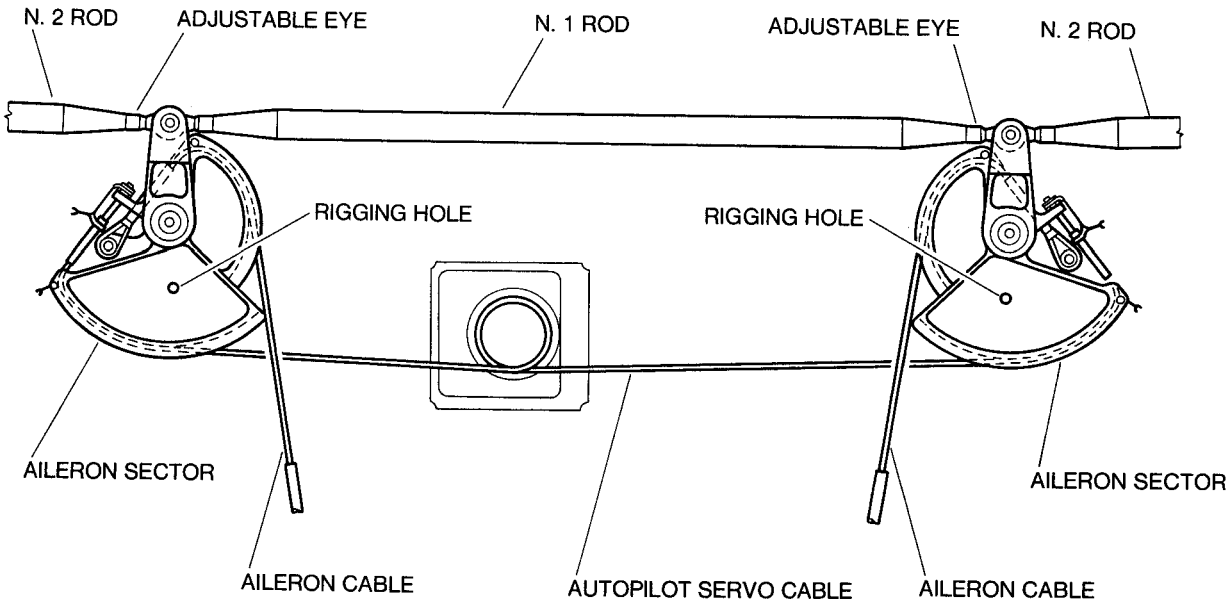

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Fig. 501 - Aileron Control System - Rigging (Sheet 2 of 4)

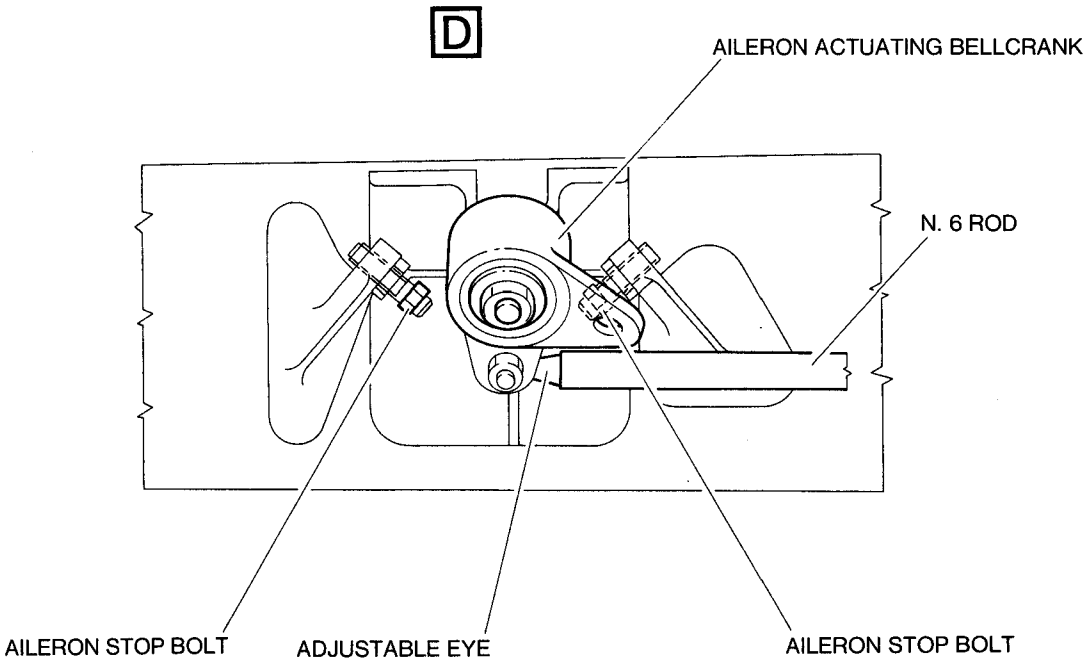

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Fig. 501 - Aileron Control System - Rigging (Sheet 3 of 4)

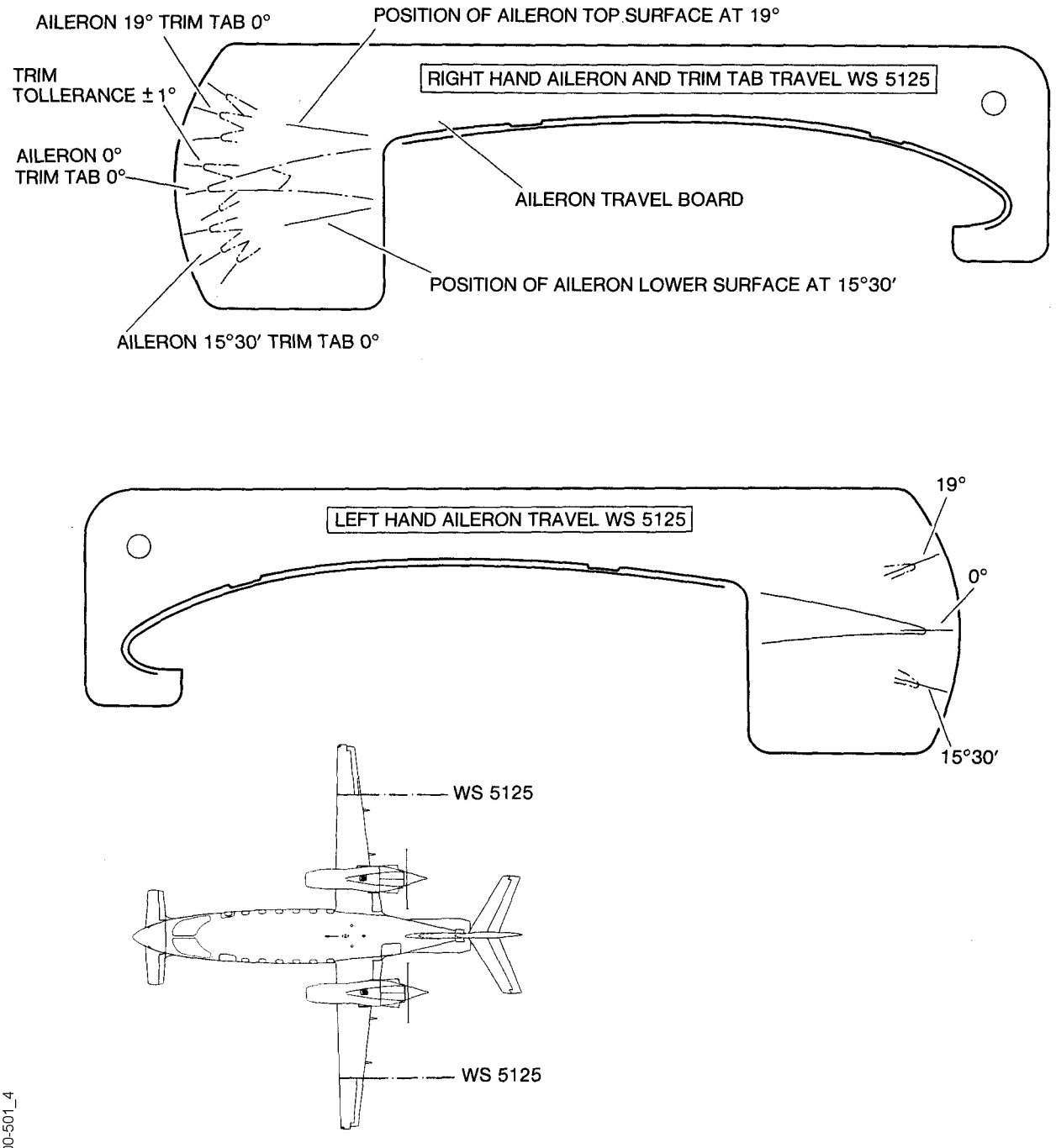

Fig. 501 - Aileron Control System - Rigging (Sheet 4 of 4)

D. Procedure - Aileron Trim Tab Rigging (Ref. to Fig. 502)

(1) Put a warning notice in the flight compartment to tell other persons not to move the flight controls.
(2) Remove the aileron trailing edge cover at the trim tab actuating system.
(3) Install the aileron/trim tab travel board at the right aileron.
(4) Open the left and right main landing gear rear door (Refer to 52-82-00).
(5) Install a rigging pin into the left and right aileron control sectors.
(6) Make sure that electrical power is available (Refer to 24-00-00).
(7) Operate the aileron trim switch (to the left) to move the tab fully up.
(8) Check the position of the tab against the travel board. The position should be 20°(±1°); if required, adjust the eye-ends of the two actuating rods to align the tab with the mark on the board.
(9) Operate the aileron trim switch to move the trim tab fully down.
(10) Check the position of the tab against the travel board. The position should be 19°(±1°); if required, adjust the eye-ends of the two actuating rods to align the tab with the mark on the board.

NOTE: If it is necessary to adjust the actuating rods, do the up position check again.

(11) Remove the rigging pins from the aileron control sectors.
(12) Move the right aileron fully up and make sure that the tab aligns with the correct position on the travel board.
(13) Move the right aileron fully down and make sure that the tab aligns with the correct position on the board.
(14) Operate the trim switch to move the trim tab fully up and do steps (12) and (13) again.
(15) Operate the trim switch to move the trim tab to neutral.
(16) Remove the electrical power (Refer to 24-00-00).
(17) Do the trim tab play test (Refer to Para 3 H).
(18) Do the roll trim indicator operational test (Refer to Para 3 E).
(19) Remove the aileron/trim tab travel board.
(20) Install the aileron leading edge cover.
(21) Close the left and right main landing gear rear doors (Refer to 52-82-00).
(22) Remove the warning notice from the flight compartment.

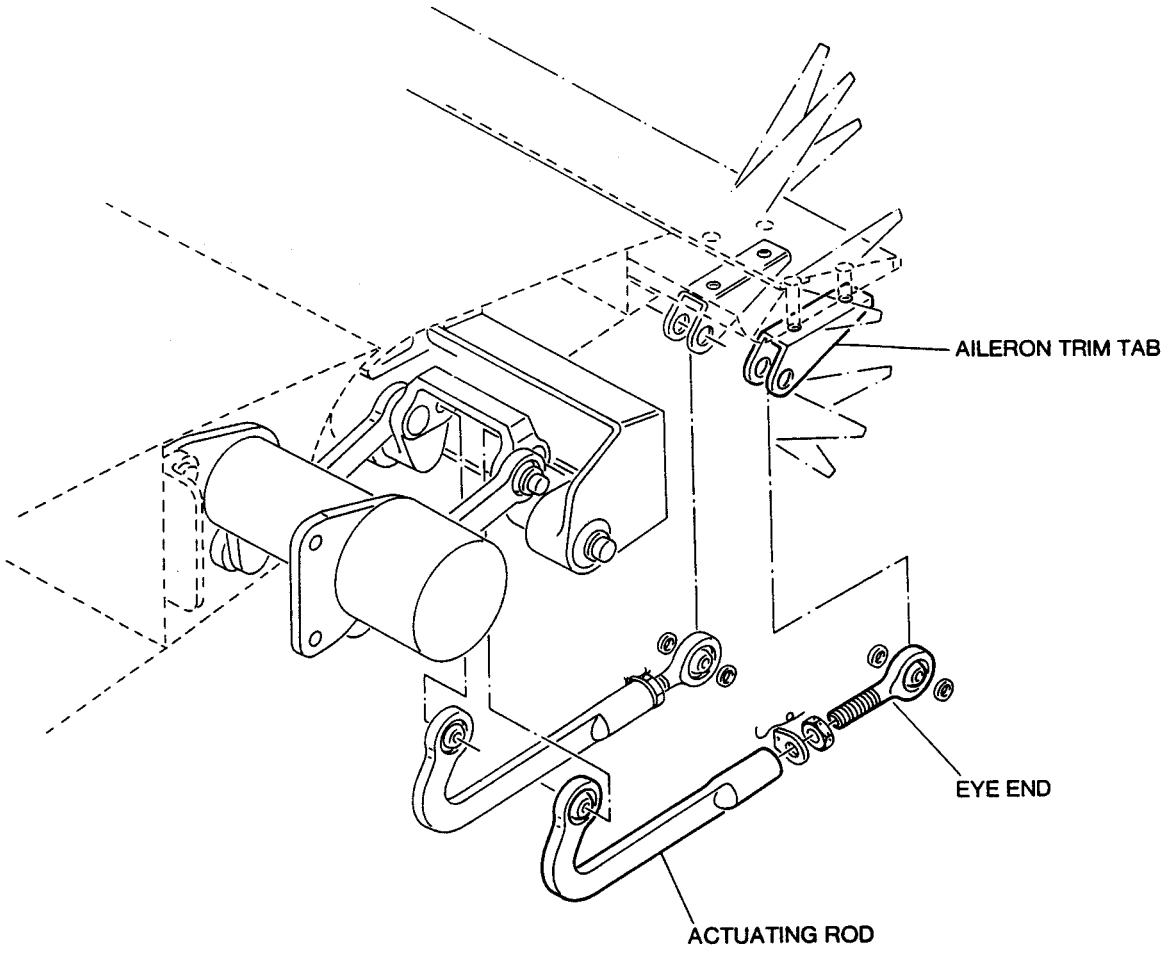

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Fig. 502 - Aileron Trim Tab System - Rigging

3. Test

A. Fixtures, Test and Support Equipment

Aileron/Trim Tab Travel Board (Qty 2)	80-909164-001
Spring Balance (0-11 lb)	Not Specified
Rigging Pin (Qty 2)	Not Specified
Dial Test Indicator	Not Specified
Pencil	Not Specified
Warning Notice	Not Specified

B. Reference Information

Maintenance Manual 24-00-00
Maintenance Manual 52-82-00

C. Procedure - Aileron Control Operational Test

(1) Do the test:

	Action	Result
(a)	Turn the control wheel to the right (clockwise)	The right aileron will move up and the left aileron will move down.
(b)	Turn the control wheel to the neutral position.	The ailerons will return to the neutral (streamlined) position.
(c)	Turn the control wheel to the left (counterclockwise).	The left aileron will move up and the right aileron will move down.
(d)	Turn the control wheel to the neutral position.	The aileron will return to the neutral (streamlined) position.

D. Procedure - Aileron Trim Tab Functional Test

(1) Make sure that electrical power is available (Refer to 24-00-00).

(2) Do the test:

	Action	Result
(a)	Operate and hold the trim switch to the left.	The aileron trim tab moves up in a smooth, responsive movement. The roll trim indicator pointer moves to indicate LWD (left wing down).
(b)	Operate and hold the trim switch to the right.	The aileron trim tab moves down in a smooth, responsive movement. The roll trim indicator pointer moves to indicate RWD (right wing down).
(c)	With no other electrical loads on the airplane (all switches OFF), do a trim tab full stroke travel vs time test in both directions.	The time taken for the trim tab to move one full stroke (fully down to fully up/fully up to fully down) should be between 12 and 15 seconds.

(3) If the time taken for the trim tab to move one full stroke is less than 12 or more than 15 seconds, replace the actuator.

(4) Remove the electrical power (Refer to 24-00-00).

E. Procedure - Roll Trim Indicator Operational Test

(1) Put a Warning Notice in the flight compartment to tell other persons not to move the flight controls.
(2) Install the aileron/trim tab travel board at the right aileron.
(3) Make sure that electrical power is available. Refer to 24-00-00.
(4) Do the test:

	Action	Result
(a)	With the ailerons at the neutral position, operate the trim switch as necessary to set the aileron trim tab to the neutral position.	The roll indicator pointer is at the horizontal position.
(b)	Operate and hold the trim switch to the left.	The trim tab moves up and the roll indicator pointer moves counterclockwise towards LWD. When the trim tab is fully up, the pointer should be at the LWD position.
(c)	Operate and hold the trim switch to the right.	The trim tab moves down and the roll indicator pointer moves clockwise towards RWD. When the trim tab is fully down, the pointer should be at the RWD position.
(d)	Operate the trim switch to the left until the trim tab is at the neutral position.	The roll indicator pointer should be horizontal.

(5) Remove the electrical power (Refer to 24-00-00).
(6) Remove the aileron/trim tab travel board.
(7) Remove the warning notice from the flight compartment.

F. Procedure - Aileron Control System Friction Test

(1) Do the test:

	Action	Result
(a)	With the ailerons at the neutral position, place a spring balance on the horizontal arm of the left (pilot's) control wheel 5.25 inches (133 mm) from the vertical centerline of the wheel.	–
(b)	Slowly apply a force (downwards) on the spring balance and check the scale readings when the control wheel begins to turn.	The force required to move the control wheel should be not more than 5.5 lb (2.5 kg).
(c)	Move the control wheel to the neutral and place the spring balance on the opposite arm of the left control wheel 5.25 inches (133 mm) from the vertical centerline.	–
(d)	Repeat step (b).	As above.

(2) If the force required to begin movement of the control wheel is more than 5 lb, check the control system pulleys, sectors, rods and bellcranks for freedom of movement; visually inspect the system for binding.

(3) Rectify any faults found and repeat the system friction test until satisfactory.

G. Procedure - Aileron Play Test (Ref. to Fig. 503)

(1) Put a warning notice in the flight compartment to tell other persons not to move the flight controls.

(2) Make a table, as shown in Fig. 503, in preparation for recording test results. Do not write on the table in Fig. 503 in this manual; if required, the sheet should be removed, copied and returned to its place in the manual.

(3) Open the left and right main landing gear rear door (Refer to 52-82-00).

(4) Install a rigging pin in the right aileron control sector.

(5) Install an inclinometer on the left aileron upper surface at the location shown in Fig. 503.

(6) Do the test:

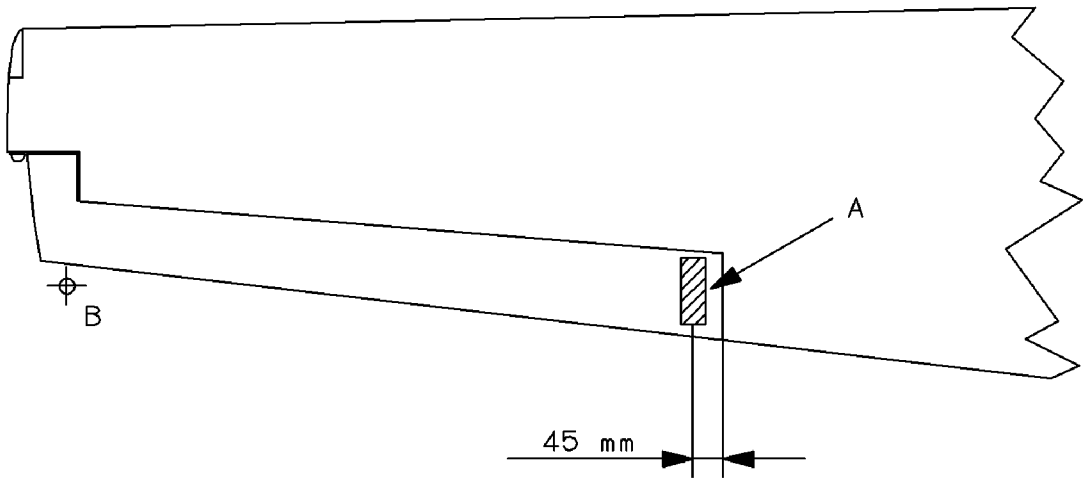
	Action	Result
(a)	With a spring balance apply a load of 4.41 lb (2 kg) downward at the location on the left aileron as shown in Fig. 503. With the load applied, zero the inclinometer.	–
(b)	Remove the load, and reapply the same (4.41 lb) load in an upward direction at the same location. With the load applied, take a reading from the inclinometer and record the reading (in degrees and minutes) in the appropriate place on the table made in step (2).	–
(c)	Do steps (a) and (b) again.	–
(d)	Add the two readings and divide the result by two to get the average.	The average deflection should be no more than the maximum allowable deflection given on the table in Fig. 503.
(e)	Remove the rigging pin from the right aileron control sector and install it in the left aileron control sector.	–
(f)	Install the inclinometer on the right aileron upper surface at the location shown in Fig. 503.	–
(g)	With the rigging pin in the left aileron control sector, do steps (a) thru (d) on the right aileron.	The average deflection should be no more than the maximum allowable deflection given on the table in Fig. 503.

(7) If any of the average deflection readings is more than the maximum allowable deflection value, examine the aileron control push-pull rod system and the aileron hinges for wear. Replace any worn item and repeat the test until satisfactory.
(8) Remove the inclinometer from the right wing.
(9) Remove the rigging pins from the left aileron control sector.
(10) Close the left and right main landing gear doors (Refer to 52-82-00)
(11) Remove the warning notice from the flight compartment.

H. Procedure - Aileron Trim Tab Play Test (Ref. to Fig. 504)

(1) Put a warning notice in the flight compartment to tell other persons not to move the flight controls.
(2) Make a table, as shown in Fig. 504, in preparation for recording test results. Do not write on the table in Fig. 504 in this manual; if required, the sheet should be removed, copied and returned to its place in the manual.
(3) Open the right main landing gear rear door (Refer to 52-82-00).
(4) Install a rigging pin in the right aileron control sector.
(5) Install the inclinometer on aileron trim tab surface at the location shown in Fig. 504.
(6) Do the test:

	Action	Result
(a)	With a spring balance, apply a load of 4.4 lb (2 kg) downward at location P1 shown in Fig. 504. While the load is applied, zero the inclinometer.	–
(b)	Release the load.	–
(c)	With a spring balance, apply a load of 4.4 lb (2 kg) upward at the location P1 shown in Fig. 504. With the load applied, take a reading from the inclinometer (in degrees and minutes) and record the reading in the appropriate place on the table made in step (2).	–
(d)	Do steps (a) thru (c) again.	–
(e)	Add the two measurements and divide by two to get the average.	The average deflection should be no more than the maximum allowable deflection given on the table in Fig. 504.



A : LOCATION OF INCLINOMETER

B : POINT OF APPLICATION OF SPRING BALANCE

AILERON INTERCONNECTION PLAY				
SYSTEM CONDITION	DEFLECTION READINGS (degrees)		AVERAGE DEFLECTION	MAXIMUM ALLOWABLE DEFLECTION
	1st	2nd	$\frac{1+2}{2}$	
LEFT AILERON PLAY RH SECTOR RIG PIN ONLY INSTALLED				1°15′
RIGHT AILERON PLAY RH SECTOR RIG PIN ONLY INSTALLED				1°15′

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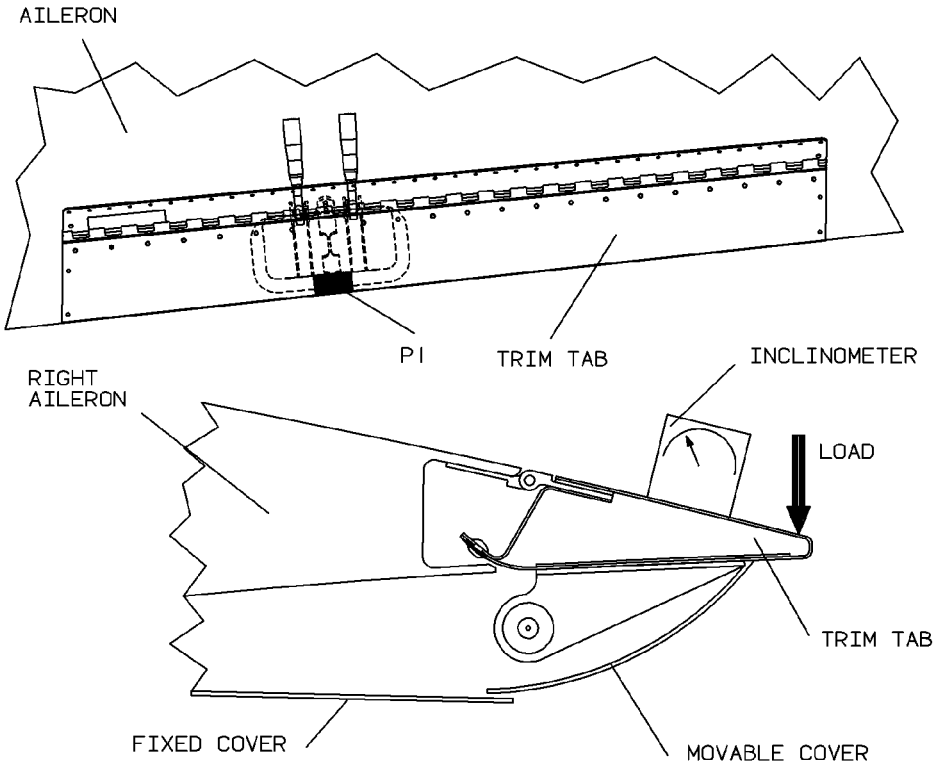
Fig. 503 - Aileron - Play Test

(7) If the average deflection is more than the maximum allowable deflection value, examine the trim tab actuator linkages and trim tab hinge for wear. Replace any worn item and repeat the test until satisfactory.
(8) Remove the rigging pin from the right aileron sector.
(9) Remove the inclinometer from the aileron trim tab.
(10) Close the right main landing gear rear door (Refer to 52-82-00).
(11) Remove the warning notice from the flight compartment.



AILERON TRIM TAB			
DEFLECTION MEASUREMENTS		AVERAGE MEASUREMENTS $\frac{1+2}{2}$	MAXIMUM ALLOWABLE DEFLECTION
1st	2nd		
			0.2°

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Fig. 504 - Aileron Trim Tab - Play Test

4. Aileron Trim Tab Actuator (*Ratier Figeac P/N FE187-001*) - Electrical Insulation

A. Fixtures, Test and Support Equipment

Milliohmeter	Not Specified
Megahometer	Not Specified

B. Procedure

NOTE: The actuator being electrically disconnected from the aircraft check for:

- Insulation resistance, between isolated pins and earth; higher than 20 megahoms under a 48 VDC test voltage.
- Bonding; Resistance between grounded pin, casings and aircraft earth shall not exceed 20 milliohms.

RUDDER AND TAB - DESCRIPTION AND OPERATION

1. General (Ref. to Fig. 1)

   A. Directional control of the airplane is provided by the rudder. The rudder system consists of a dual set of rudder pedals, a cable system, and a rudder assembly. Each set of rudder pedals is individually adjustable. The rudder, mounted on a torque tube, is connected to the vertical stabilizer at three hinge points. Rudder control is provided manually by either set of interconnected rudder pedals or automatically through the autopilot servo. Rudder travel is 23° (+0, -0.5°) degrees left and right.

   B. An integral rudder trim tab system increases directional stability of the airplane. The rudder trim tab is attached to the rudder at three hinge points, each one consisting of a piece of a continuous-type hinge. The trim tab is actuated by an axial-type electrical actuator located in the vertical stabilizer. The rudder trim switch on the flight compartment control pedestal controls the tab actuator and a yaw trim indicator, located immediately above the rudder trim switch, indicates trim tab travel. Trim tab travel is 30° (±1°) left and right.

2. Operation

   A. Rudder control motion is transmitted from the interconnected rudder control pedals through push-pull tubes, pedals adjustment devices, a front sector, then via a closed loop drive cable assembly to a rear drive sector connected to the rudder torque tube. Two sets of rudder travel stop bolts (front and rear) are installed. The rear stop bolts limit rudder travel when contacted by the rudder rear sector. The front stop bolts, located under the flight compartment floorboard, limit rudder travel when contacted by the rudder front sector.

   B. Rudder trim tab motion is controlled by the rudder trim switch. Setting the switch to LEFT or RIGHT energizes the trim tab actuator to move the trim tab RIGHT or LEFT. A dual rod linkage connects the actuator to the trim tab. In case of trim tab actuator runaway, two switches (Control Wheel MASTER SWITCH) are provided, one on each control wheel. Operation of either of the switches deenergizes the trim tab actuator itself.

   C. A schematic of the rudder trim tab electrical control system is shown in Fig. 2.

   D. Rudder pedal adjustment is by a bellcrank system which is connected to control knobs located on the left and right of the instrument panel.

      The rudder pedals are also used to operate the airplane wheel brakes and the nose wheel steering. This part of the system is described in Chapter 32.

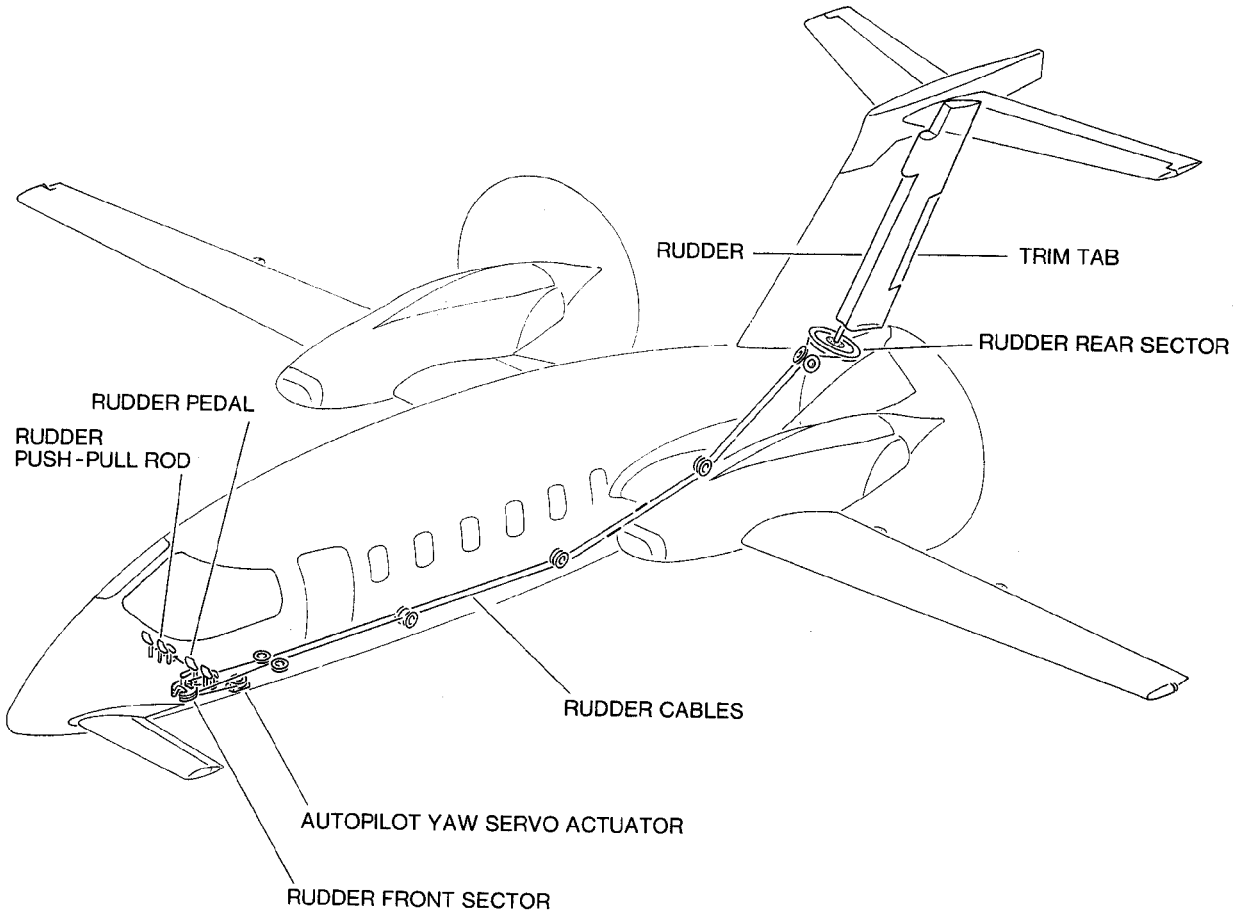

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Fig. 1 - Rudder Control System Installation

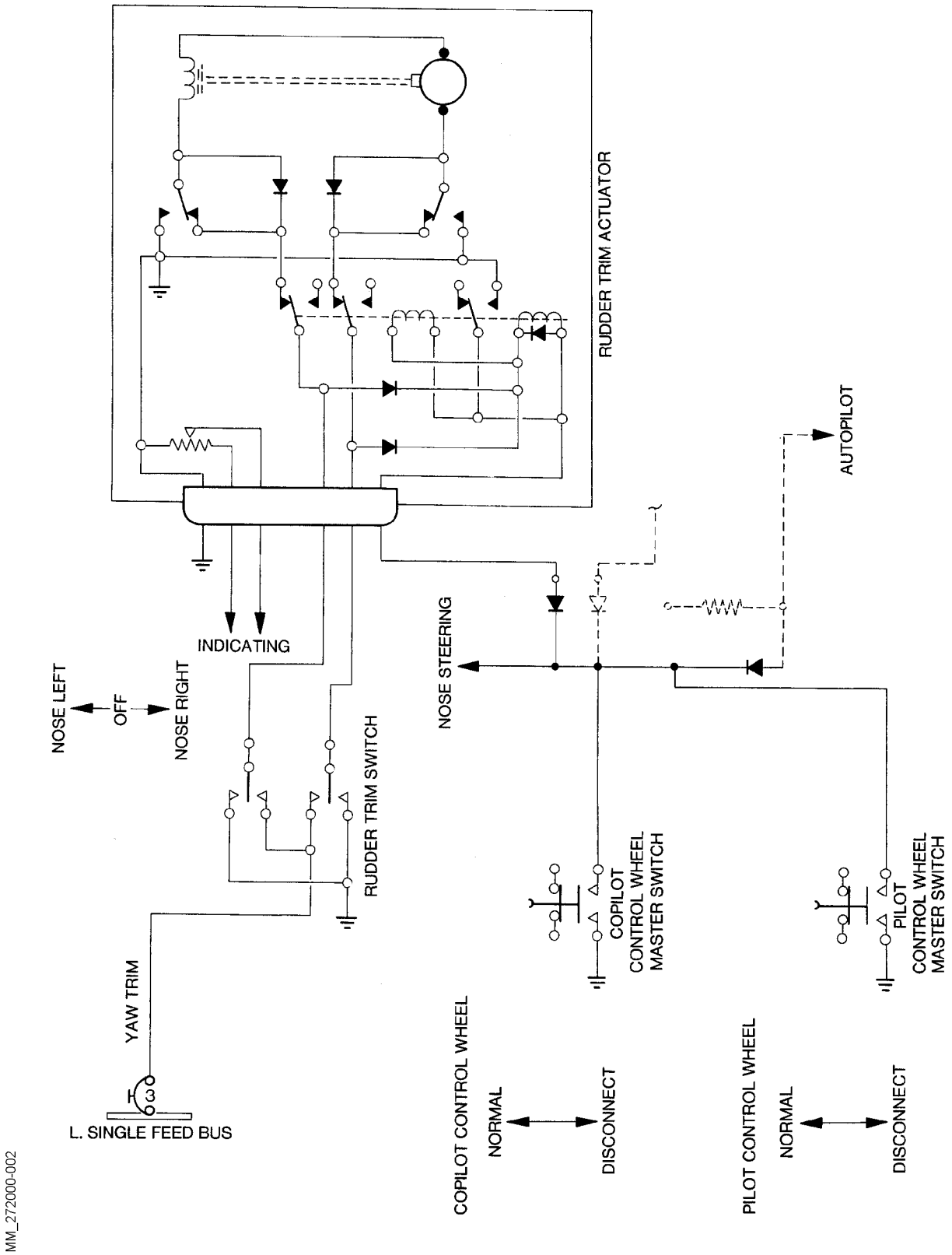

Fig. 2 - Rudder Trim Tab Electrical Control Schematic

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RUDDER AND TAB - MAINTENANCE PRACTICES

1. General

A. This page block contains the following maintenance practices:

- removal/installation of the rudder
- removal/installation of the rudder trim tab
- removal/installation of the rudder trim tab actuator
- removal/installation of the rudder control cables
- removal/installation of the rudder pedals
- removal/installation of the rudder pedal bellcrank
- removal/installation of the bellcrank control cable
- removal/installation of the trim position indicator.

2. Rudder - Removal (Ref. to Fig. 201)

A. Reference Information

Maintenance Manual Chapter 52-82-00

B. Procedure

(1) Open the left main gear rear door. (Refer to 52-82-00).

(2) Loosen the turnbuckles of both rudder control cables, gaining access to them from the hole located in the floor of the left main landing gear well.

(3) Remove the six caps located on the vertical stabilizer corresponding to the rudder hinges.

(4) Remove the two inspection panels (320AL, 320AR) on either side of the tailcone.

(5) Remove the tailcone.

(6) Remove the cable retaining pins (5, 8) from the rear sector (9).

(7) Remove the cotter pins, bolts, nuts and washers (12, 13, 14, 15, 16, 17, 18, 19) that fasten the terminal ends of the rudder control cables from the rear sector (9).

(8) Remove torque tube hinge fitting bolts and washers (6, 7) at the bottom of the rudder torque tube.

(9) Disconnect both trim actuator connecting rods (21) at the rocker arms (23) in the rudder leading edge by removing nuts, washers and bolts (24, 25, 26). Make sure that the bushings (27, 28) remain in their respective locations.

(10) Support the rudder.

CAUTION: BE CAREFUL TO AVOID DAMAGE TO THE RUDDER.

(11) Remove the nuts (2) and the bolts (4) from the three hinges through the holes located on the vertical stabilizer.

CAUTION: WITH REFERENCE TO FIG. 201 (SHEET 4 OF 4), WHEN TILTING THE RUDDER TO REMOVE IT BACKWARD, MAKE SURE THAT THE MAXIMUM DISTANCE BETWEEN THE RUDDER UPPER HINGE AND THE VERTICAL STABILIZER UPPER HINGE DOESN'T EXCEED 10 INCHES (CORRESPONDING TO A SOLID ANGLE, WHOSE VERTEX IS LOCATED IN THE RUDDER TORQUE TUBE BOTTOM FLANGE, OF APPROXIMATELY 6 DEGREES).

(12) Deflect the rudder so that it clears upwards and remove it rearward together with the rear sector.

3. Rudder - Installation (Ref. to Fig. 201)

A. Expendable Parts

Cotter Pin (Fig. 201, item 1) Qty.3	MS 24665-151
Cotter Pin (Fig. 201, item 12 and 16) Qty.2	MS 24665-153

B. Reference Information

Maintenance Manual Chapter 52-82-00

C. Procedure

CAUTION: WITH REFERENCE TO FIG. 201 (SHEET 4 OF 4), WHEN TILTING THE RUDDER TO INSTALL IT FORWARD, MAKE SURE THAT THE MAXIMUM DISTANCE BETWEEN THE RUDDER UPPER HINGE AND THE VERTICAL STABILIZER UPPER HINGE DOESN'T EXCEED 10 INCHES (CORRESPONDING TO A SOLID ANGLE, WHOSE VERTEX IS LOCATED IN THE RUDDER TORQUE TUBE BOTTOM FLANGE, OF APPROXIMATELY 6 DEGREES).

CAUTION: USE NEW SELF-LOCKING NUTS EACH TIME THE RUDDER ISINSTALLED

(1) Position the rudder to align with the vertical stabilizer hinges.
(2) Install bolts (4) and nuts (2) at the upper, central, and lower hinge points. Tighten the nuts.
(3) Attach the torque tube to the lower hinge fitting point with washers and bolts (7, 6).
(4) Position the ends of the rudder control cables on the rear sector (9) and secure in place with bolts, nuts, and washers (13, 14, 15, 17, 18, 19). Tighten the nuts and safety with new cotter pins (12, 16).
(5) Install the cable retaining pins (5, 8) of the rear sector (9).
(6) Connect both trim actuator connecting rods (2, 1) at the rocker arms (23) in the rudder leading edge by installing bolts, washers and nuts (24, 25, 26). Make sure that bushings (27, 28) are correctly located.
(7) Install the tailcone.
(8) Install the panels (320AL, 320AR) on either side of the tailcone.
(9) Check that the clearance between the rudder upper and lower end and the vertical stabilizer is at least 5mm (0.2 in.).

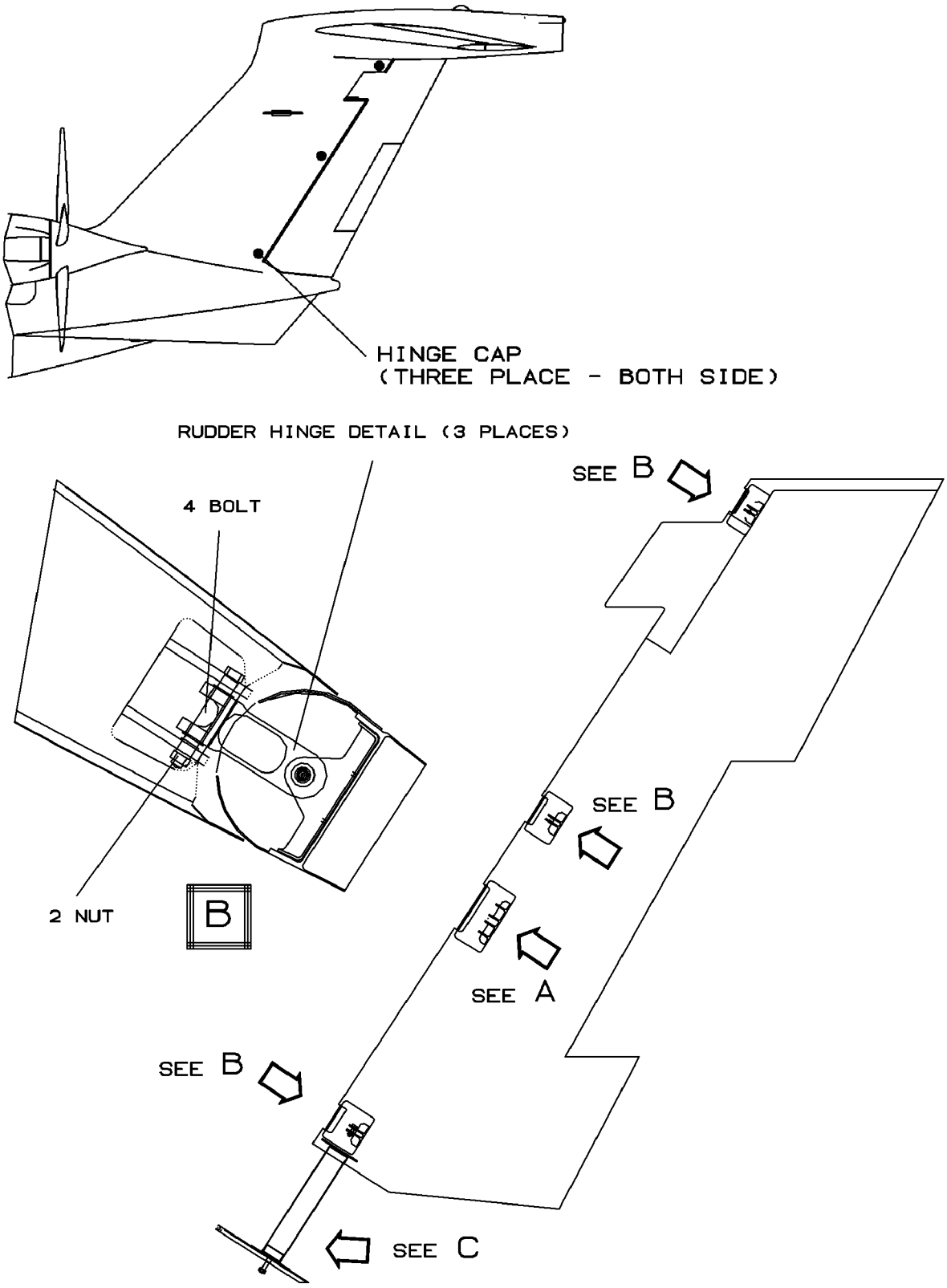

Fig. 201 - Rudder - Removal/Installation (Sheet 1 of 4)

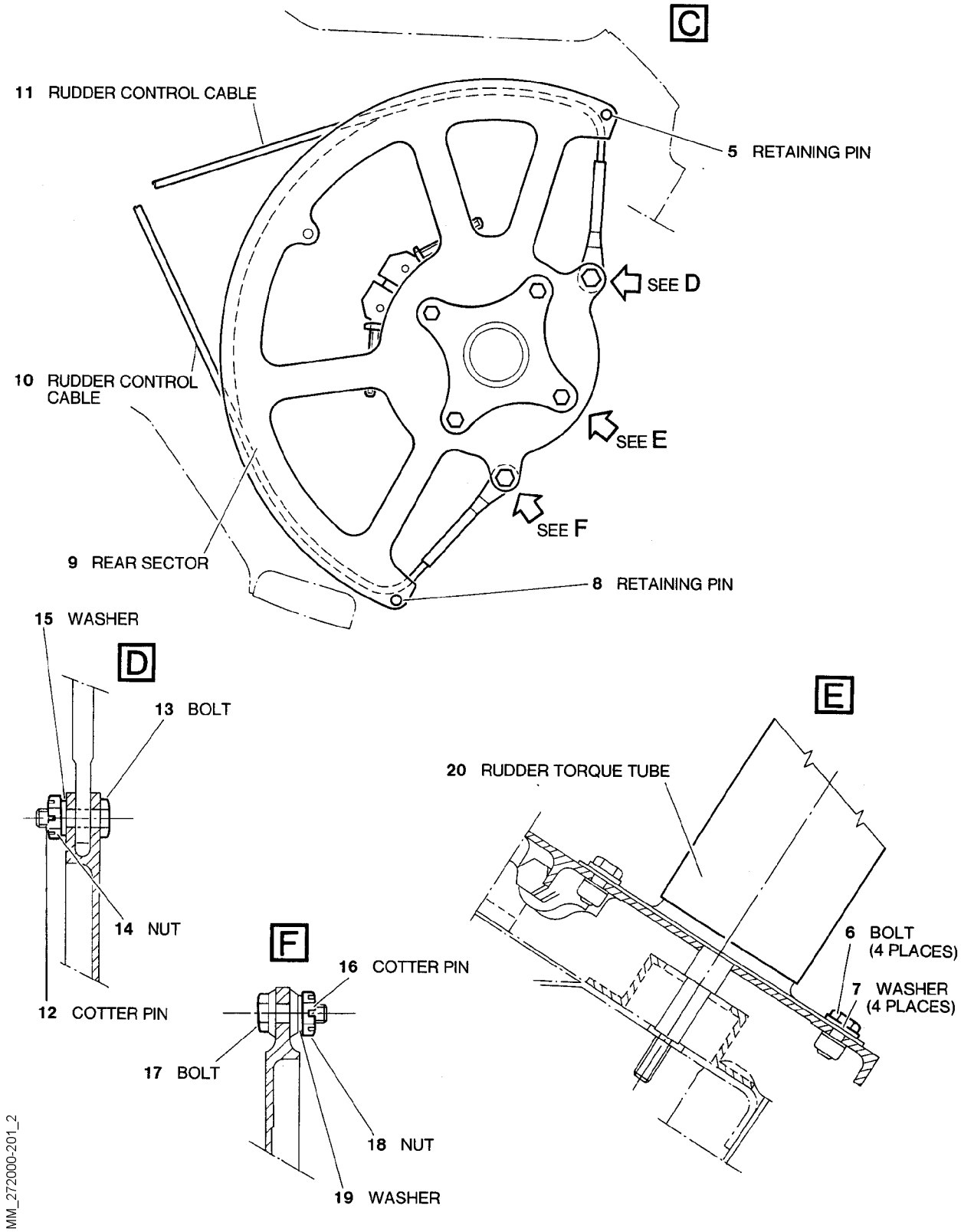

Fig. 201 - Rudder - Removal/Installation (Sheet 2 of 4)

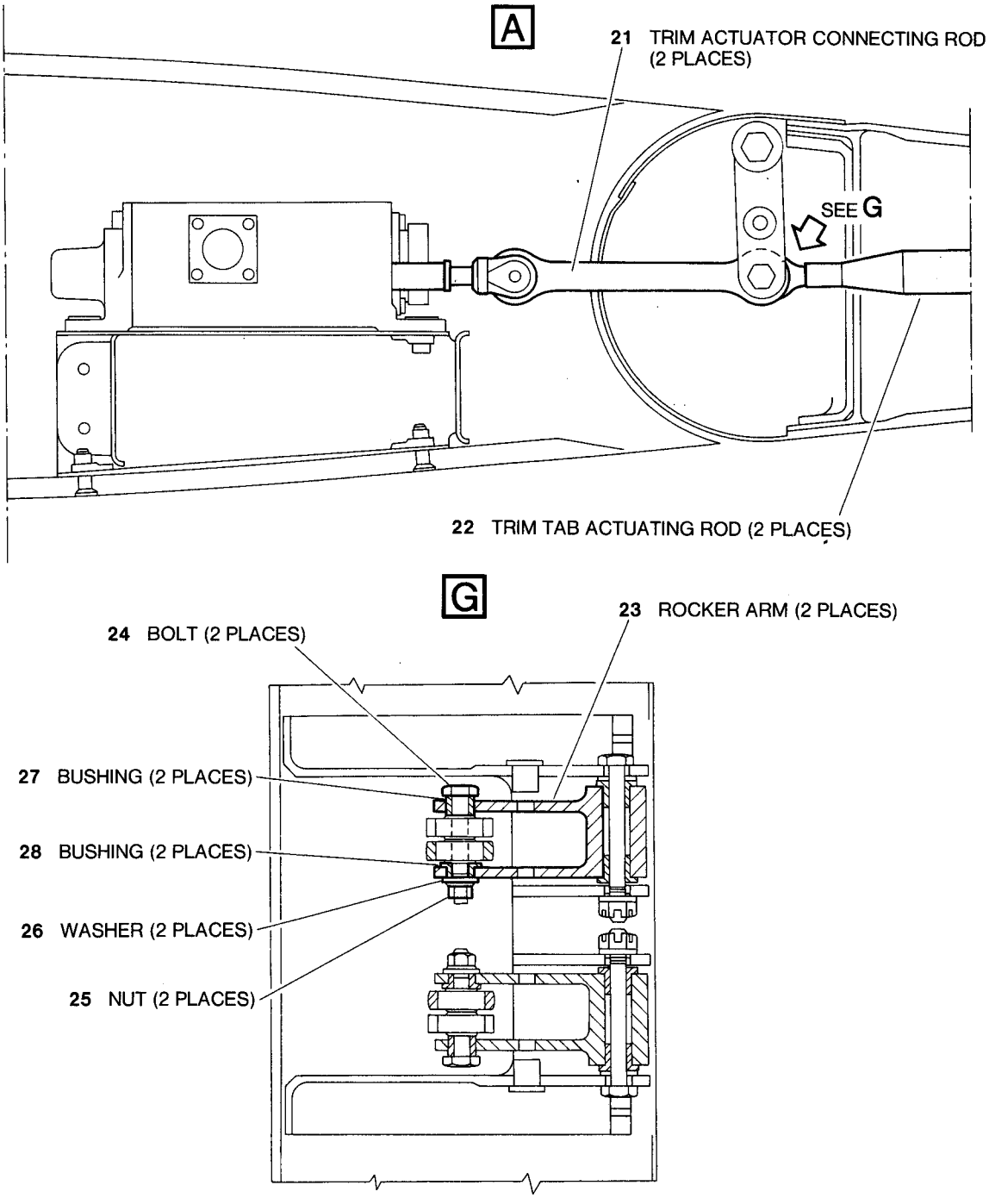

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Fig. 201 - Rudder - Removal/Installation (Sheet 3 of 4)

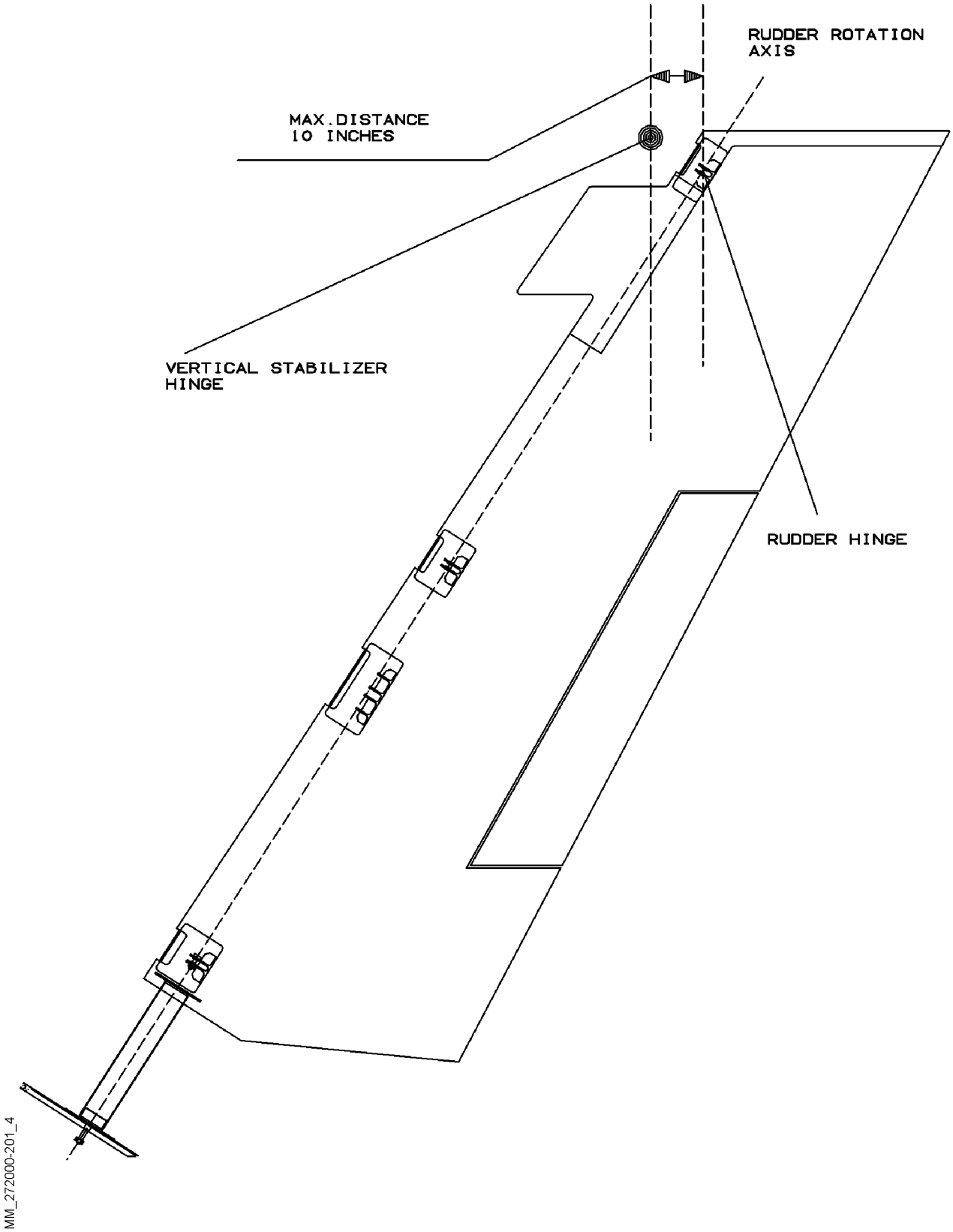


Fig. 201 - Rudder - Removal/Installation (Sheet 4 of 4)

(10) Tighten the rudder control cables at the turnbuckles.
(11) Check rudder control and trim systems for proper rigging. (Refer to page block 501).
(12) Install the six caps located on both sides of the vertical stabilizer.
(13) Close the left main landing gear rear door (Refer to 52-82-00).

4. Rudder Trim Tab - Removal (Ref. to Fig. 202)

A. Procedure

(1) Remove rudder hinge access cover 330BR.

NOTE: 330BR is the lower of the two access covers in the area of the rudder center hinge.

(2) Disconnect both trim tab actuating rods (8) at the rocker arms in the rudder leading edge by removing the nuts, washers and bolts (3, 2, 1). Make sure that the bushings (4, 5) remain in their respective locations.
(3) Pull out the three hinge wires (6).

NOTE: Turn the hinge wire and pull it at the same time to remove it.

(4) Carefully remove the trim tab (7), together with the two actuating rods (8).
(5) Disconnect both actuating rods at the trim tab by removing the nuts, washers and bolts (9, 10, 11).

5. Rudder Trim Tab - Installation (Ref. to Fig. 202)

A. Consumable Materials

Grease	TBD

B. Reference Information

Maintenance Manual Chapter 51-62-00

C. Procedure

(1) Connect the two actuating rods (8) to the trim tab (7) by installing the bolts, washers and nuts (11, 10, 9).

CAUTION: IF A NEW TRIM TAB IS TO BE INSTALLED, REMOVE THE RUDDER, INSTALL THE NEW TRIM TAB AS DETAILED HERE AND BALANCE THE RUDDER. REFER TO 51-62-00.

(2) Carefully install the trim tab; align the actuating rods with the rocker arms in the rudder leading edge and align the three hinge halves of the tab with the hinge halves on the rudder.
(3) Lubricate the hinge wires in preparation for installation.
(4) Install the three hinge wires.

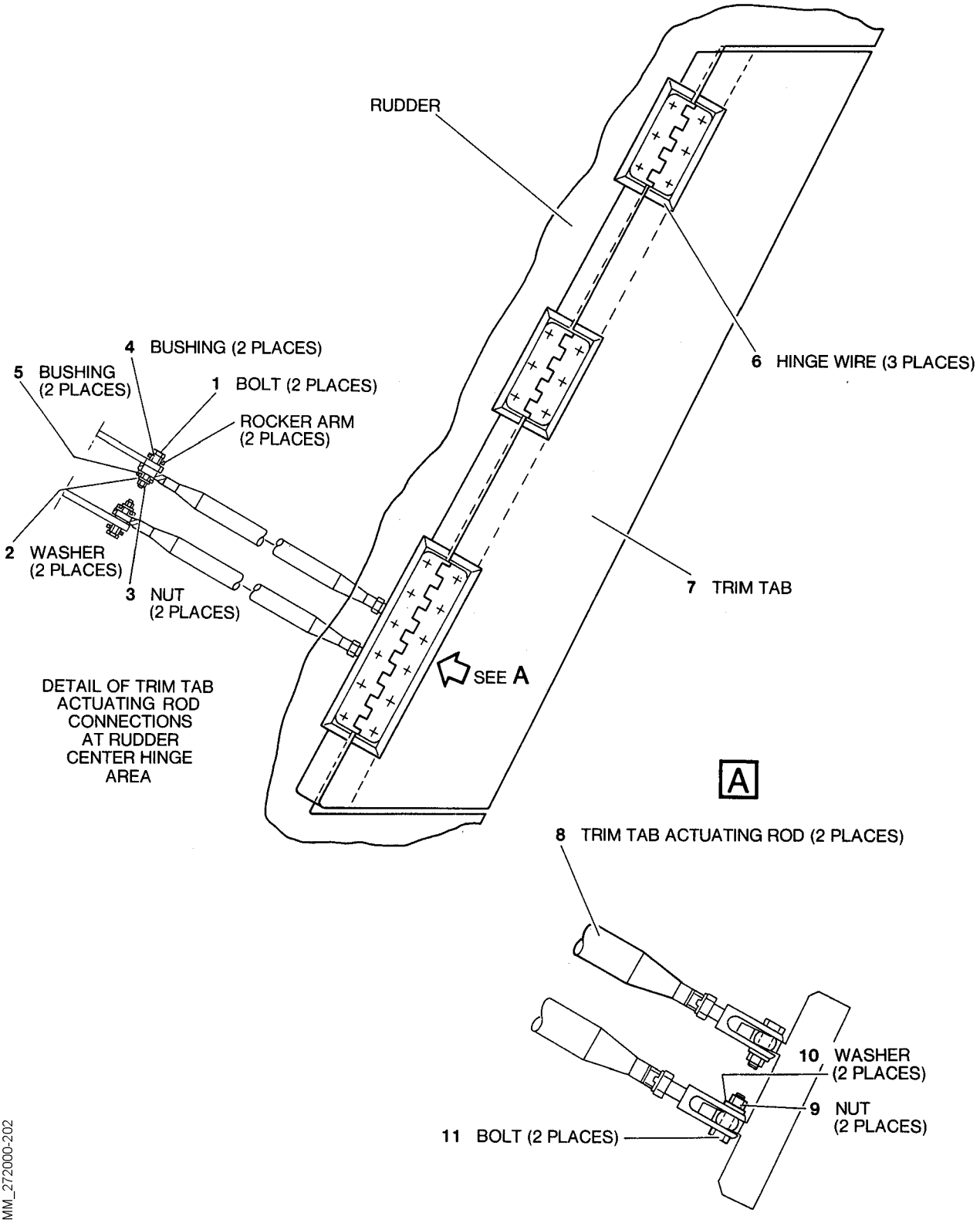


Fig. 202 - Rudder Trim Tab - Removal/Installation

NOTE: Turn the hinge wire and push it at the same time to install it.

(5) Support the hinges; use a centerpunch and slightly deform the end of the hinges to maintain the hinge wires in position.
(6) Connect both trim tab actuating rods (8) and both trim actuator connecting rods to the rocker arms at the rudder leading edge. Make sure that the bushings (4, 5) are in position and install bolts, washers and nuts (1, 2, 3).
(7) Check that there is clearance of at least 5mm (0.2 in.) between the ends of the trim tab and the rudder.
(8) Check the rudder and trim tab rigging (Ref. to page block 501).
(9) Install rudder hinge access cover 330BR.

6. Rudder Trim Tab Actuator - Removal (Ref. to Fig. 203)

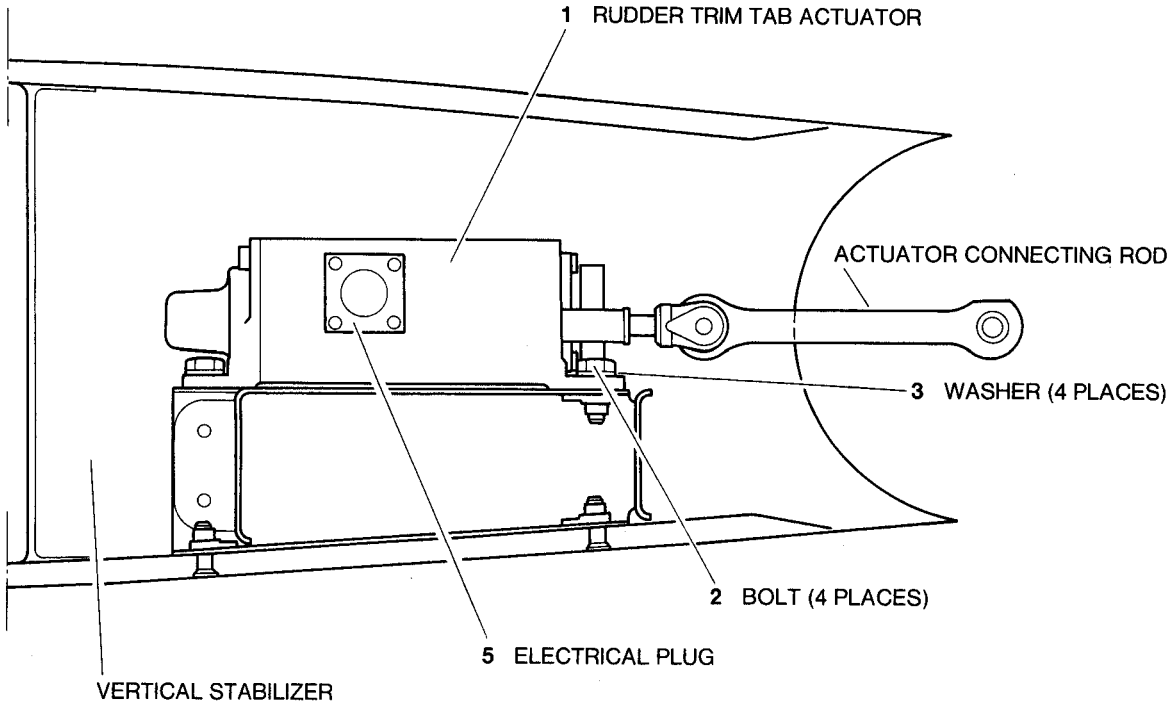
A. Procedure

(1) Remove the rudder (Refer to Para. 2).
(2) Disconnect the electrical plug (5) from the actuator (1).
(3) Support the actuator, remove the four bolts and washers (2,3) which secure the actuator to the attachment bracket, and remove the actuator.

7. Rudder Trim Tab Actuator - Installation (Ref. to Fig. 203)

A. Procedure

(1) Put the actuator (1) into position at the attachment bracket with the connecting rods to the rear; install the four washers and bolts (3, 2) to secure the actuator to the bracket.
(2) Connect the electrical plug (5) to the actuator.
(3) Install the rudder (Refer to Para. 3).



MM_272000-203

Fig. 203 - Trim Tab Actuator - Removal/Installation

8. Rudder Control Cables - Removal (Ref. to Fig. 204)

A. Fixture, Test and Support Equipment

Rigging Pin (Qty. 2)	Not Specified

B. Consumable Materials

String, four pieces, approx. 50 ft (15 m) long	Not specified

C. Reference Information

Maintenance Manual Chapter 25-20-00
Maintenance Manual Chapter 52-82-00
Maintenance Manual Chapter 27-00-00

D. Procedure

(1) Remove the carpet from the center aisle of the passenger compartment (Refer to 25-20-00).
(2) Remove the center floor panels 211CLF, 212BRF, 211DLF, 211GLF, 231ALF, 231FLF, 231MLF, 231QLF and 231RLF.
(3) Remove the panels at the left and right sides of the control pedestal. In the baggage compartment, remove floor panel 281BZ, and at the tailcone, remove access panels 320AL and 320AR.
(4) Open the left main landing gear rear door (Refer to 52-82-00).
(5) Remove the retaining pins from the rudder cable pulleys at the locations detailed in Fig. 204, as follows:

LOCATION	PULLEY No.	RETAINING PIN No.	FIG. 204 DETAIL
FS 1130	2 and 4	1 and 3	H
FS 4114	30	31	B
FS 5792	11	26	C
FS 8140	32	29	E
FS 9614	24	23	F

NOTE: On the airplane with SN 1034 and up, remove the retaining pin on the pulley No.39.

(6) Remove the retaining pins (12, 21) from the rear sector (22).
(7) Remove the retaining plates (5, 9) from the front sector (6).
(8) Install a rigging pin in the front and rear sector locations (10,25).
(9) Disconnect the turnbuckles (28, 33) of the rudder control cables (27, 34); the turnbuckles are accessible through the left main landing gear rear door opening.
(10) Remove the cotter pins (35,36) from the front sector (6).

(11) Detach the cable ball end (8) and the cable barrel end (7) from the front sector (6); Attach a length of string to the ball end, and another length to the barrel end.

(12) Remove the pressure seal that the rudder cables pass through (Refer to 27-00-00).

NOTE: The left aileron cable passes through the same pressure seal; remove the pressure seal only enough to allow the removal of the rudder cables without interfering with the aileron cable.

(13) Pull the cables out through the left main landing gear well. When the end of the lengths of string are in position (outside the landing gear well), tag both ends of the two lengths of string to identify which is attached to the ball-ended cable and which is attached to the barrel-ended cable.

(14) Detach the cables from the lengths of string. Leave the string in position.

(15) Remove and discard the cotter pin (37), then remove the bolt, washer and nut (14, 15, 16) to detach the cable eye end (13) from the rear sector (22).

(16) Remove and discard the cotter pin (38), then remove the bolt, washer and nut (18, 19, 20) to detach the cable clevis end (17) from the rear sector (22).

(17) Attach a length of string to the cable eye end, and another length to the cable clevis end.

(18) Pull the cable out through the left main landing gear well. When the end of the lengths of string are in position (outside the landing gear well), tag the two lengths of string to identify which is attached to the eye-ended cable and which is attached to the clevis- ended cable.

(19) Detach the cables from the strings. Leave the strings in position.

9. Rudder Control Cables - Installation (Ref. to Fig. 204)

A. Expendable Parts

Cotter Pin (Fig. 204, item 38 and 37) Qty. 2	MS 24665-153
Cotter Pin (Fig. 204, item 36)	MS 24665-155
Cotter Pin (Fig. 204, item 35)	MS 24665-157

B. Reference Information

Maintenance Manual Chapter 27-00-00
Maintenance Manual Chapter 25-20-00
Maintenance Manual Chapter 52-82-00

C. Procedure

(1) At the rear sector location, attach the two lengths of string (according to the identification tags) to the turnbuckle (threaded) ends of the eye-ended cable and the clevis-ended cable.

(2) At the front sector location, attach the two lengths of string (according to the identification tags) to the turnbuckle (threaded) ends of the ball-ended cable and the barrel-ended cable.

(3) Put the ball-ended cable into position by pulling the length of string through the main landing gear rear well. Be careful to avoid damage to the pressure seal as the cable passes through the pressure seal.

(4) When the ball-end (8) is in position at the front sector (6), install the ball-end in its location in the sector and install a new cotter pin (35) to hold the ball-end in the sector.

(5) Put the eye-ended cable into position by pulling the length of string through the main landing gear well.

(6) When the eye-end (13) is in position at the rear sector (22), connect the eye-end to the rear sector by installing the bolt, washer and nut (14, 15, 16). Secure the nut with a new cotter pin (37).

(7) Remove the lengths of string from the threaded ends of the ball-ended and eye-ended cables.

(8) Connect the two cables to each other with the turnbuckle (28); make sure that the cables are correctly installed on their pulleys and that the cable is correctly routed along its entire length.

(9) Install the barrel-ended cable and the clevis-ended cable in the same manner as given for the ball-ended and eye-ended cables; refer to steps (3) thru (8). Use a new cotter pin (36) to secure the barrel-end (7) to the front sector (6); use the bolt, washer, nut and new cotter pin (18, 19, 20, 38) to secure the clevis-end to the rear sector, and use a turnbuckle (33) to connect the cables to each other.

(10) Install the retaining pins in the rudder cable pulleys at the location detailed in Fig. 204, as follows:

LOCATION	PULLEY No.	RETAINING PIN No.	FIG. 204 DETAIL
FS 1130	2 and 4	1 and 3	H
FS 4114	30	31	B
FS 5792	11	26	C
FS 8140	32	29	E
FS 9614	24	23	F

NOTE: On the airplane with SN 1034 and up install the retaining pin on the pulley 39.

(11) Install the retaining pins (12, 21) in the rear sector (22).

(12) Install the retaining plates (5, 9) at the front sector (6).

(13) Make sure that the cables are correctly engaged in their pulleys.

(14) Install the pressure seal at FS 6000 (Refer to 27-00-00).

(15) Stretch the rudder cables (Refer to 27-10-00).

(16) Rig the rudder control system as detailed in page block 501.

(17) Install access panels 320AL and 320AR at the tailcone.

(18) Install floor panel 281BZ in the baggage compartment.

(19) Install the center floor panels 231RLF, 231QLF, 231MLF, 231FLF, 231ALF, 211GLF, 211DLF, 212BRF, 211CLF and the panels at the left and right sides of the control pedestal.

(20) Install the carpet in the center aisle of the passenger compartment (Refer to 25-20-00).

(21) Close the left main landing gear rear door (Refer to 52-82-00).

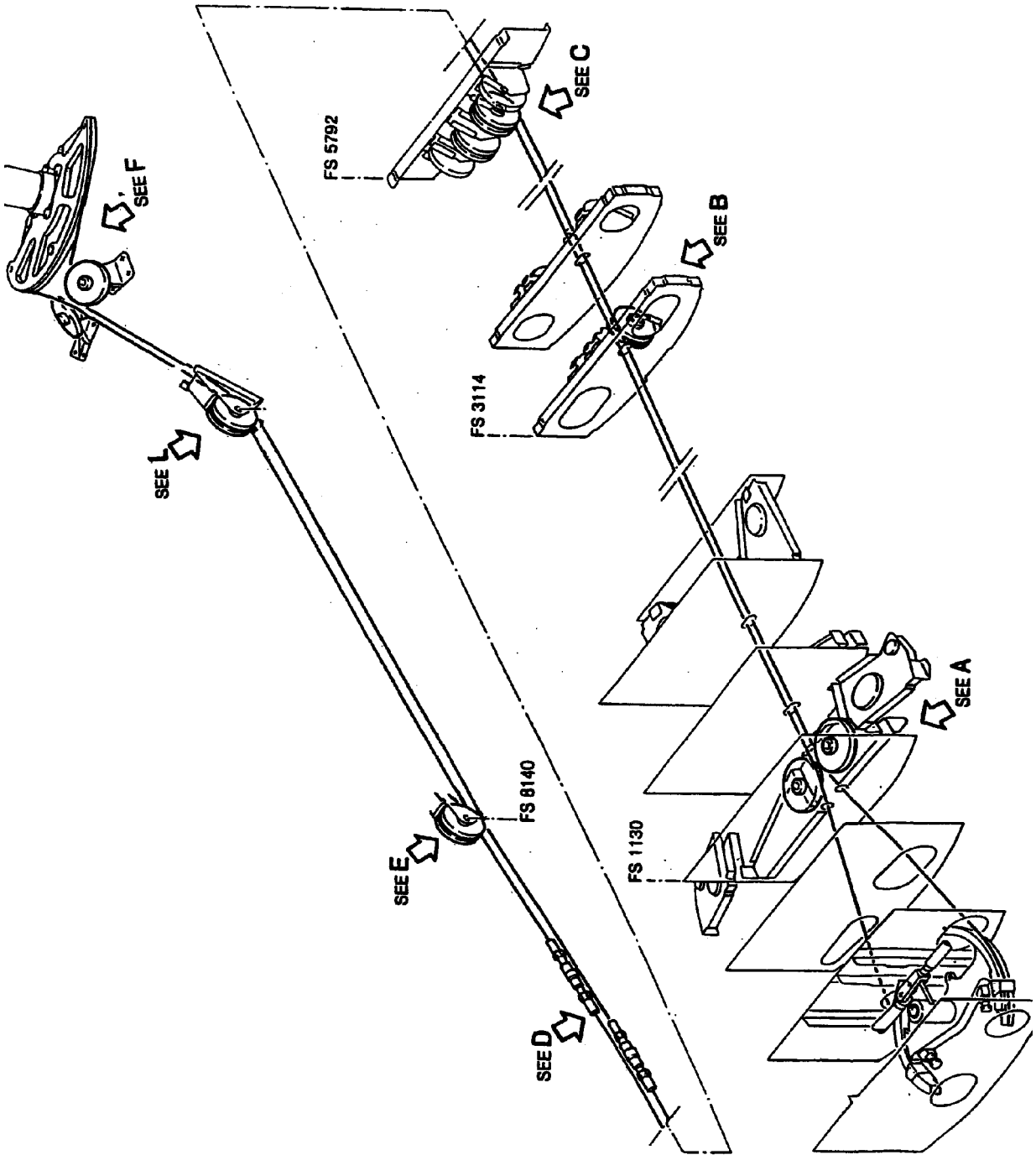


Fig. 204 - Rudder Cables - Removal/Installation (Sheet 1 of 4)

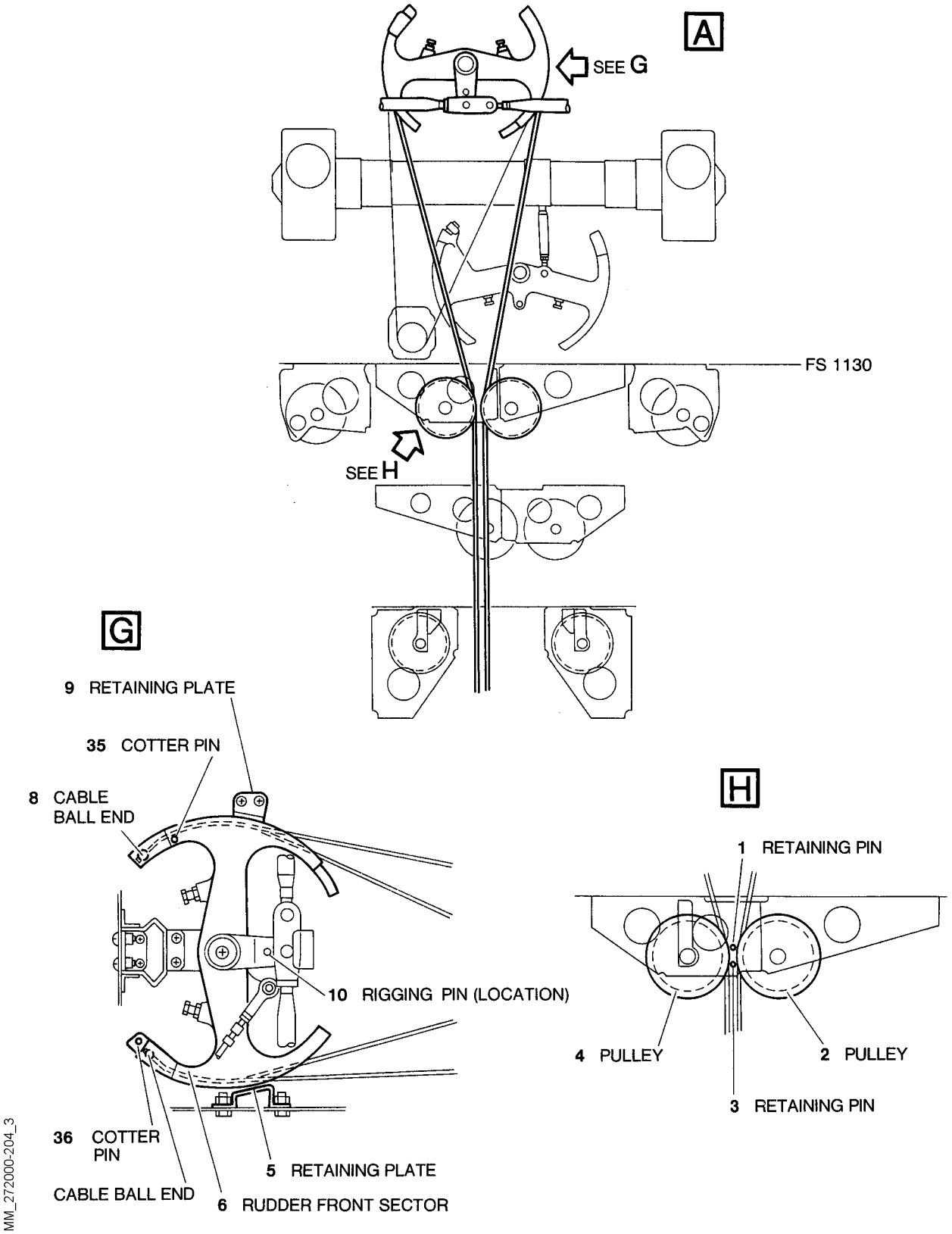


Fig. 204 - Rudder Cables - Removal/Installation (Sheet 2 of 4)

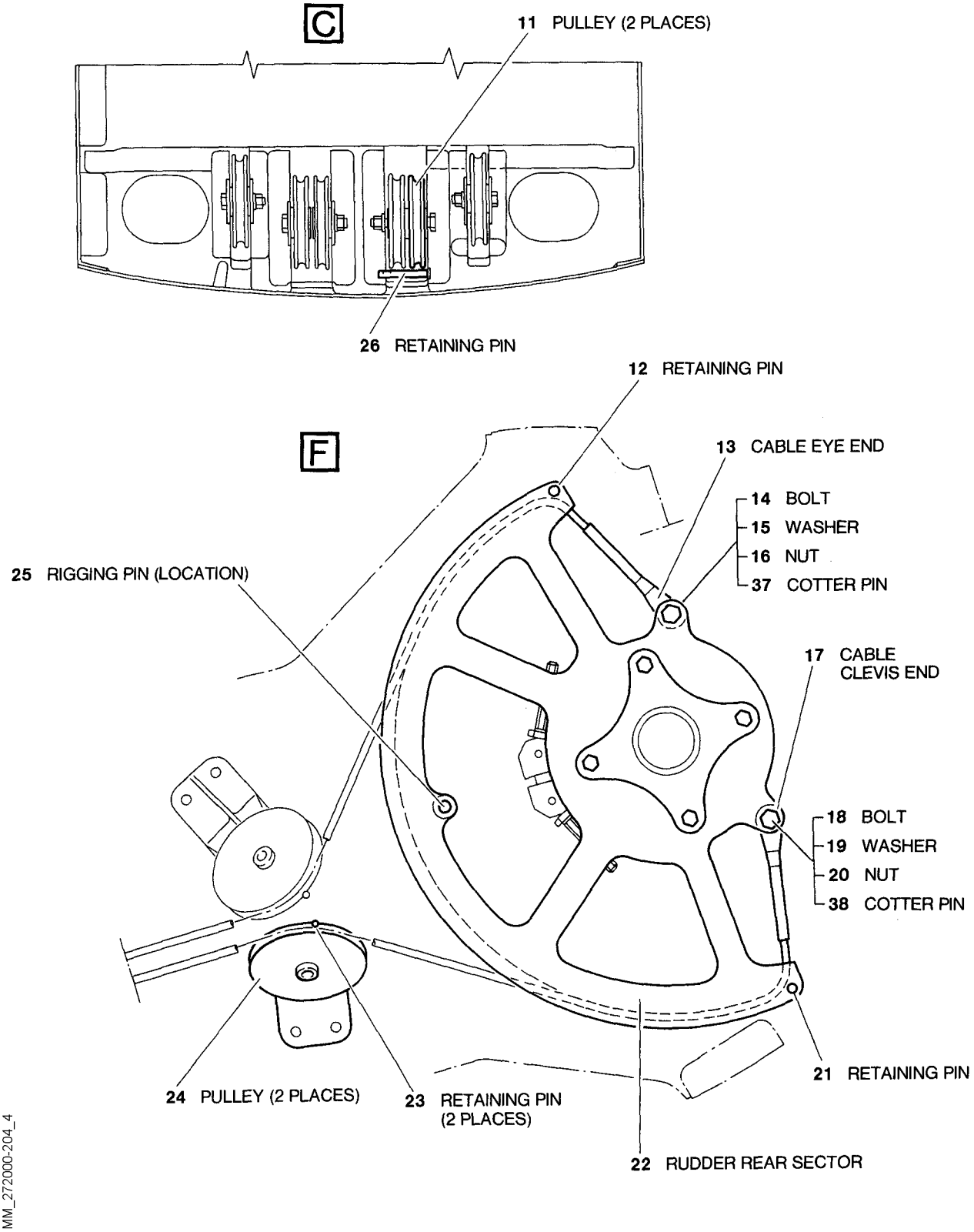


Fig. 204 - Rudder Cables - Removal/Installation (Sheet 3 of 4)

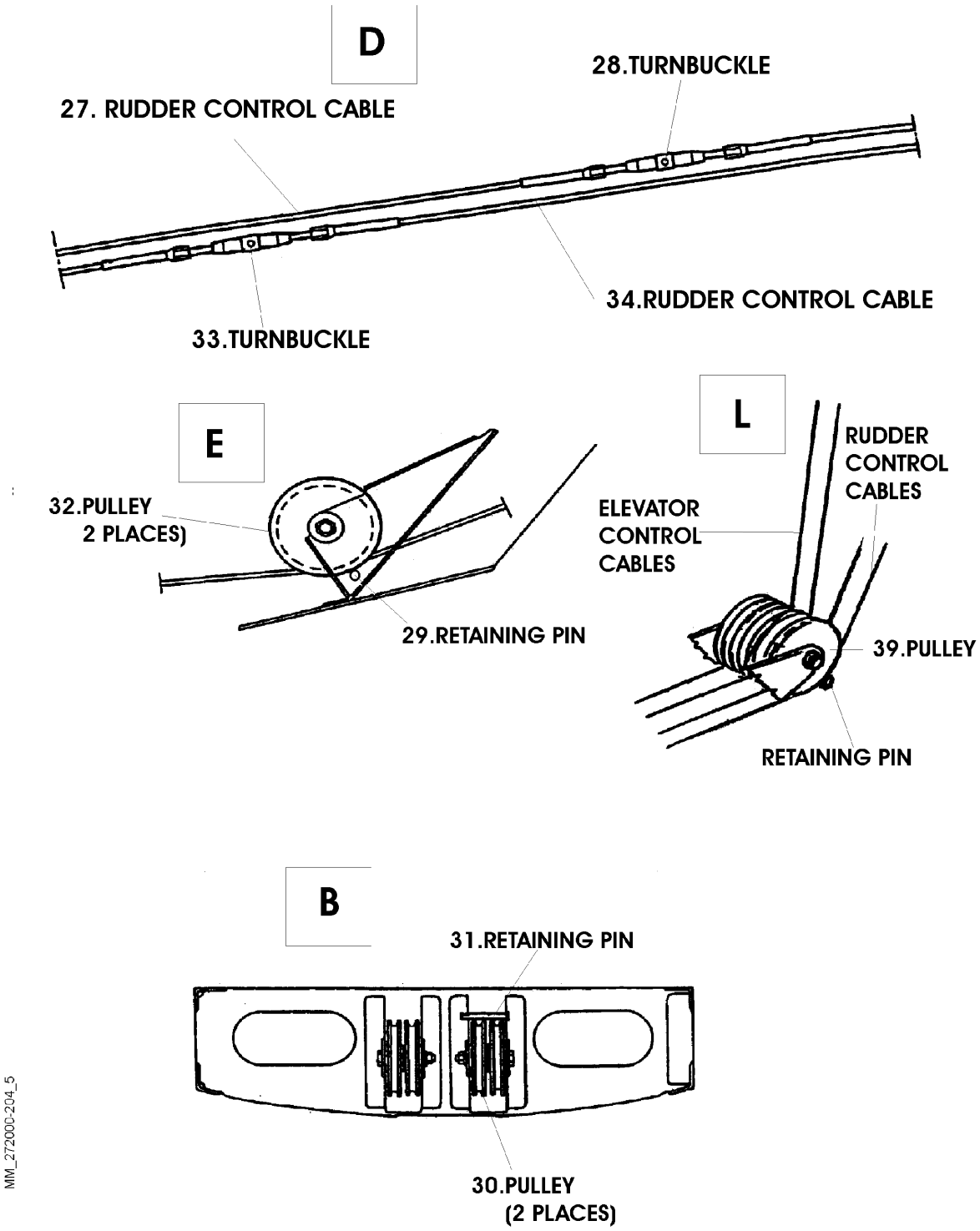


Fig. 204 - Rudder Cables - Removal/Installation (Sheet 4 of 4)

10. Rudder Pedals - Removal (Ref. to Fig. 205)

A. Procedure - Removal of Complete Assembly

NOTE: This procedure applies to the right (copilot's) set of pedals. The procedure for the left (pilot's) set of pedals is the same except that the pilot's pedal assembly does not have brake control springs.

(1) Move the copilot's seat fully rearwards.
(2) Remove the protective covers from between the rudder pedals.
(3) Remove access panel 212ARF (211ALF for the pilot's pedals) to gain access to the pedal supports.

WARNING: IF THERE IS A POSSIBILITY OF THE RUDDER CONTROL SYSTEM BEING MOVED WHILE THE SYSTEM IS BEING WORKED ON, INSTALL A RIGGING PIN IN THE RUDDER FRONT SECTOR TO PREVENT POSSIBLE INJURY.

(4) Remove the nut (12), two spring washers (13) and bolt (14) which secure the brake control springs (11) to the structure.
(5) Remove the nut (9) washer (8) and bolt (7) which secure the two rudder push-pull rods (10) to the rudder pedal levers (6); move the pedal levers as necessary to remove the bolt.
(6) Remove the nut (16) washer (17) and bolt (18) which secure the two brake control rods (15) to the two lower brake levers (19).
(7) Remove the nut (20) washer (21) and bolt (22) which secure the two rudder pedal levers (6) to the support structure. Remove the assembly.

B. Procedure - Removal of Pedals Only

(1) Remove the nut (2), washer (3) and pin (5) which secure the rudder pedal (14) to the upper brake lever (4).
(2) Slide the pedal (14) out from the upper brake lever (4) and the lateral pin (1) to remove it.

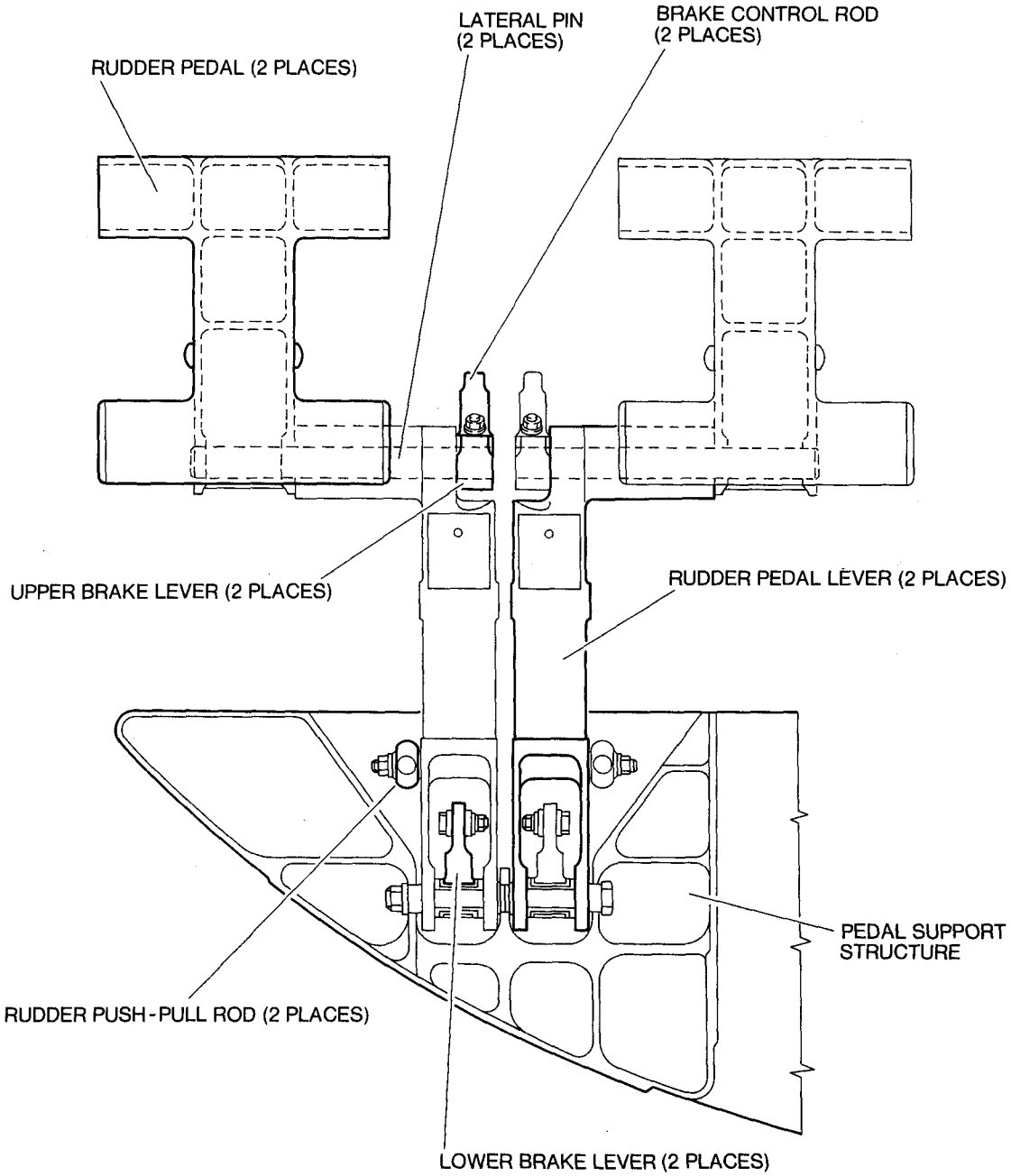


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Fig. 205 - Rudder Pedal - Removal/Installation (Sheet 1 of 3)

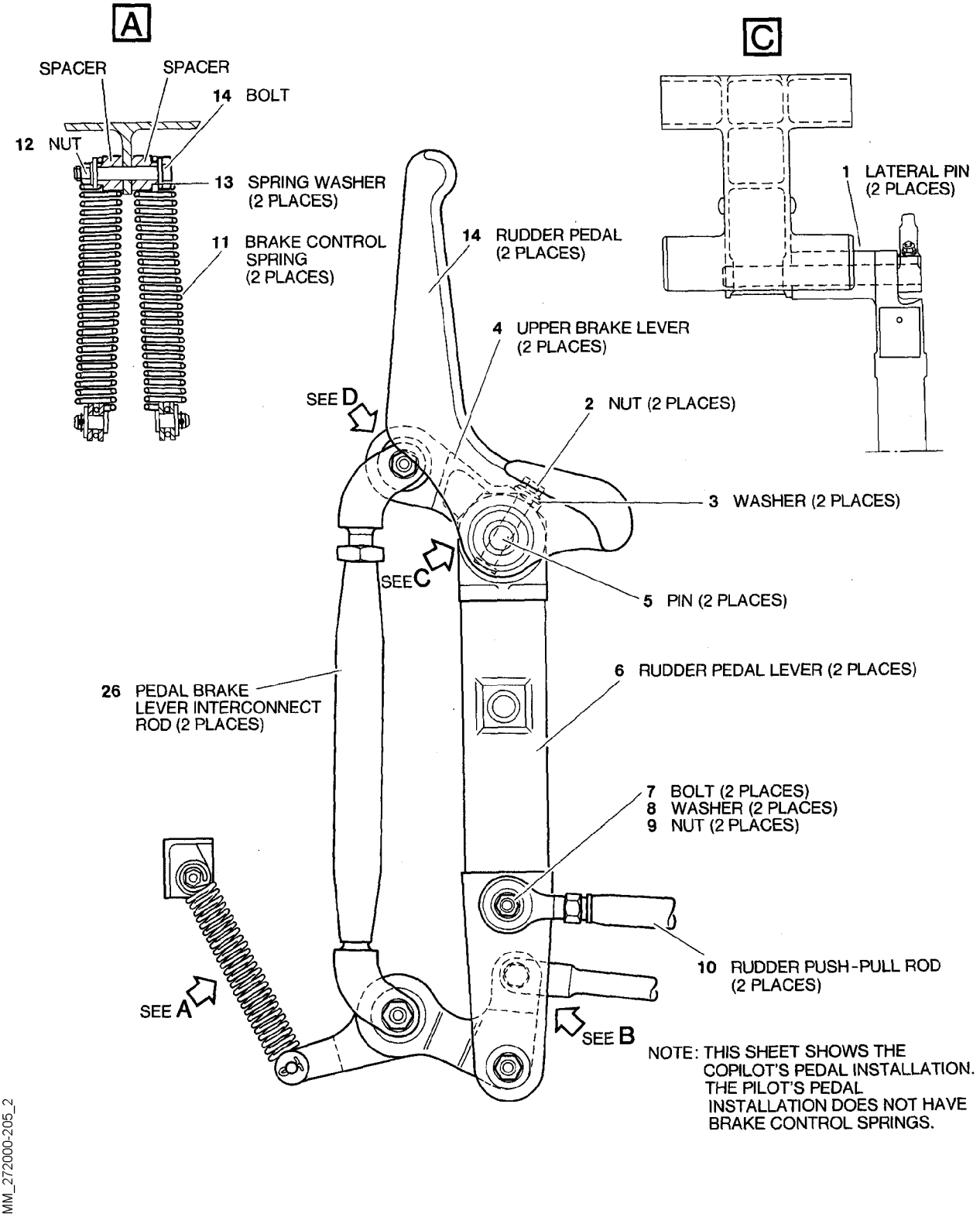

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Fig. 205 - Rudder Pedal - Removal/Installation (Sheet 2 of 3)

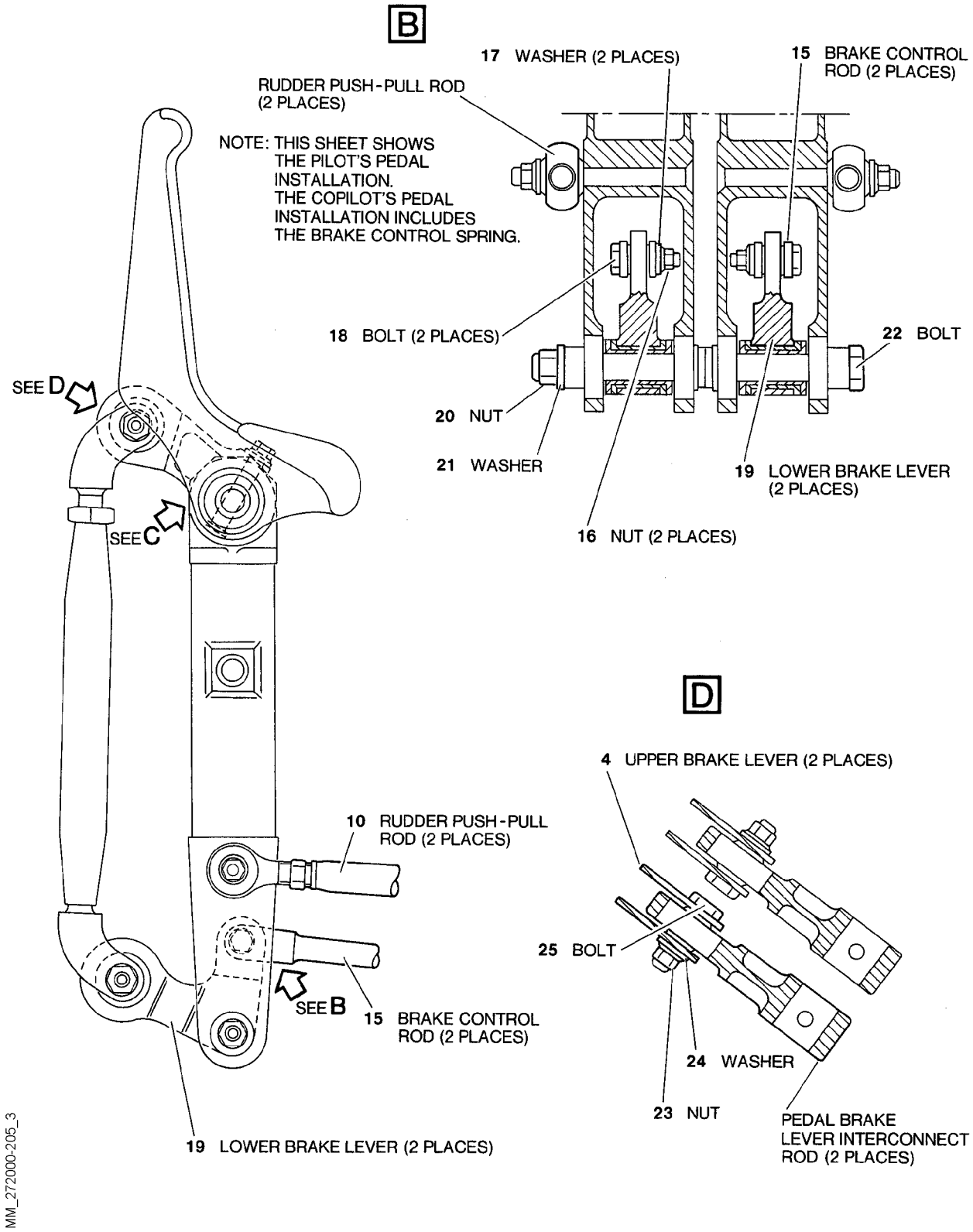

Fig. 205 - Rudder Pedal - Removal/Installation (Sheet 3 of 3)

11. Rudder Pedals - Installation (Ref. to Fig. 205)

A. Reference Information

Maintenance Manual Chapter 32-00-00

B. Procedure - Installation of Pedals Only

(1) Slide the pedal (14) into the lateral pin (1) and into the upper brake lever (4).
(2) Install the pin (5), washer (3) and nut (2) as shown in sheet 2 of Fig. 205.

C. Procedure - Installation of Complete Assembly

NOTE: This procedure applies to the right (copilot's) set of pedals. The procedure for the left (pilot's) set of pedals is the same except that the pilot's pedal assembly does not have brake control springs.

(1) Put the pedal assembly into position so that the two levers (6) are located in the pedal support structure; make sure that all the bushes are correctly located as shown in detail B of Fig. 205.
(2) Install the bolt (22), washer (21) and nut (20) to secure the levers (6) to the support structure.
(3) Install the bolt (18), washer (17) and nut (16) to secure the two brake control rods (15) to the two lower brake levers (19).
(4) Install the bolt (7), washer (8) and nut (9) to secure the two rudder push-pull rods (10) to the rudder pedal levers (6). Move the pedal levers as necessary to enable bolt installation.
(5) Install the bolt (14), two spring washers (13) and nut (12) to secure the brake control spring to the structure; make sure that the spacers are correctly located as shown in detail A of Fig. 205.
(6) If a rigging pin was installed during the removal procedure, remove it.
(7) Rig, inspect and check the rudder control system as detailed in page block 501.
(8) Check the brakes for proper operation (Refer to 32-00-00).
(9) Make sure that all tools etc have been removed from the work area then install access panel 212ARF (211ALF for the pilot's pedals).
(10) Install the protective covers between the rudder pedals.

12. Rudder Pedal Bellcrank - Removal (Ref. to Fig. 206)

A. Fixture, Test and Support Equipment

Rigging Pin	Not Specified

B. Reference Information

Maintenance Manual Chapter 25-10-00

C. Procedure

NOTE: This procedure applies to either of the bellcrank assemblies. Data specific to the right (copilot's) bellcrank is given between parentheses.

(1) Remove the pilot's (copilot's) seat (Refer to [1]).'
(2) Remove the covers from between the rudder pedals.
(3) Remove the access panels 211ALF and 211CLF (212ARF and 212CRF) to get access to the bellcrank.
(4) Install a rigging pin in the location (8) in the rudder front sector (10).
(5) Remove the nut (3), washer (2) and bolt (1) which secure each of the two rudder push-pull rods (15) to the bellcrank assembly (9); make sure that the bush remains in place.
(6) Remove the nut (13), washer (12) and bolt (11) which secure the front sector push-pull rod (14) to the bellcrank (9); make sure that the two bushes remain in place.
(7) Remove the cotter pin (16), nut (17) and washer (18) which secure the bellcrank assembly (9) to the bellcrank support (4).
(8) Remove the nuts (7) washers (6) and screws (5) which secure the bellcrank support (4) to the structure.
(9) Remove the bellcrank support (4), then remove the bellcrank assembly (9).

1.

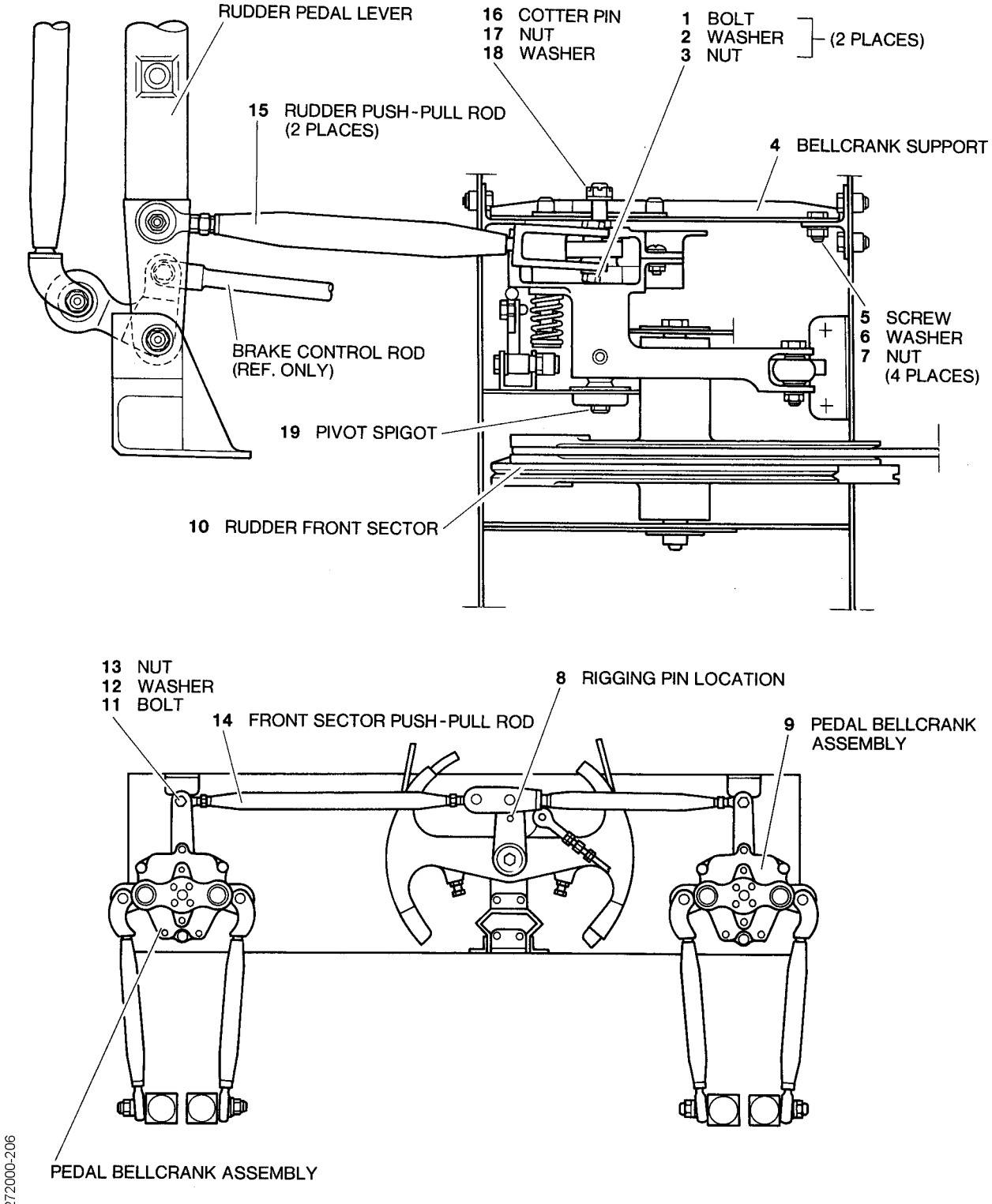

Fig. 206 - Rudder Pedal Bellcrank - Removal/Installation

13. Rudder Pedal Bellcrank - Installation (Ref. to Fig. 206)

A. Expendable Parts

Cotter Pin (Fig. 206, item 16)	MS 24665-171

B. Reference Information

Maintenance Manual Chapter 25-10-00

C. Procedure

NOTE: This procedure applies to either of the bellcrank assemblies. Data specific to the right (copilot's) bellcrank is given between parentheses.

(1) Put the bellcrank assembly (9) into position so that the pivot spigot (19) goes into its bearing location.
(2) Install the bellcrank support (4) so that the pivot upper extension threaded part protrudes from the upper bearing location.
(3) Secure the bellcrank support (4) to the structure with the screws (5), washers (6) and nuts (7).
(4) Install the washer (18) and the nut (17) to secure the bellcrank assembly to the support (4). Safety the nut with a new cotter pin (16).
(5) Install the bolt (11), washer (12) and nut (13) to secure the front sector push-pull rod (14) to the bellcrank assembly (9); make sure that the two bushes are in place.
(6) Install the bolt (1), washer (2) and nut (3) to secure each of the two rudder push-pull rods (15) to the bellcrank assembly (9); make sure that the bush is in place.
(7) Remove the rigging pin from its location (8) in the rudder front sector.
(8) Rig, inspect and check the rudder control system as detailed in page block 501.
(9) Install access panels 211ALF and 211CLF (212ARF and 212CRF).
(10) Make sure that all loose items, tools etc. have been removed from the area of the rudder pedals then install the protective covers between the pedals.
(11) Install the pilot's (copilot's) seat (Refer to 25-10-00).

14. Bellcrank Control Cable - Removal (Ref. to Fig. 207)

A. Reference Information

Maintenance Manual Chapter 25-10-00

B. Procedure

NOTE: This procedure applies to both bellcrank control cables. Data specific to the right (copilot's) cable is given between parentheses.

(1) Remove the pilot's (copilot's) seat (Refer to 25-10-00).
(2) Remove the upholstery on the left (right) side of the flight compartment below the switch panel (Refer to 25-10-00).
(3) Remove the access panel 211ALF and 211CLF (212ARF and 212CRF) to gain access to the bellcrank assembly (7).
(4) Loosen the screw of the cable retainer (10) just enough to allow the cable end to come out of the hole in the retainer.
(5) Remove the clamps (5) and (6) which secure the conduit to the structure.
(6) Unscrew the nut (3) fully, and remove the nut (3) and washer (4) from the cable.
(7) Pull the cable out from the hole in the switch panel.

15. Bellcrank Control Cable - Installation (Ref. to Fig. 207)

A. Reference Information

Maintenance Manual Chapter 25-10-00

B. Procedure

NOTE: This procedure applies to both bellcrank control cables. Data specific to the right (copilot's) cable is given between parentheses.

(1) Put the cable into position by feeding it through the hole in the switch panel.
(2) Install the washer (4) and nut (3) on the cable. Tighten the nut to secure the cable to the switch panel.
(3) Install the cable end through the conduit seat (7) and feed the cable end through the hole in the cable retainer (10).
(4) Push the knob (2) fully in (forward); make sure that the cable conduit is fully into its seat (7) then tighten the screw of the cable retainer (10).
(5) Secure the cable to the structure with the clamps (5) and (6).
(6) Pull the knob (2) and push the rudder pedals forward to check correct operation of the bellcrank control cable. Take all pressure off the rudder pedals and check that the pedals return to the fully rearward position.
(7) Push the knob (2) fully in and check the rudder pedals cannot be pushed forward.
(8) Check the rudder control system for full and free movement.
(9) Install access panels 211ALF and 211CLF (212ARF and 212CRF).

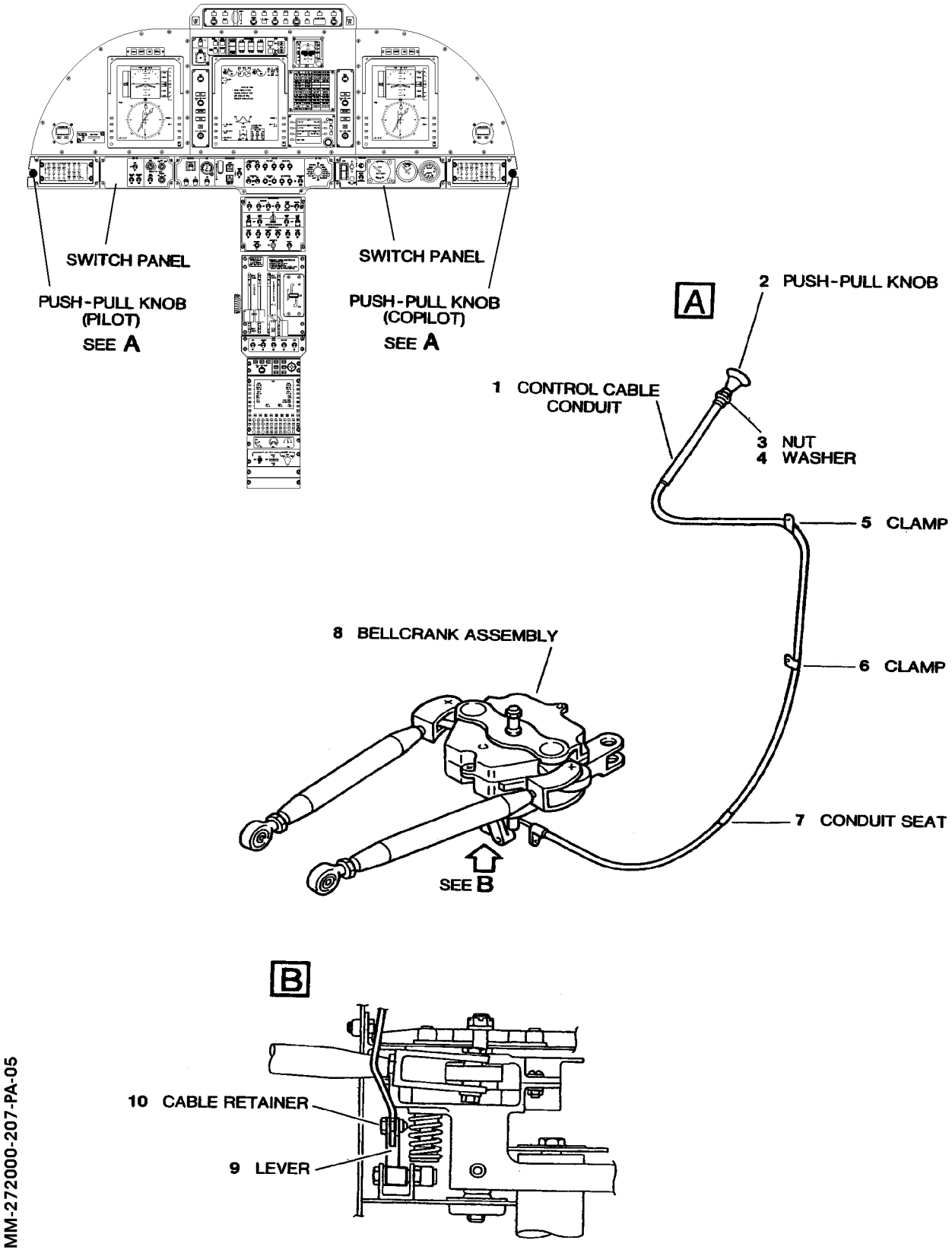

Fig. 207 - Bellcrank Control Cable Removal/Installation

(10) Make sure that all loose items, tools etc. have been removed from the area then install the upholstery on the left (right) side of the flight compartment (Refer to 25-10-00).

(11) Install the pilot's (copilot's) seat (Refer to 25-10-00).

16. Rudder Trim Position Indicator - Removal (Ref. to Fig. 208)

A. Procedure

(1) Unlock the two fasteners of the trim indicator panel located on the flight compartment control pedestal.

(2) Pull the trim indicator panel from the pedestal to get access to the electrical plug at the rear.

(3) Disconnect the electrical plug and remove the trim indicator panel.

17. Rudder Trim Position Indicator - Installation (Ref. to Fig. 208)

A. Procedure

(1) Connect the electrical plug at the rear.

(2) Position the trim indicator panel in the pedestal and lock it in position with the fasteners.

(3) Do the indicator operational test (Refer to page block 501).

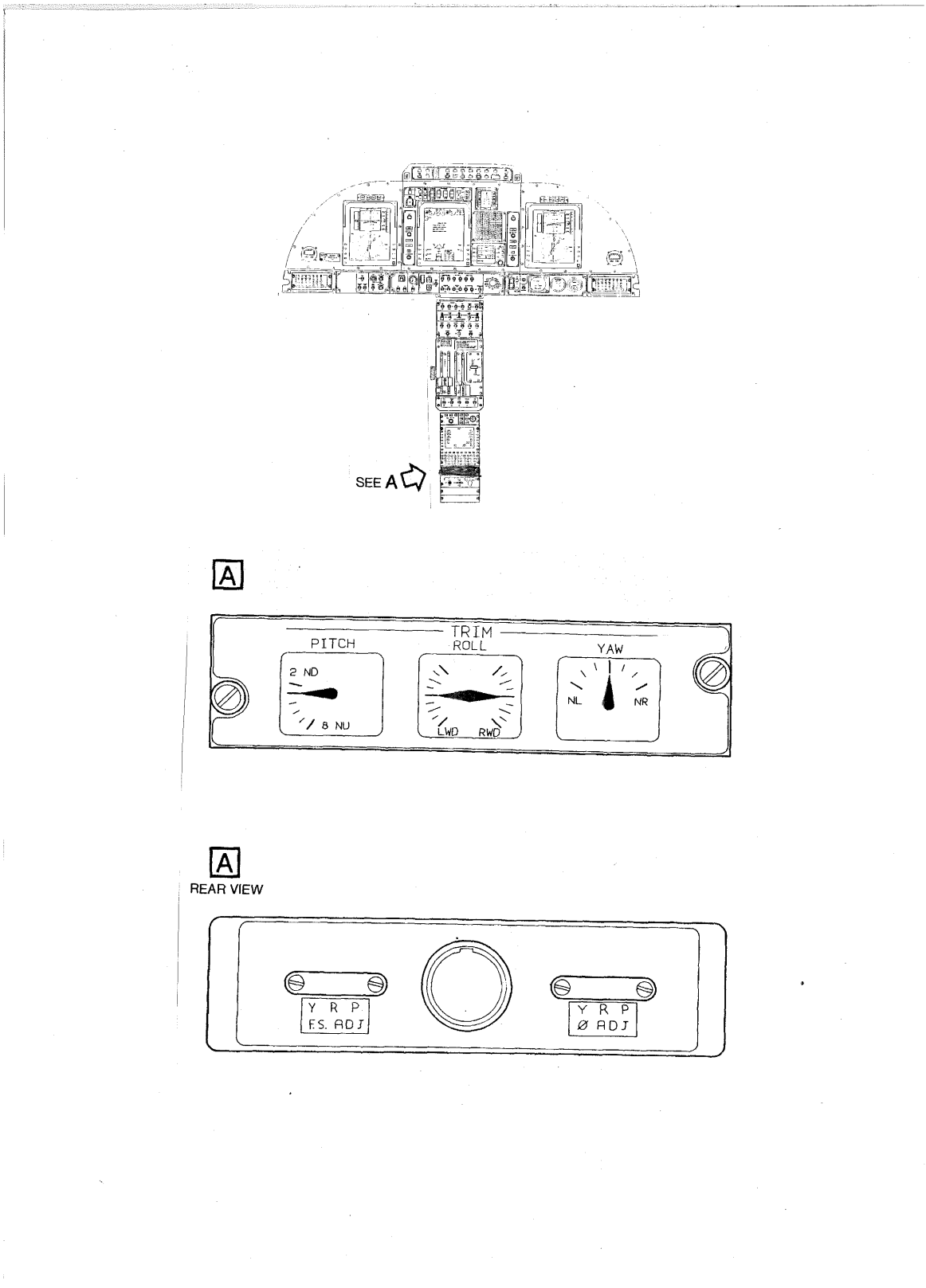

Fig. 208 - Trim Position Indicator - Removal/Installation

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RUDDER AND TAB - ADJUSTMENT/TEST

1. General

A. The following procedures cover rigging of the rudder and rudder trim tab systems, and testing the systems for proper operation. Each rigging and test procedure is complete including instructions for the removal/installation of access panels/doors etc. and the installation/removal of rigging pins etc. If more than one procedure is to be done at any one time, take note of the procedural requirements and minimize the number of times panels, pins etc. are removed/installed.

2. Adjustment (Rigging)

Fixtures, Test and Support Equipment

Rudder Travel Board (Qty 1)	80-909166-401
Rudder Trim Tab Travel Board (Qty 1)	80-909167-403
Rigging Pin (Qty 6)	Not Specified
Tensiometer	T5-2002-104-00 (Pacific Scientific) or equivalent
Inclinometer	Not Specified
Warning Notice	Not Specified
Spring Balance (0-150 lb)	Not Specified
Dinamometer	Not Specified

A. Referenced Information

Maintenance Manual Chapter 25-20-00
Maintenance Manual Chapter 52-82-00
Maintenance Manual Chapter 22-00-00
Maintenance Manual Chapter 27-00-00 (Fig. 201)

B. Procedure - Rudder Control System Rigging (Ref. to Fig. 501)

(1) Put a warning notice in the flight compartment to tell other persons not to move the flight controls.

(2) Remove the carpet from the center aisle of the passenger compartment (Refer to 25-20-00).

(3) Remove center floor panels 212BRF, 211CLF, 211GLF, 231ALF, 231FLF, 231MLF, 231QLF, 231RLF and the panels on each side of the control pedestal.

(4) In the baggage compartment, remove floor panel 281BZ, and at the tailcone, remove inspection panels 320AL and 320AR.

(5) Open the left main landing gear rear doors (Ref. to 52-82-00).

(6) Disconnect the autopilot servo cables from the rudder control front sector (Refer to 22-00-00).

(7) Install rigging pins (5) and (6) in the rudder front sector (1) and the rudder rear sector (11).

(8) Install rigging pins (3) in the two rudder pedals bellcranks (8). Adjust the front sector push-pull rods (4) as required so that the pins go in easily.

(9) Position the rudder pedal bellcranks to the mid-adjustment position so as to make three forward and three rearward adjustments possible.

(10) Install rigging pins (7) into the rudder pedal levers (6) adjust the rudder pedal push-pull rods (2) as required to install the pins easily and so that the pedal levers (6) are at 90° to the seat tracks.

(11) Adjust the turnbuckles (14) and (15) to obtain the correct cable tension. (Refer to 27-00-00, Fig. 201, for cable tension temperature load correction).

(12) Install the rudder travel board (17) between the under side of the rudder and the tailcone.

(13) Remove the rigging pins from the front and rear sectors (1) and (11), from the rudder pedal levers (6) and from the rudder pedal bellcranks (8).

NOTE: When cable turnbuckles are loosened or tightened to adjust cable tension, recheck rudder pedals levers and rudder for neutral position after rigging pins have been removed. If necessary, repeat the procedure until the system is at neutral position and a correct cable tension is obtained.

(14) Connect and rig the autopilot yaw servo cable to the front sector (1). (Refer to 22-00-00).

(15) Recheck the tension on rudder control system cables.

(16) Safety the turnbuckles.

(17) Screw in completely the forward sector stop bolts (9).

(18) Apply full load to the pilot RH rudder pedal to turn to right the rudder and maintain it on this position. Check with a dynamometer that the load is approximately 100 lbs on the pilot LH pedal.

(a) Verify that when the load is applied to the RH rudder pedal, the rubber damper stop is compressed.

(b) Temporarily remove the force and adjust the LH rudder damper stop to obtain the required value of 23 Deg with a tolerance of +0 Deg -0.5 Deg.

(c) Apply again the force of 100 lbs and verify that the rubber damper stop, when compressed, allows the rudder to stay within the tolerance limits.

(d) Tighten the LH rudder damper stop nut.

(19) Apply full load to the pilot LH rudder pedal to turn to left the rudder and maintain it on this position. Check with a dynamometer that the load is approximately 100 lbs on the pilot RH pedal.

(a) Verify that when the load is applied to the RH rudder pedal, the rudder damper stop is compressed.

(b) Temporarily remove the force and adjust the RH rudder damper stop to obtain the required value of 23 Deg with a tolerance of +0 Deg -0.5 Deg.

(c) Apply again the force of 100 lbs and verify that the rubber damper stop, when compressed, allows the rudder to stay within the tolerance limits.

(d) Tighten the RH rudder damper stop nut.

(20) Operate the rudder several times by moving the rudder pedals and checking for freedom of movement.

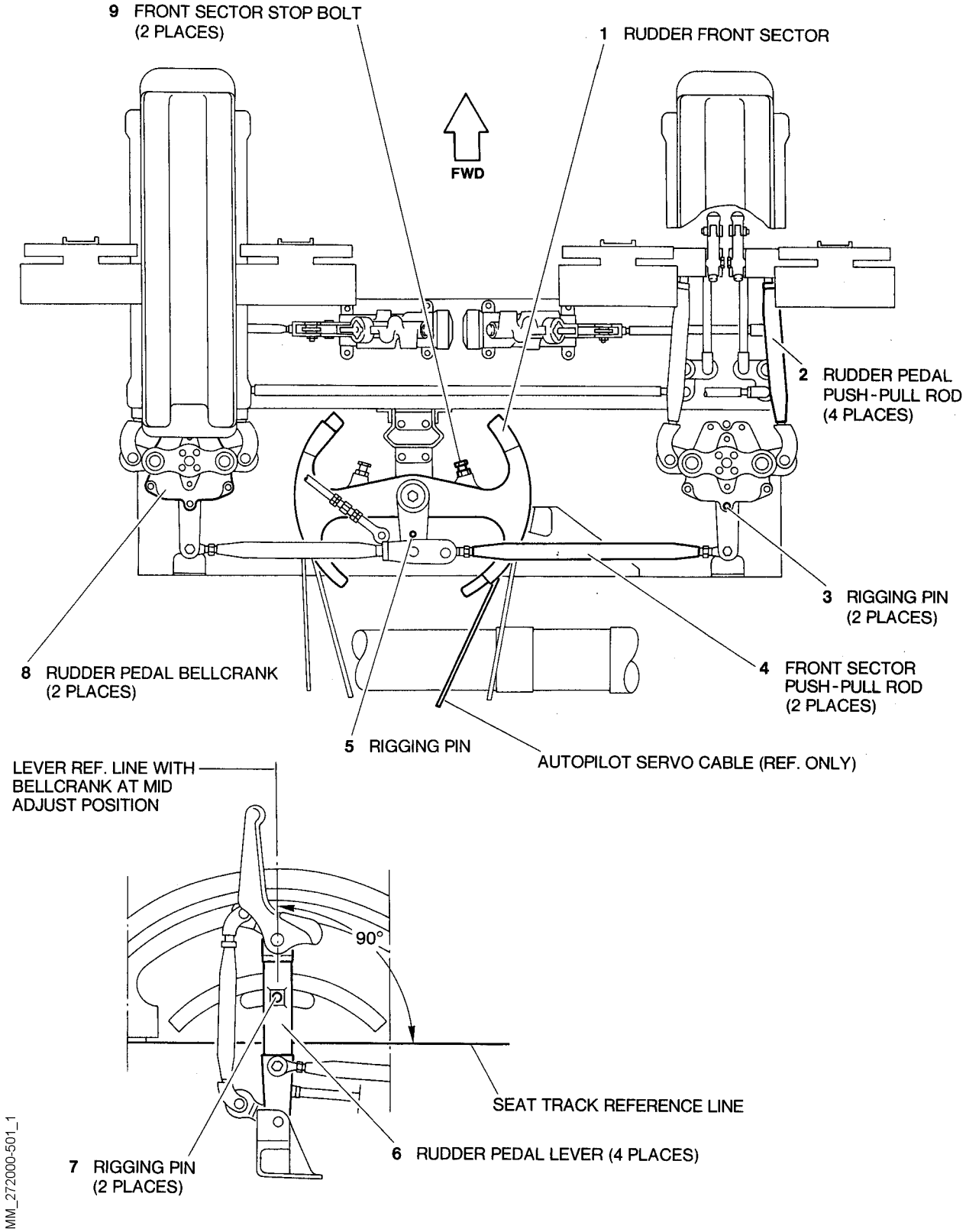

Fig. 501 - Rudder Control System - Rigging (Sheet 1 of 3)

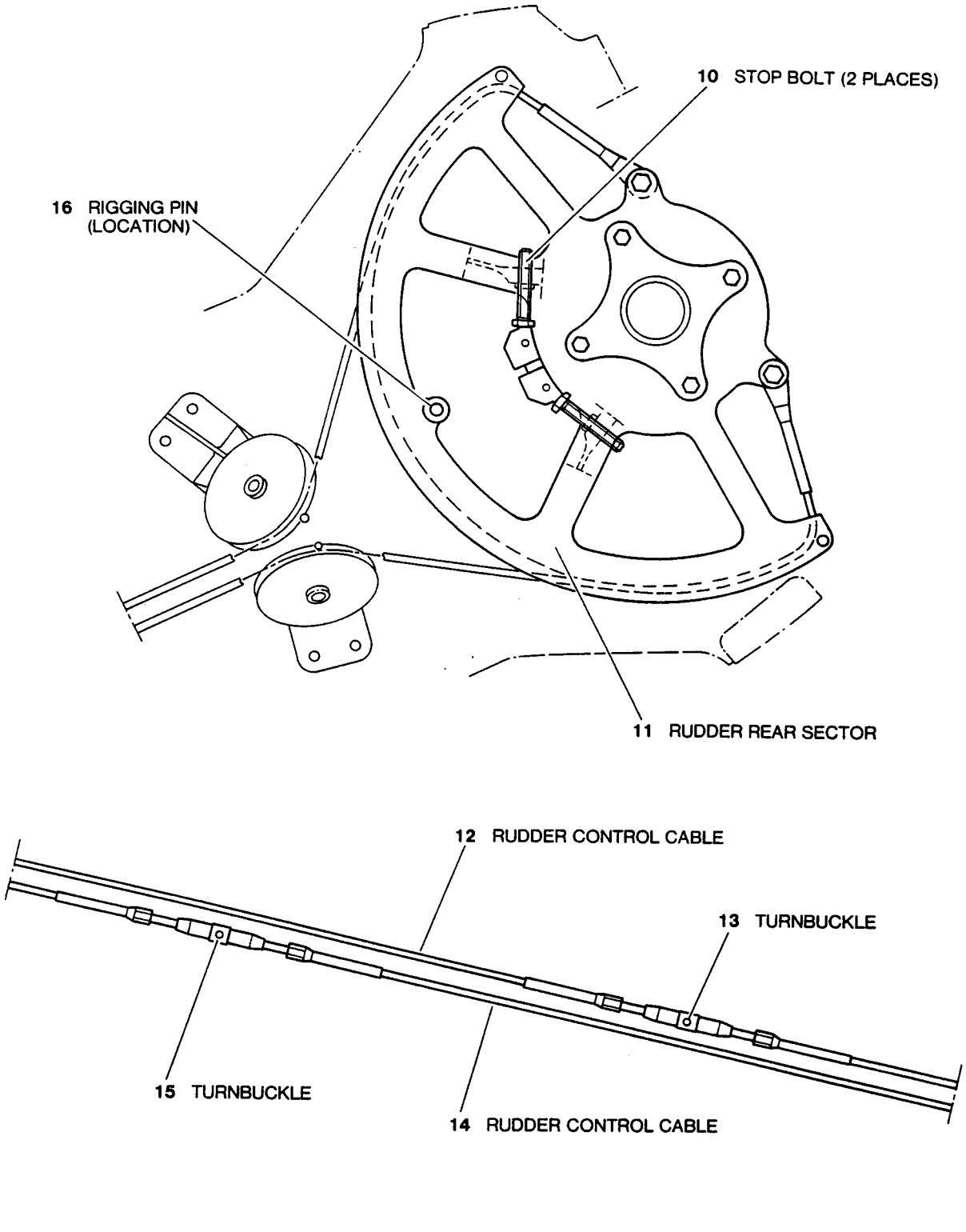

Fig. 501 - Rudder Control System - Rigging (Sheet 2 of 3)

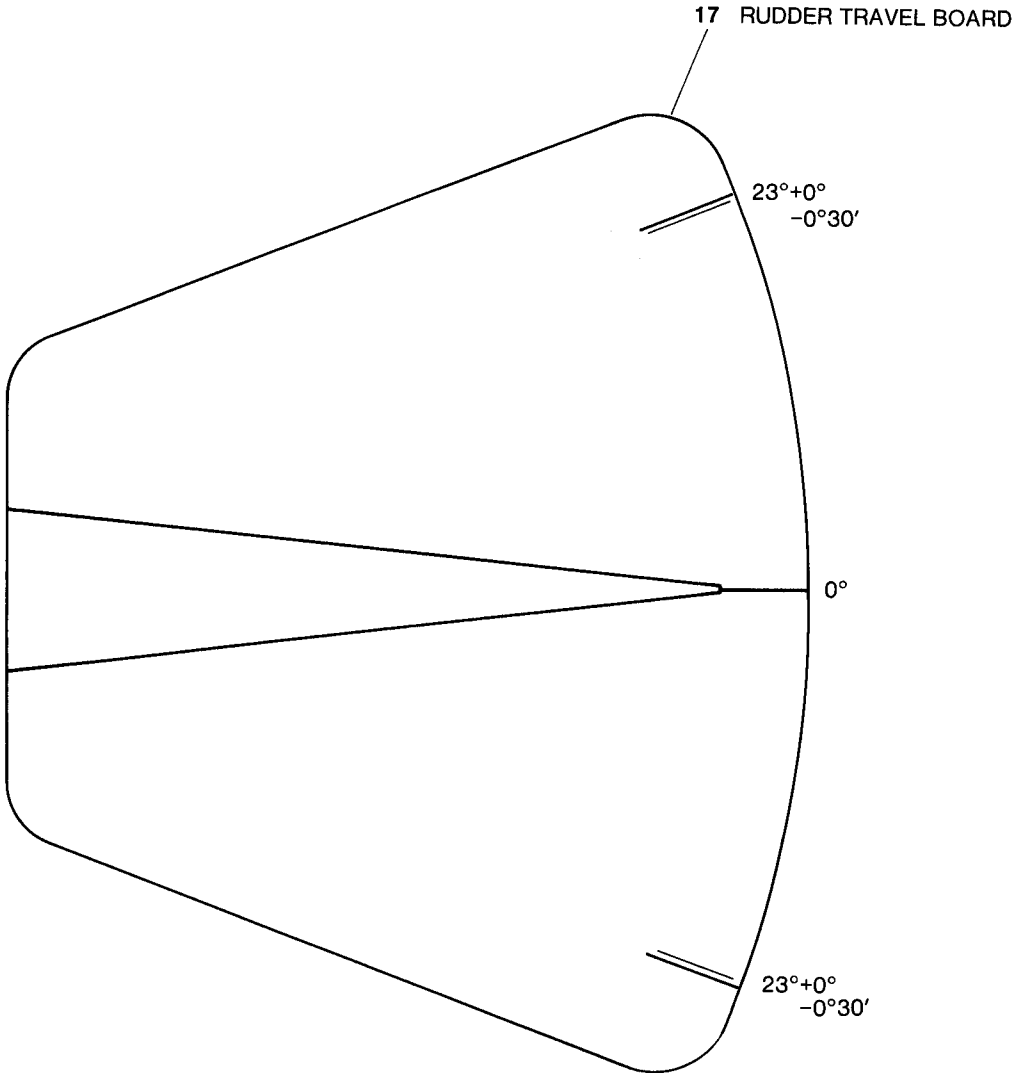

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Fig. 501 - Rudder Control System - Rigging (Sheet 3 of 3)

(21) Do the rudder control system friction test as described in this page block.
(22) Remove the rudder travel board (17).
(23) Close the left main landing gear rear door. (Refer to 52-82-00).
(24) In the baggage compartment, install floor panel 281BZ, and at the tailcone, install inspection panels 320AL and 320AR.
(25) Install center floor panels 212BRF, 211CLF, 231GLF, 231ALF, 231FLF, 231MLF, 231QLF, 231RLF and the panel on each side of the control pedestal.
(26) Install the carpet in the center aisle of the passenger compartment. (Refer to 25-20-00).
(27) Remove the warning notice from the flight compartment.

C. Procedure - Rudder Trim Tab Rigging (Ref. to Fig. 502)

(1) Put a warning notice in the flight compartment to tell other persons not to move the flight controls.
(2) Remove rudder hinge access cover 330BR.

NOTE: 330BR is the lower of the two access covers in the area of the rudder center hinge.

(3) Set and lock the rudder at neutral position by installing a rigging pin in the rudder rear sector. Access to the rear sector is gained through removal of panels located on each side of the tailcone (320AR, 320AL).
(4) Install the rudder trim travel board between the lower part of trim tab and the rudder.
(5) Check the position of the trim tab (3) against the travel board (5). If the tab is at 2° (neutral position) and the rigging pin is easily inserted in the rocker arm (1) the system is rigged. If the rigging pin cannot be installed easily:
   (a) Set the rudder trim tab actuator (6) to the electrical mid-travel.
   (b) Disconnect both trim actuating connecting rods (5) from the rudder trim tab actuator (6).
   (c) Install the rigging pin into the rocker arms (1).
   (d) Adjust the actuator rod end (7) so that it is possible to connect it to the trim actuator connecting rod (5).
   (e) Adjust the actuating rod (2), at the trim tab horn (4) end to return the tab to the neutral position (2õ on the travel board). Lock and safety the rod ends.

CAUTION: MAKE SURE BEFORE OPERATING THE RUDDER TRIM SWITCH THAT THE RIGGING PIN IS NOT IN THE ROCKER ARMS. OPERATION OF THE TRIM SYSTEM WHILE THE RIGGING PIN IS INSTALLED WILL CAUSE SEVERE DAMAGE TO THE SYSTEM COMPONENTS.

(6) With the tab set at neutral (2õ on the travel board), install a rigging pin into the rocker arms (1). If the rigging pin cannot be installed easily:
   (a) Operate the rudder trim switch as required to align the rigging pin holes so that the rigging pin can be installed easily.
   (b) Adjust the two actuating rods (2), at the trim tab horn (4) end, to return the tab to the neutral position (2° on the travel board). Lock and safety the rod ends.

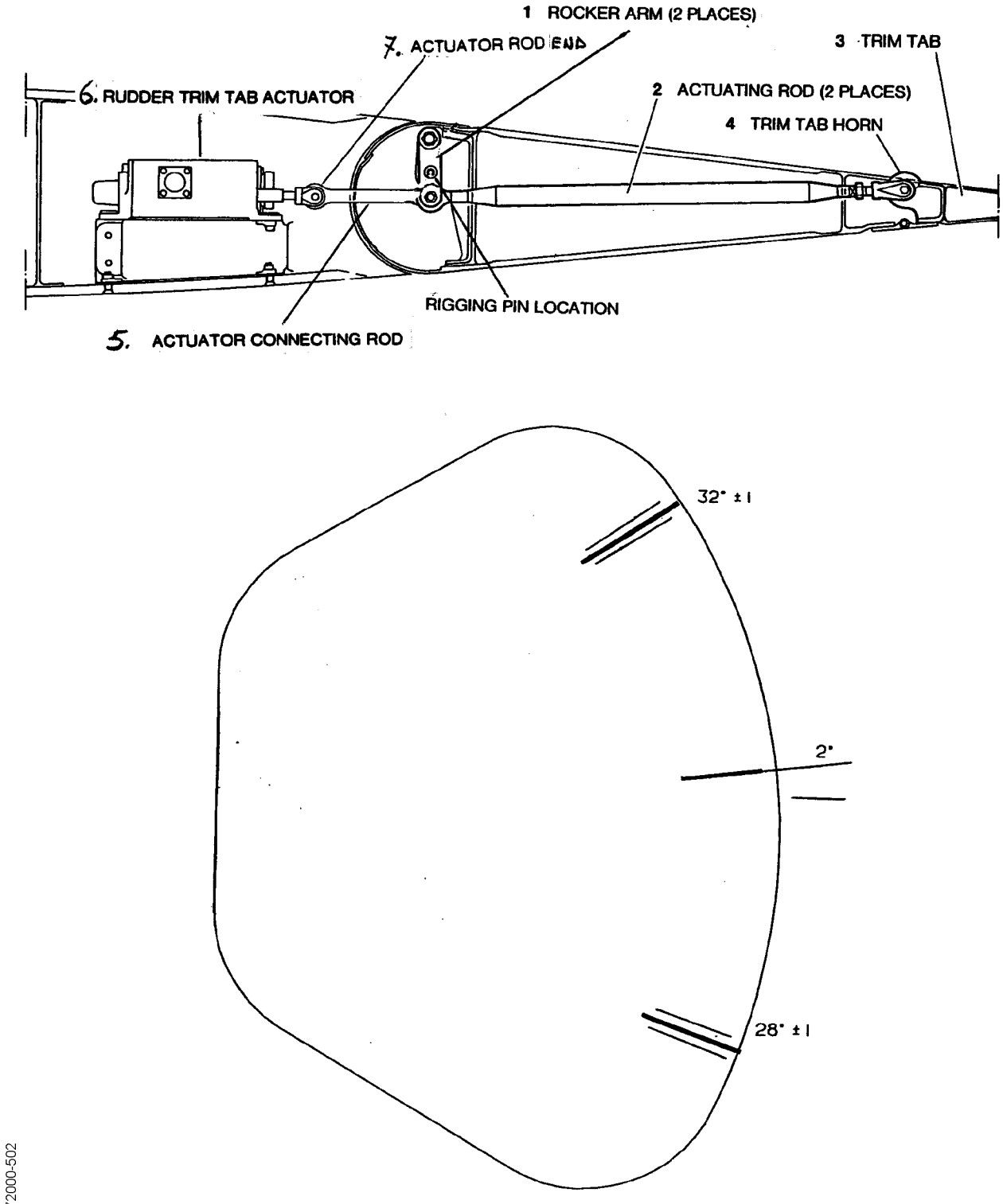

Fig. 502 - Rudder Trim Tab System - Rigging

(7) Remove the rigging pin from the rocker arms (1).
(8) With the rudder set to neutral, operate the rudder trim switch as required to check that the trim tab moves 30° (±1°) right and 30° (±1) left.

NOTE: If the above check is not satisfactory (tab travel outside limits), the fault is likely to be the actuator limit switches. Replace the actuator and repeat the checks.

(9) Cycle trim tab several times checking for proper operation and correlation between the rudder trim tab and the rudder trim indicator on the control pedestal.
(10) Install access cover 330BR on the rudder leading edge.
(11) Remove the rigging pin from the rudder rear sector.
(12) Install the panel on each side of the tailcone (320AR, 320AL).
(13) Remove the trim travel board.
(14) Remove the warning notice from the flight compartment.

3. Test

A. Fixtures, Test and Support Equipment

Rudder Travel Board (Qty 1)	80-909166-401
Rudder Trim Tab Travel Board (Qty 1)	80-909167-401
Warning Notice	Not Specified
Spring Balance (0-10 lb)	Not specified

B. Reference Information

Maintenance Manual

C. Procedure - Rudder Control Operational Test

(1) Do the test:

	Action	Result
(a)	Apply force to pilot's outboard rudder pedal.	The rudder trailing edge will move to the left. Observe response and freedom of movement of the rudder pedals.
(b)	Apply force to pilot's inboard rudder pedal.	The rudder trailing edge will move to the right. Observe response and freedom of movement of the rudder pedals.

Action	Result
(c) Apply force to copilot's outboard rudder pedal.	The rudder trailing edge will move to the right. Observe response and freedom of movement of the rudder pedals.
(d) Apply force to copilot's inboard rudder pedal.	The rudder trailing edge will move to the left. Observe response and freedom of movement of the rudder pedals.

D. Procedure - Rudder Trim Tab Functional Test

(1) Make sure that electrical power is available (Refer to 24-00-00).

(2) Do the test:

Action	Result
(a) Operate and hold the trim switch to the NOSE RIGHT position.	The rudder trim tab moves left in a smooth, responsive movement.
(b) Operate and hold the trim switch to the NOSE LEFT position.	The rudder trim tab moves right in a smooth, responsive movement.
(c) With no other electrical loads on the airplane (all switches OFF), do a trim tab full stroke travel vs time test in both directions.	The time taken for the trim tab to move one full stroke (fully left to fully right/fully right to fully left) should be between 24 and 30 seconds.

(3) If the time taken for the trim tab to move one full stroke is less than 24 or more than 30 seconds, replace the actuator.

(4) Remove the electrical power (Refer to 24-00-00).

E. Procedure - Yaw Trim Indicator Operational Test

(1) Put a Warning Notice in the flight compartment to tell other persons not to move the flight controls.

(2) Install the rudder trim tab travel board at rudder.

(3) Make sure that electrical power is available. Refer to 24-00-00.

(4) Do the test:

Action	Result
(a) With the rudder at the neutral position, operate the trim switch as necessary to set the rudder trim tab to the neutral position.	The yaw indicator pointer is at the vertical position.

	Action	Result
(b)	Operate and hold the trim switch to the NOSE LEFT position.	The trim tab moves to right and the yaw indicator pointer moves towards left NL (Nose Left).
(c)	Operate and hold the trim switch to the NOSE RIGHT position.	The trim tab moves to left and the yaw indicator pointer moves towards right NR (Nose Right).
(d)	Operate the trim switch to the left until the trim tab is at the neutral position.	The yaw indicator pointer should be vertical.

(5) Remove the electrical power (Refer to 24-00-00).
(6) Remove the rudder trim tab travel board.
(7) Remove the warning notice from the flight compartment.

F. Procedure - Rudder Control System Friction Test

(1) Do the test:

	Action	Result
(a)	With the rudder at the neutral position, place a spring balance at the center of the pilot's left rudder pedal.	–
(b)	Slowly apply a force to push on the spring balance and check the scale readings when the rudder pedal begins to move.	The force required to move the pedals should be not more than 13 lb (6 kg).
(c)	Move the rudder pedal to neutral and place the spring balance at the center of the pilot's right rudder pedal.	–
(d)	Repeat step (b).	As above.

(2) If the force required to begin movement of the rudder pedals is more than 10 lb, check the control system pulleys, sectors, rods and bellcranks for freedom of movement; visually inspect the system for binding.
(3) Rectify any faults found and repeat the system friction test until satisfactory.

4. Rudder Trim Tab Actuator (*Ratier Figeac P/N FE182-000*) - Electrical Insulation

A. Fixtures, Test and Support Equipment

Milliohmeter	Not Specified
Megahometer	Not Specified

B. Procedure

NOTE: The actuator being electrically disconnected from the aircraft check for:

- Insulation resistance, between isolated pins and earth; higher than 20 megahoms under a 48 VDC test voltage.
- Bonding; Resistance between grounded pin, casings and aircraft earth shall not exceed 20 milliohms.

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ELEVATOR - DESCRIPTION AND OPERATION

1. General (Ref. Fig. 1)

   A. The elevator consists of two symmetrical surfaces which provide longitudinal control of the aircraft. Each elevator surface is connected to the horizontal stabilizer at three points. The mechanical control system consists of control columns, bellcranks, sectors, cables, and push-pull rods. A bellcrank is mounted on the control column base and, through a push-pull rod, it provides rotary motion to the elevator front sector. The elevator front sector is connected to the elevator rear sector by a series of cables and pulleys.

   B. The elevator is aerodynamically balanced. The mass balance is installed in the horn at the outboard tip.

   C. Elevator control motion is transferred from the interconnected control columns, through the bellcrank and push-pull rod, to the front sector. Front sector motion is transmitted by a closed loop cable assembly to a rear sector assembly in the vertical stabilizer fairing.

   D. The control column movement is 3.7 inches (94 mm) pull and 3.3 inches (84 mm) push measured at a point 26.5 inches (673.1 mm) from the turning point at the base. From the rear sector assembly, motion is transferred through two push-pull rods to the elevator bellcranks. Rear sector motion is also transmitted to the bellcrank and spring assembly which is interconnected with the horizontal stabilizer. The elevator spring augments the pilot stick force gradient in the high speed range of the airplane. The elevator spring interconnects the horizontal stabilizer and elevator in such a manner that the movement of the stabilizer creates tension on the elevator spring which causes a proportional movement of the elevator in the opposite direction. The autopilot servo is connected to the elevator rear sector by servo cables. Elevator travel is 14° ±0.50° trailing edge up and 12° ±0.25° trailing edge down.

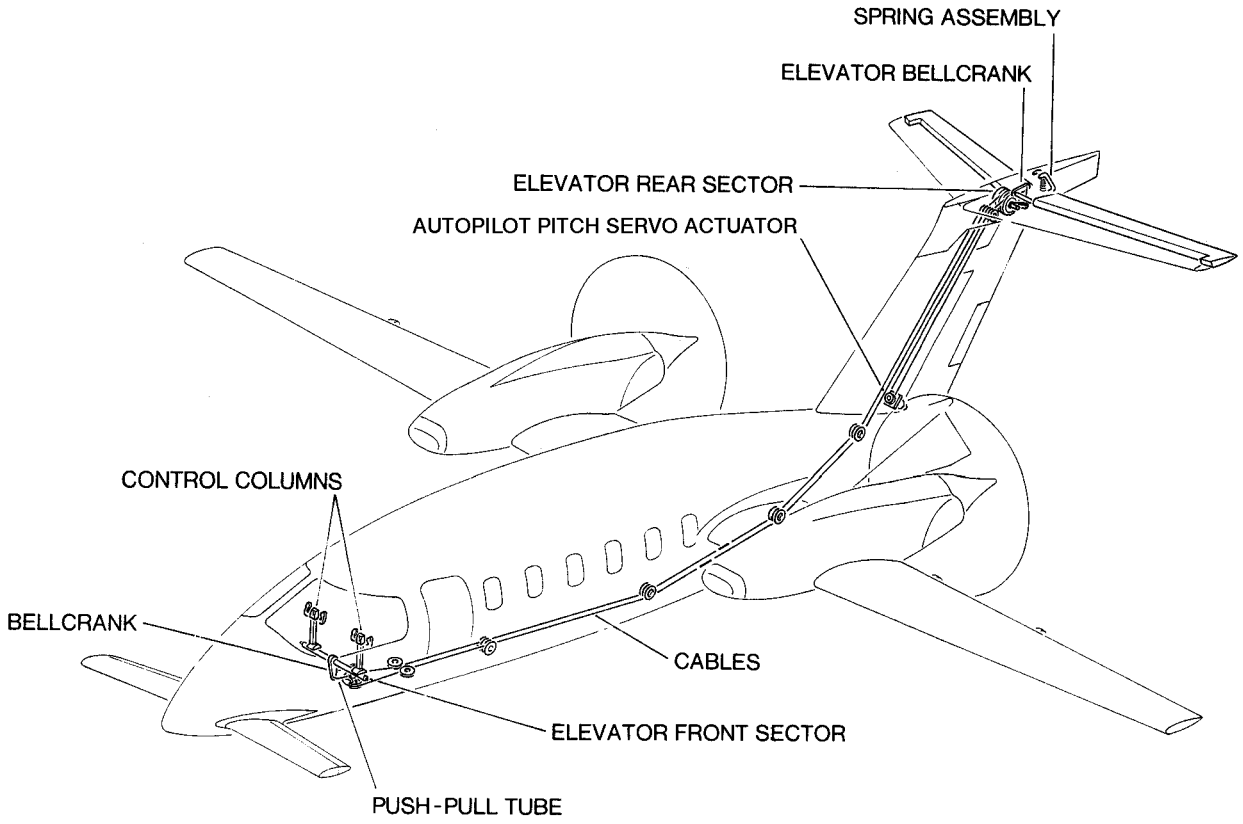

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Fig. 1 - Elevator Control System Installation

ELEVATOR - MAINTENANCE PRACTICES

1. General

A. This page block contains the following maintenance practices:

- removal/installation of the elevator
- removal/installation of the elevator spring assembly
- removal/installation of the elevator control cables
- removal/installation of the control columns

2. Elevator - Removal (Ref. to Fig. 201)

A. Fixtures, Test and Support Equipment

Warning Notice — Not Specified

B. Procedure

NOTE: This procedure applies to either of the elevator surfaces. Data specific to the right surface is given between parentheses.

(1) Put a warning notice in the flight compartment to tell persons not to move the control columns.
(2) Remove the fillet from the left (right) side of the vertical stabilizer, at the elevator/horizontal stabilizer root.
(3) Remove the center and rear fairings from the top of the vertical stabilizer.
(4) Remove the three hinge access covers at the leading edge of the elevator (1).
(5) Remove the nut (7), washer (6) and bolt (5) which secure the elevator bellcrank (9) to the elevator/rear sector push-pull rod (8). Make sure that the bushes remain in the bellcrank.
(6) Remove the nuts which secure the two bonding jumpers to the elevator near to the center and outboard hinges; disconnect the bonding jumpers from the elevator.
(7) Remove the nut (2) and washer (3) which secure the rotation pin (10) in the bearing (4).

CAUTION: MAKE SURE THAT THE ELEVATOR IS ADEQUATELY SUPPORTED WHEN THE HINGE BOLTS ARE REMOVED. ALTHOUGH THE ELEVATOR WEIGHS ONLY 16.5 LB (7.5 KG), THE INBOARD HINGE CAN BE DAMAGED IF THE ELEVATOR IS NOT SUPPORTED.

(8) Support the elevator, then remove the nuts (18), washers (15, 16) and bolts (14) and bushings (17) at the center and outboard hinge locations.
(9) Carefully and slowly maneuver the outboard end of the elevator to clear the outboard and center hinges then slide the elevator (rotation pin) out of the bearing (4).
(10) Place the elevator on a smooth surface to avoid damage.

3. Elevator - Installation (Ref. to Fig. 201)

A. Procedure

CAUTION: MAKE SURE THAT THE ELEVATOR IS ADEQUATELY SUPPORTED UNTIL THE HINGE BOLTS ARE INSTALLED. ALTHOUGH THE ELEVATOR WEIGHS ONLY 16.5 LB (7.5 KG), THE INBOARD HINGE CAN BE DAMAGED IF THE ELEVATOR IS NOT SUPPORTED.

CAUTION: USE NEW SELF-LOCKING NUTS EACH TIME THE ELEVATOR ISINSTALLED

NOTE: Make sure that the static dischargers are on the upper surface of the elevator.

(1) Put the elevator (1) into position by sliding the rotation pin (10) into the bearing (4) and maneuvering the elevator so that the center and outboard hinges are aligned.
(2) Make sure that the bushings (17) are in place at the hinges then install the bolt (14), washers (15, 16) and nuts (18) at the outboard and center hinge locations. Tighten the nuts.
(3) Install the washer (3) and the nut (2) to secure the rotation pin (10) in the bearing (4).
(4) Connect the bonding jumpers at the center and outboard hinge locations.

NOTE: Make sure that the bolt head is toward the inboard of the airplane to avoid interference with the elevator rear sector.

(5) Make sure that the bushes are in place in the elevator bellcrank (9), then connect the bellcrank to the elevator/rear sector push-pull rod (8) with bolt (5), washer (6) and nut (7).
(6) Check the clearance at both ends of the elevator; there must be a clearance of at least 5mm (0.2 inch.).
(7) Do an elevator operational check as detailed in page block 501.
(8) Install the three hinge access covers at the leading edge of the elevator (1).
(9) Install the center and rear fairings at the top of the vertical stabilizer.
(10) Install the fillet at the left (right) side of the vertical stabilizer, at the elevator/ horizontal stabilizer root.
(11) Remove the warning notice from the flight compartment.

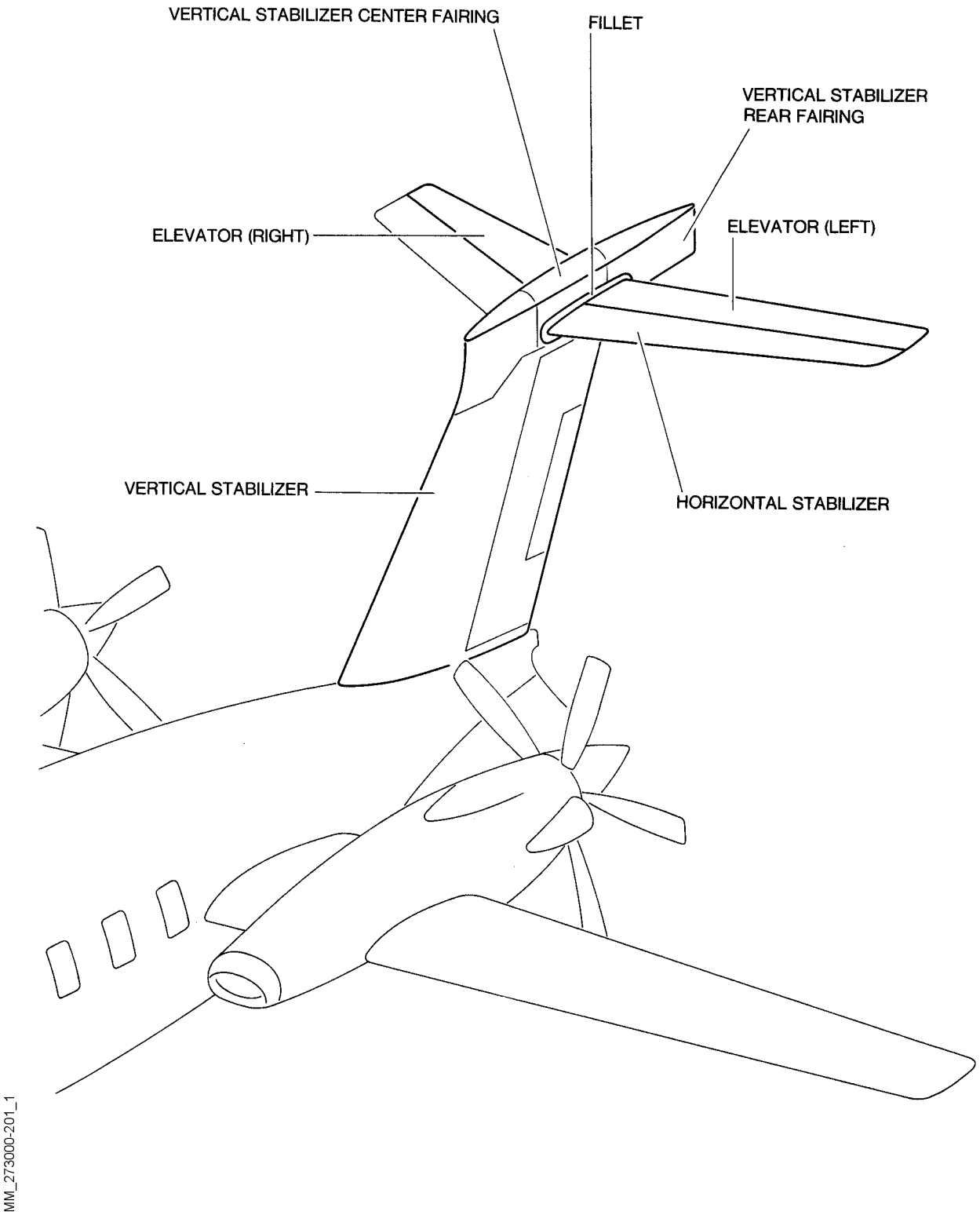

Fig. 201 - Elevator - Removal/Installation (Sheet 1 of 2)

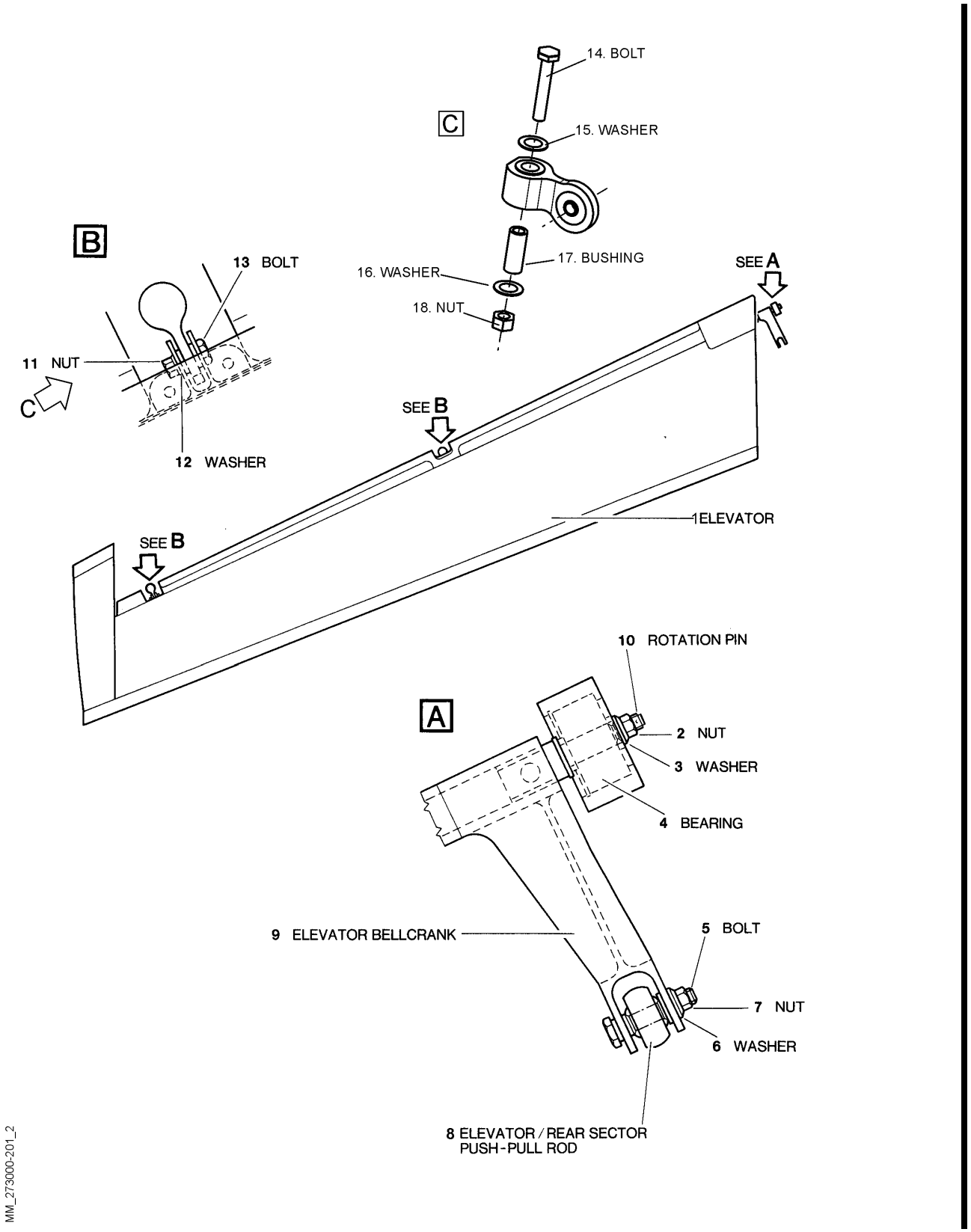

Fig. 201 - Elevator - Removal/Installation (Sheet 2 of 2)

4. Elevator Spring Assembly - Removal (Ref. to Fig. 202)

A. Fixture, Test and Support Equipment

Warning Notice	Not Specified
Wooden Board (or similar)	Not Specified
LH Elevator Travel Board	80-909165-801
RH Elevator Travel Board	80-909165-802
Inclinometer	Not Specified

B. Procedure

WARNING: BE VERY CAREFUL WHEN YOU DO ANY WORK AT THE SPRING ASSEMBLY. THE SPRING TENSION OR COMPRESSION IS APPROXIMATELY 290 POUNDS (131.5 KG), AND CAN CAUSE INJURY AND DAMAGE IF THE INSTRUCTIONS FOR REMOVAL ARE NOT FOLLOWED EXACTLY.

(1) Put a warning notice in the flight compartment to tell other persons not to move the control systems or operate the pitch trim system.

(2) Remove the fillet from both sides of the horizontal stabilizer at the horizontal stabilizer/elevator root.

(3) Remove the rear fairing of the vertical stabilizer.

CAUTION: MAKE SURE THAT THE WOODEN BOARD (OR SIMILAR), AND THE MEANS OF ATTACHMENT, WILL NOT DAMAGE BELLCRANK "B" IN ANY WAY, USE SOFT PADDING AS REQUIRED TO PROTECT THE BELLCRANK SURFACES OR EDGES.

(4) Attach a suitably-sized wooden board (or similar) to bellcrank "B". Refer to Fig. 202 for an example of the location and method of attachment.

(5) Install the LH and RH elevator travel boards.

(6) Reduce the tension/compression forces of the spring assembly as follows:

(a) Operate the pitch trim switch as required to set the horizontal stabilizer to 0°.

NOTE: It is acceptable to position the horizontal stabilizer using the cockpit indicator, provided the proper calibration of the indicator is checked by placing the stabilizer at FULL NOSE UP / FULL NOSE DN and reading the indication on the cockpit.

(b) Place the inclinometer on either of the elevator travel boards and set the inclinometer to 0°.

(c) Operate the pitch trim switch as required to set the horizontal stabilizer to -4°30' (as measured by the inclinometer).

NOTE: When the horizontal stabilizer is at -4°30' of the two (upper and lower) spring connection points should be in line with the center of the bellcrank "C"/bellcrank "B" connection point. This is the position at

which spring forces are lowest.

(7) Hold the bellcrank "B" in its position; use the wooden board as required to counteract any remaining spring force.
(8) Remove the nut (6), washer (5) and bolt (4) which secure the two bellcranks "A" to bellcrank "B".
(9) Slowly release the counteracting force of the wooden board and allow the spring force to release completely.
(10) Remove the nut (12), washer (11) and bolt (10) which secure the lower end of the two bellcranks "A" to their supports. Remove the two bellcranks.
(11) Remove the nut (18), washer (17) and bolt (16) which secure the rear sector push-pull rod to the spring drive link.
(12) Remove the nut (3), washer (2) and bolt (1) which secure the spring assembly to the bellcrank "B".
(13) Remove the nut (9), washer (8) and bolt (7) which secure each side of the spring drive link to the two bellcranks "C". Remove the spring/drive link assembly.
(14) If it is required to separate the spring assembly from the drive link, remove nut (15), washer (14) and bolt (13).
(15) If it is required to remove bellcrank "B", remove the nut (21), washer (20) and bolt (19) which secure bellcrank "B" to the two bellcranks "C".

5. Elevator Spring Assembly - Installation (Ref. to Fig. 202)

NOTE: It is assumed that the elevator travel boards, the inclinometer and the wooden board used during the removal procedure are still in place/ available. The horizontal stabilizer should be at -4°30'.

A. Procedure

(1) Make sure that the warning notice telling other persons not to move the controls or operate the pitch trim system is still in place in the flight compartment.
(2) Connect the lower end of bellcrank "B" to the lower rear end of the two bellcranks "C" with the bolt (19), washer (20) and nut (21) at each of the two places.
(3) Connect the lower end of the spring assembly to the spring drive link with the bolt (13), washer (14) and nut (15).
(4) Put the spring/drive link assembly into position.
(5) Connect the upper ends of the drive link to the rear upper ends of the two bellcranks "C" with the bolt (7), washer (8) and nut (9) at each of the two places.
(6) Connect the upper end of the spring assembly to the upper end of bellcrank "B" with the bolt (1), washer (2) and nut (3).
(7) Connect the rear sector push-pull rod to the lower end of the spring drive link with the bolt (16), washer (17) and nut (18).
(8) Install the two bellcranks "A" and connect the lower ends to the two supports with the bolt (10), washer (11) and nut (12) at each of the two places.
(9) Apply force (as required) to the wooden board attached to bellcrank "B" so that the upper connection holes of bellcrank "B" and the two bellcranks "A" are aligned.

(10) Connect the upper ends of the two bellcranks "A" to the upper end of bellcrank "B" with the bolt (4), washer (5) and nut (6) at each of the two places.

(11) Remove the wooden board from bellcrank "B".

(12) Check the elevator spring assembly for correct operation and rigging as given in page block 501.

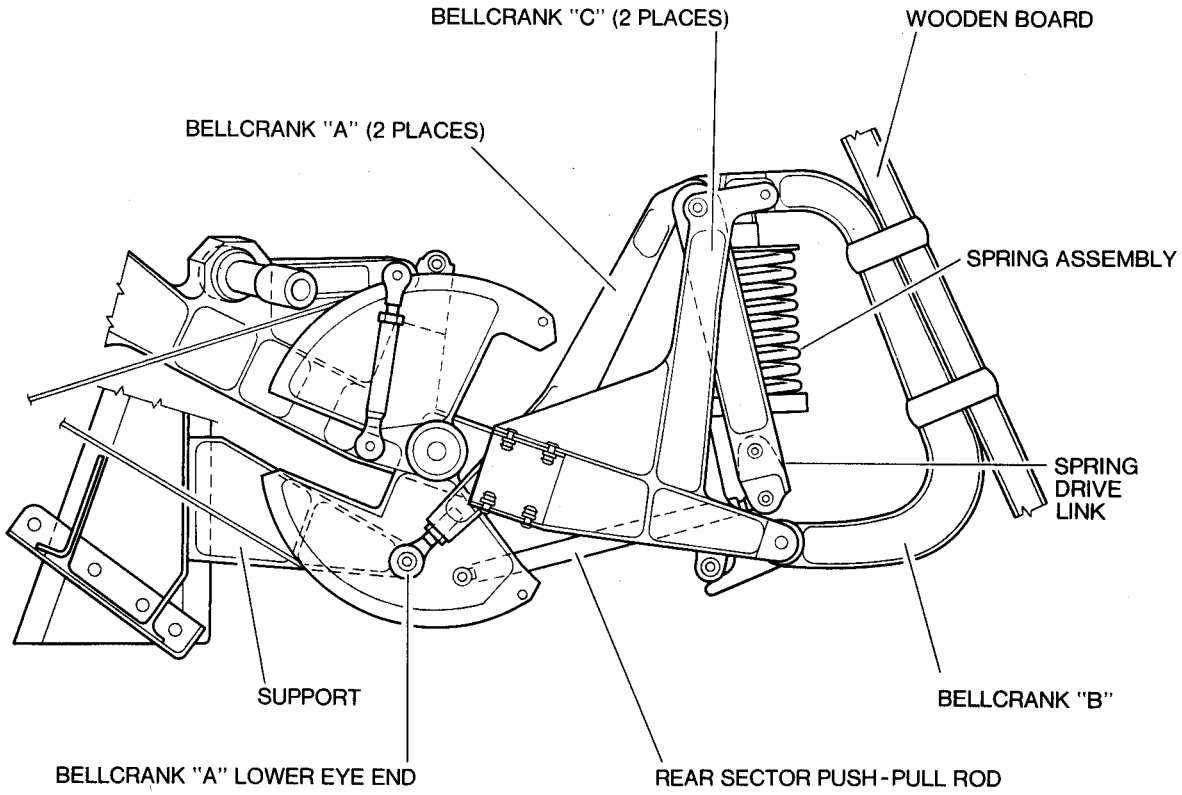

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Fig. 202 - Spring Assembly - Removal/Installation (Sheet 1 of 2)

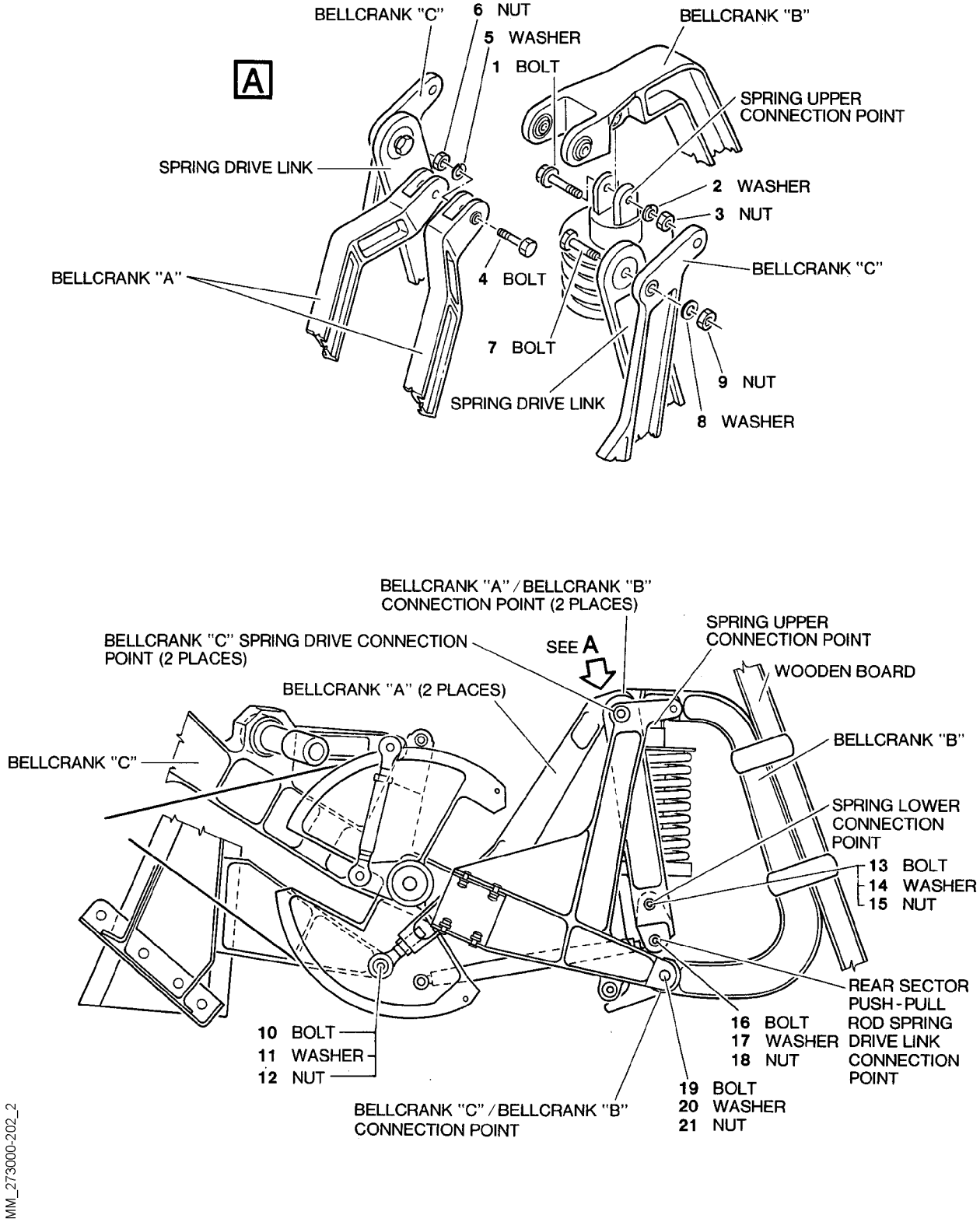

Fig. 202 - Spring Assembly - Removal/Installation (Sheet 2 of 2)

(13) Remove the travel board and the inclinometer.
(14) Install the rear fairing of the vertical stabilizer.
(15) Install the fillets at both sides of the vertical stabilizer.
(16) Remove the warning notice from the flight compartment.

6. Elevators Control Cables - Removal (Ref. to Fig. 203)

A. Fixtures, Test and Support Equipment

Rigging Pin (Qty 2)	Not Specified

B. Consumable Materials

String, four pieces, approx 50 ft (15 m) long	Not Specified

C. Reference Information

Maintenance Manual Chapter 25-20-00
Maintenance Manual Chapter 52-82-00
Maintenance Manual Chapter 27-00-00

D. Procedure

(1) Remove the carpet from the center aisle of the passenger compartment. (Refer to 25-20-00).
(2) Remove the center floor panels 211CLF, 212BRF, 211DLF, 211GLF, 231ALF, 231FLF, 231MLF, 231QLF and 231RLF.
(3) Remove the panels at the left and right sides of the control pedestal. In the baggage compartment, remove floor panel 281BZ and, at the vertical stabilizer, remove the fillet from both sides.
(4) Remove the center and rear fairings from the top of the vertical stabilizer.
(5) Open the right main landing gear rear door. (Refer to 52-82-00).
(6) Remove the retaining pins from the elevator cable pulleys at the locations detailed in Fig 203, as follows:

LOCATION	PULLEY No.	RETAINING PIN No.	FIG. 203 DETAIL
FS 1340	9 and 14	10 and 1	I
FS 3114	15	21	B
FS 5792	22	16	C
FS 8140	20	19	E
FS 9614	17	18	F

NOTE: On the airplane with SN 1034 and up remove the retaining pin on the pulley 39.

(7) Remove the cotter pin (45), washer (44) and the retaining pin (25) from the rear sector (26). Discard the cotter pin.

(8) Remove the retaining pin (34) from the two supports (41) as follows:
  (a) Remove the lockwire from the two pairs of nuts (39, 40 and 42, 43).
  (b) Remove the two outer nuts (39, 42) and the two washers (47).
  (c) Screw the two inner nuts (40, 43) in as far as possible to allow removal of the retaining pin.
  (d) Remove the retaining pin.

(9) Remove the retaining plate (37) at the pulleys (36) at the top of the vertical stabilizer (near the hinges of the horizontal stabilizer).

(10) Remove the retaining plates (3, 5) from the front sector (6).

(11) Install a rigging pin in the front and rear sector locations (4, 35).

(12) Disconnect the turnbuckles (23, 24) of the elevator control cables (11, 13); the turnbuckes are accessible through the right main landing gear rear door opening.

(13) Remove the cotter pin (2) from the front sector (6).

(14) Remove the nut, washer and bolt which secures the cable retainer (7) to the front sector (6).

(15) Detach the cable ball end (12) and the cable barrel end (8) from the front sector (6); attach a length of string to the ball end and another length to the barrel end.

(16) Remove the pressure seal that the elevator cables pass through (Ref. to 27-00-00).

NOTE: The right aileron cable passes through the same pressure seal: remove the pressure seal only enough to allow the removal of the elevator cables without interfering with the aileron cable.

(17) Pull the cables out through the right main landing gear well. When the end of the lengths of string are in position (outside the landing gear well), tag both ends of the two lengths of string to identify which is attached to the ball-ended cable and which is attached to the barrel-ended cable.

(18) Detach the cables from the lengths of string. Leave the strings in position.

(19) Remove and discard the cotter pin (31), then remove the nut, washer and bolt (30, 29, 28) to detach the cable eye end (27) from the rear sector (26).

(20) Remove the retaining pin (46) from the right side of the rear sector (26). Detach the cable ball-end (32) from the sector.

NOTE: The retaining pin on the left side of the rear sector is to retain the autopilot cable, and should not be removed during this procedure.

(21) Attach a length of string to the cable eye end and another length to the cable ball end.

(22) Pull the cables out through the right main landing gear well. When the end of the lengths of string are in position (outside the landing gear well), tag both ends of the two lengths of string to identify which is attached to the eye-ended cable and which is attached to the ball-ended cable.

(23) Detach the cables from the strings. Leave the strings in position.

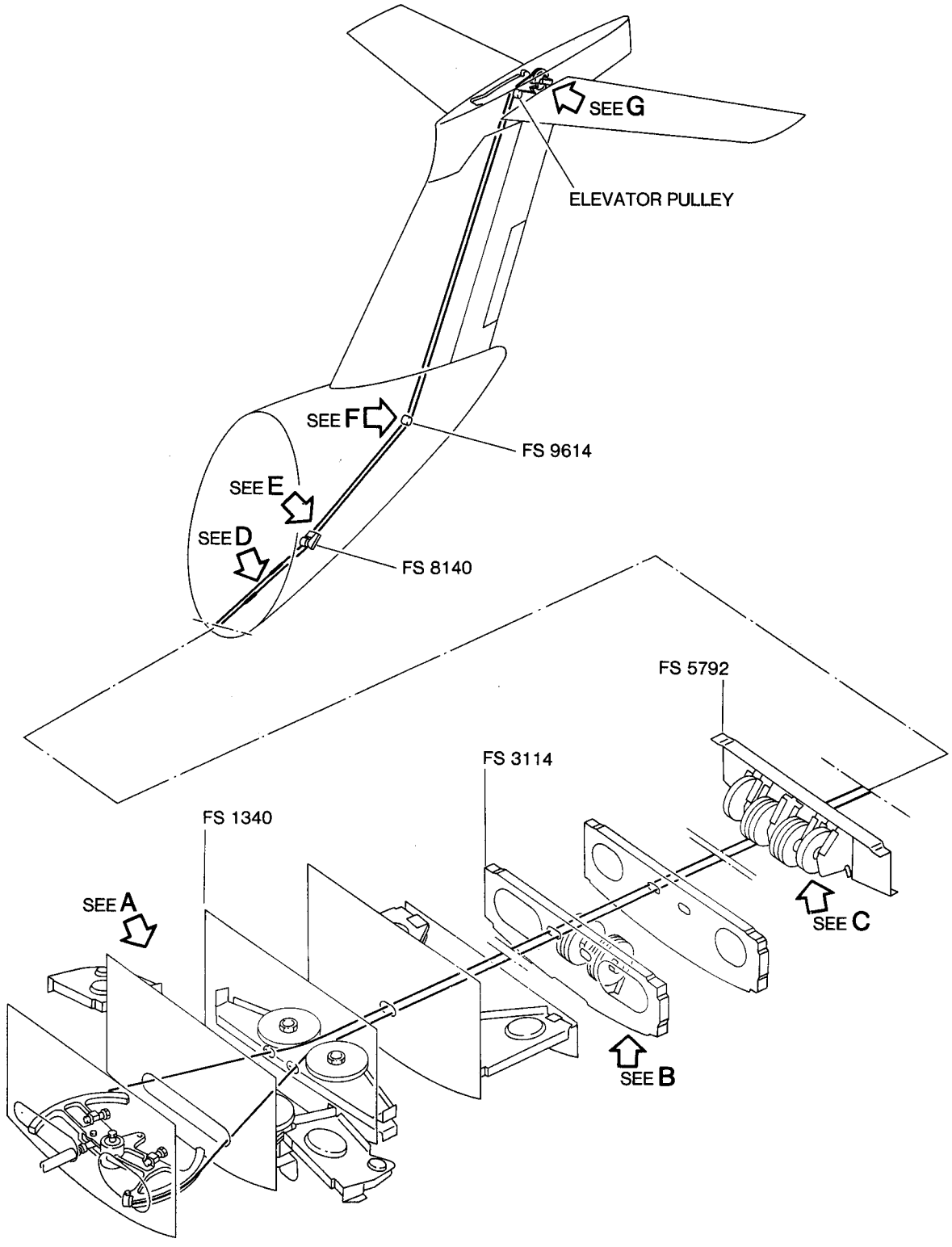

Fig. 203 - Control Cable - Removal/Installation (Sheet 1 of 4)

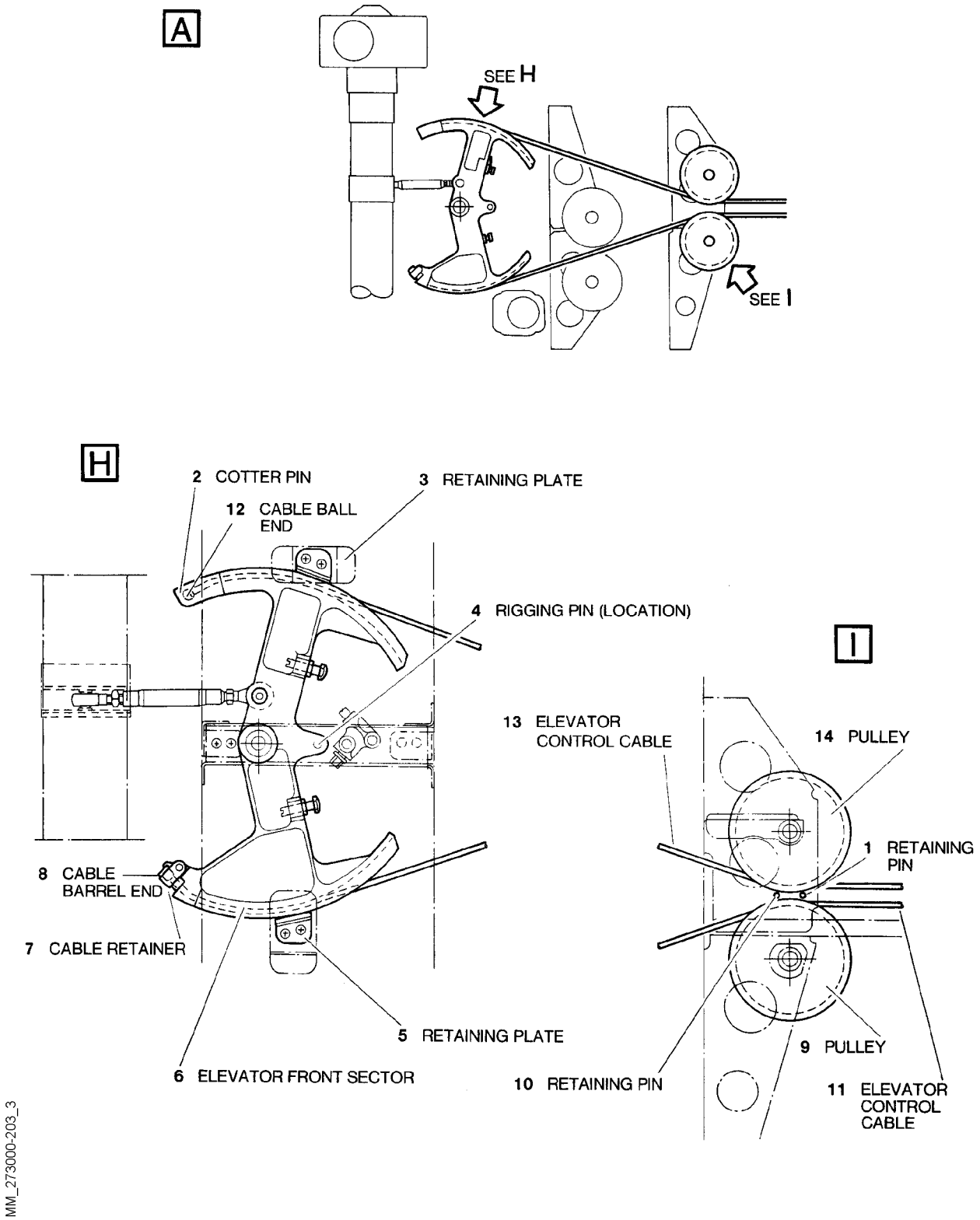

Fig. 203 - Control Cable - Removal/Installation (Sheet 2 of 4)

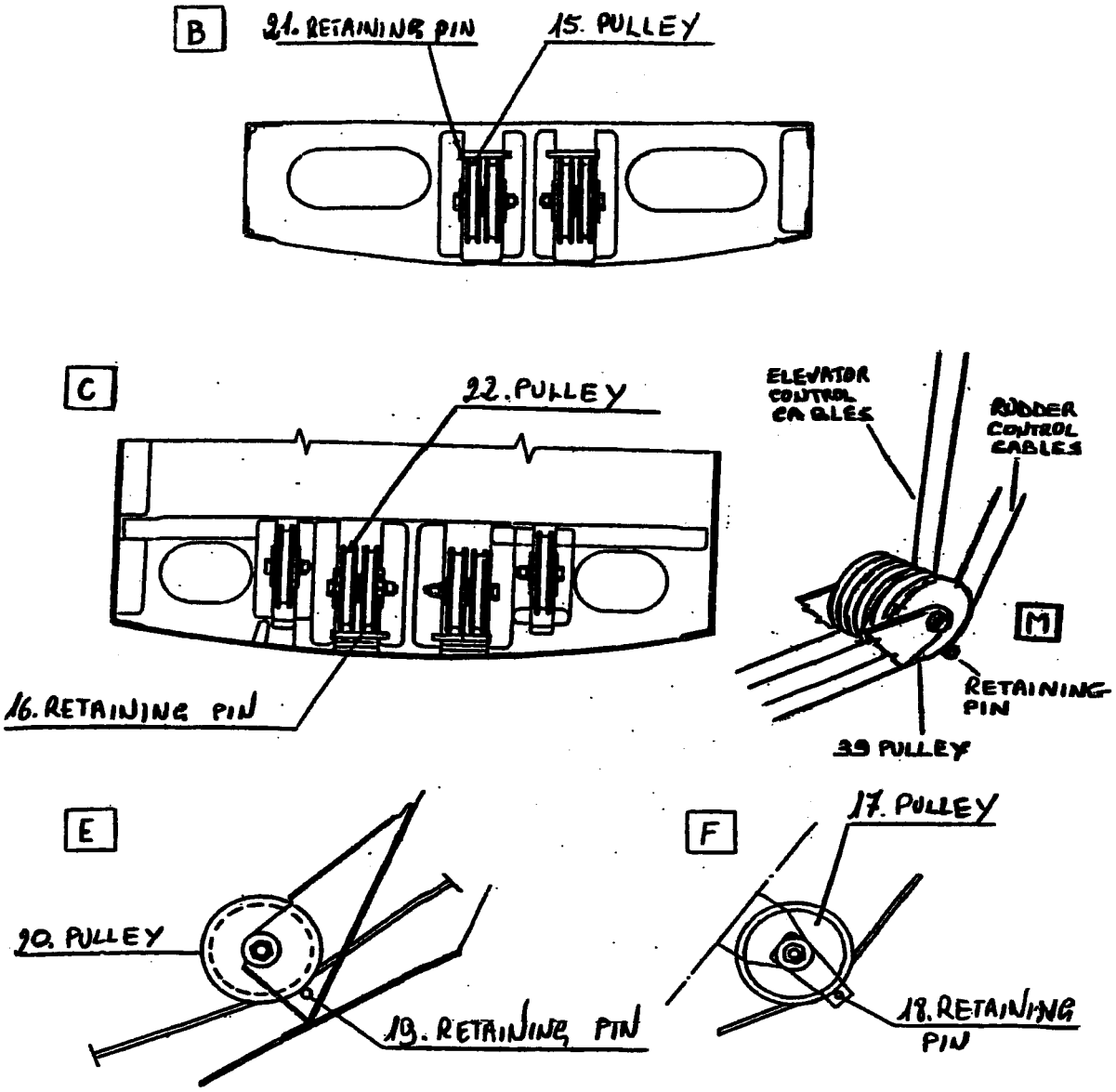

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Fig. 203 - Control Cable - Removal/Installation (Sheet 3 of 4)

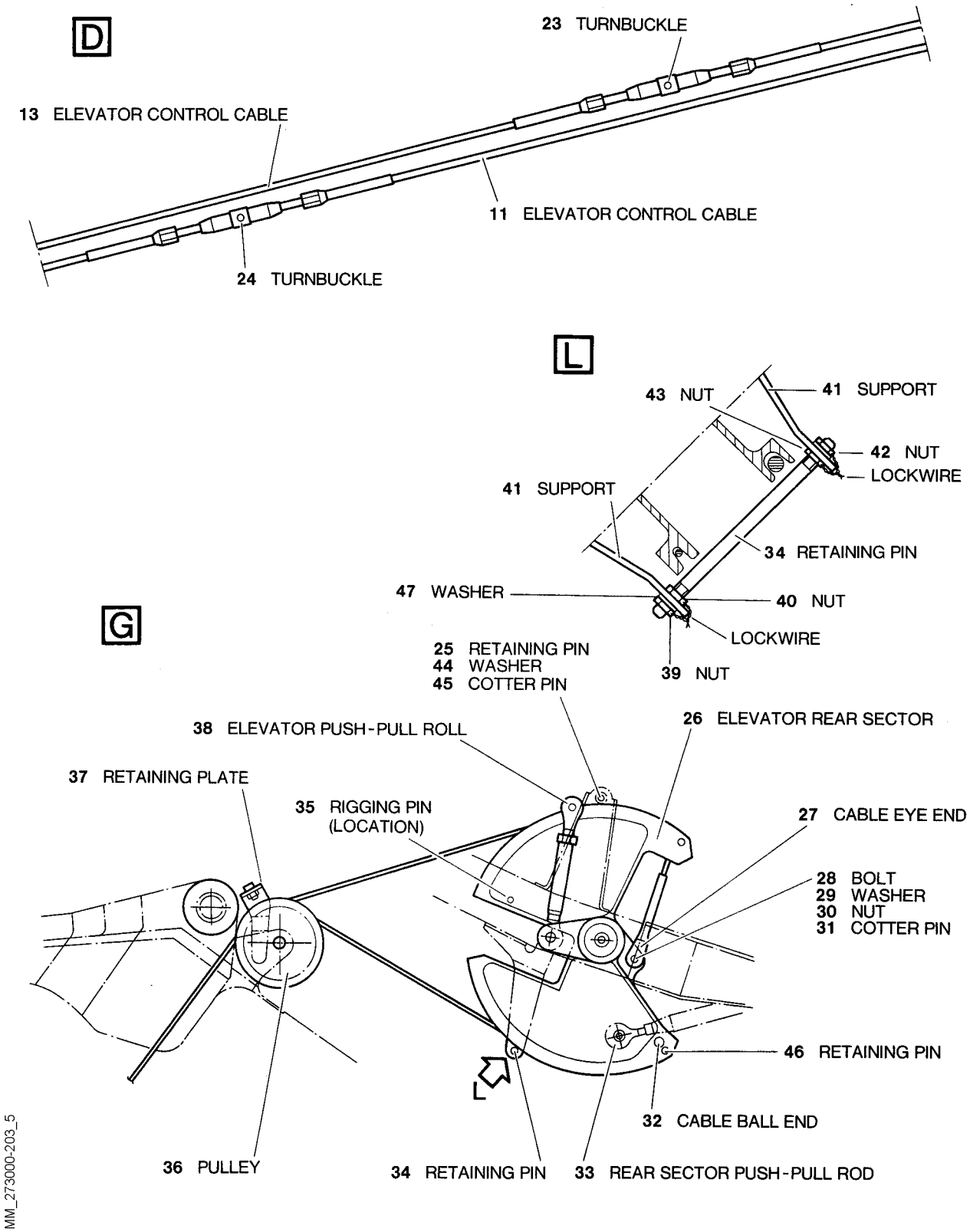

Fig. 203 - Control Cable - Removal/Installation (Sheet 4 of 4)

7. Elevators Control Cables - Installation (Ref. to Fig. 203)

A. Consumable Materials

Lockwire	04-008

B. Expendable Parts

Cotter Pin (Fig. 203, item 2)	MS24665-155
Cotter Pin (Fig. 203, item 31 and 45) Qty.2	MS24665-153

C. Reference Information

Maintenance Manual Chapter 27-00-00
Maintenance Manual Chapter 25-20-00
Maintenance Manual Chapter 52-82-00

D. Procedure

(1) At the rear sector location, attach the two lengths of string (according to the identification tags) to the turnbuckle (threaded) ends of the eye-ended cable and the shortest of the two ball-ended cables.

(2) At the front sector location, attach the two lengths of string (according to the identification tags) to the turnbuckle (threaded) ends of the barrel-ended cable and the longest of the two ball-ended cables.

(3) Put the ball-ended cables into position by pulling the applicable lengths of string (according to the identification tags) through the landing gear well. Be careful to avoid damage to the pressure seal as the rear cable passes through the seal.

(4) When the ball-end (12) is in position at the front sector (6), install the ball-end in the sector and install a new cotter pin (2) to hold the ball-end in the sector.

(5) When the ball-end (32) is in position at the rear sector (26), install the ball-end in the sector and install the retaining pin (46) to hold the ball-end in the sector.

(6) Remove the lengths of string from the threaded ends of the ball-ended cables.

(7) Connect the two cables to each other with the turnbuckle (23); make sure that the cables are correctly installed on their pulleys and that the cable is correctly routed along its entire length.

(8) Install the barrel-ended cable and the eye-ended cable in the same manner as detailed for the ball-ended cables; refer to steps (3) thru (7). Secure the barrel-end (8) in its location in the front sector (6) with the cable retainer (7) and its bolt, washer and nut; use the bolt (28), washer (29), nut (30) and a new cotter pin (31) to secure the cable eye-end (27) to the rear sector (26), and use a turnbuckle (24) to connect the cables to each other.

(9) Install the retaining pins in the elevator cable pulleys at the locations detailed in Fig. 203, as follows:

LOCATION	PULLEY No.	RETAINING PIN No.	FIG. 203 DETAIL
FS 1340	9 and 14	10 and 1	I
FS 3114	15	21	B
FS 5792	22	16	C
FS 8140	20	19	E
FS 9614	17	18	F

NOTE: On the airplane with SN 1034 and up install the retaining pin on the pulley 39.

(10) Install the retaining pin (25) in the rear sector (26); install the washer (44) and secure the pin in place with a new cotter pin (45).

(11) Install the retaining pin (34) in the two supports (41) as follows:

(a) Screw the inner nut (40) all the way onto one end of the retaining pin, and screw the inner nut (43) all the way onto the other end.

(b) Put the retaining pin into position between the two supports as shown in detail L of Fig. 203.

(c) Screw the two inner nuts out an equal amount until they touch the supports (41).

(d) Install the two washers (47) and the outer nuts (39, 42) and tighten the nuts.

(e) Safety the inner nut (43) to the outer nut (42) with lockwire, and safety the inner nut (40) to the outer nut (39) with lockwire.

(12) Install the retaining plate (37) at the pulleys (36) at the top of the vertical stabilizer (near the hinges of the horizontal stabilizer).

(13) Install the retaining plates (3, 5) at the front sector (6).

(14) Make sure that the cables are correctly engaged in their pulleys.

(15) Install the pressure seal at FS 6000 (Refer to 27-00-00).

(16) Stretch the elevators cables (Refer to 27-00-00).

(17) Rig the elevator control system as detailed in page block 501.

(18) Install the center and rear fairings at the top of the vertical stabilizer.

(19) Install the fillets at both sides of the vertical stabilizer.

(20) In the baggage compartment, install floor panel 281BZ.

(21) Install the center floor panels 211CLF, 212BRF, 211DLF, 211GLF, 231ALF, 231FLF, 231MLF, 231QLF, 231RLF and the panels at the left and right sides of the control pedestal.

(22) Install the carpet in the center aisle of the passenger compartment (Refer to 25-20-00).

(23) Close the right main landing gear rear door (Refer to 25-82-00).

8. Control Columns - Removal (Ref. to Fig. 204)

A. Fixtures, Test and Support Equipment

Rigging Pin (Qty 2)	Not Specified

B. Consumable Materials

String, four pieces, approx 50 ft (15 m) long	Not Specified

C. Reference Information

Maintenance Manual Chapter 25-10-00
Maintenance Manual Chapter 53-10-00
Maintenance Manual Chapter 52-82-00

D. Procedure

(1) Remove the pilots and the copilot seats (Refer to 25-10-00).
(2) Remove the floor panels 211CLF and 212BRF.
(3) Remove the control pedestal (Refer to 53-10-00).
(4) Remove the control wheel sector covers (3, 31) and the control column base covers (5, 20, 25, 35).
(5) Open the left and right rear doors of the main landing gear (Refer to 52-82-00).
(6) Install a rigging pin in either the left or the right aileron control sector (39 or 44); gain access through the left or right main landing gear opening.
(7) Loosen the two turnbuckles (41, 42) of the aileron control cables.
(8) Remove the cable retaining pins (4, 15) from the pulley at the base of each control column (13, 23).
(9) Remove the lockwire which retains the ball-ends (33, 34) of the aileron control cables in the control wheel sectors (1, 2).

NOTE: The aileron cable ball-ends are located at the inboard sides of the sectors.

(10) Attach the ball end (33) to one end of one of the lengths of string and attach the ball end (34) to one end of the other length.
(11) Pull the two aileron control cables out through the base of the control columns; when the lengths of string are in position (inside the columns with their ends outside) detach the cables and stow the cable ends so that they will not be damaged. Leave the strings in position.
(12) Disconnect the electrical plugs (3, 37) located near the base of the control columns.
(13) Install a rigging pin in the elevator front sector (4).

WARNING: THE CONTROL COLUMN ASSEMBLY BECOMES "TOP HEAVY" WHEN DISCONNECTED FROM THE REST OF THE CONTROL SYSTEM. MAKE SURE THAT THE ASSEMBLY IS ADEQUATELY SECURED TO PREVENT INADVERTANT MOVEMENT WHICH COULD CAUSE INJURY TO PERSONS OR DAMAGE TO THE ASSEMBLY.

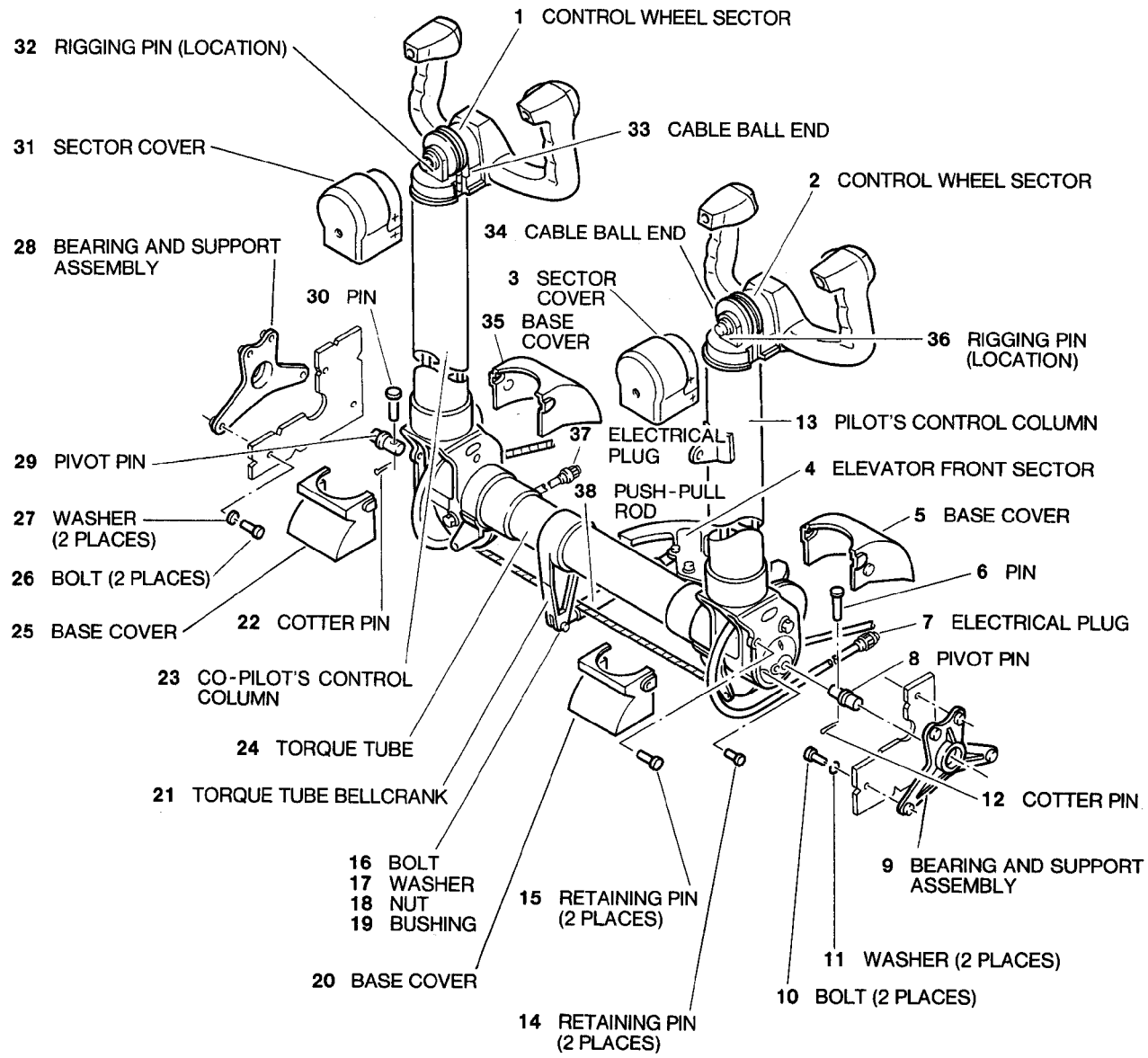

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Fig. 204 - Control Column - Removal/Installation (Sheet 1 of 2)

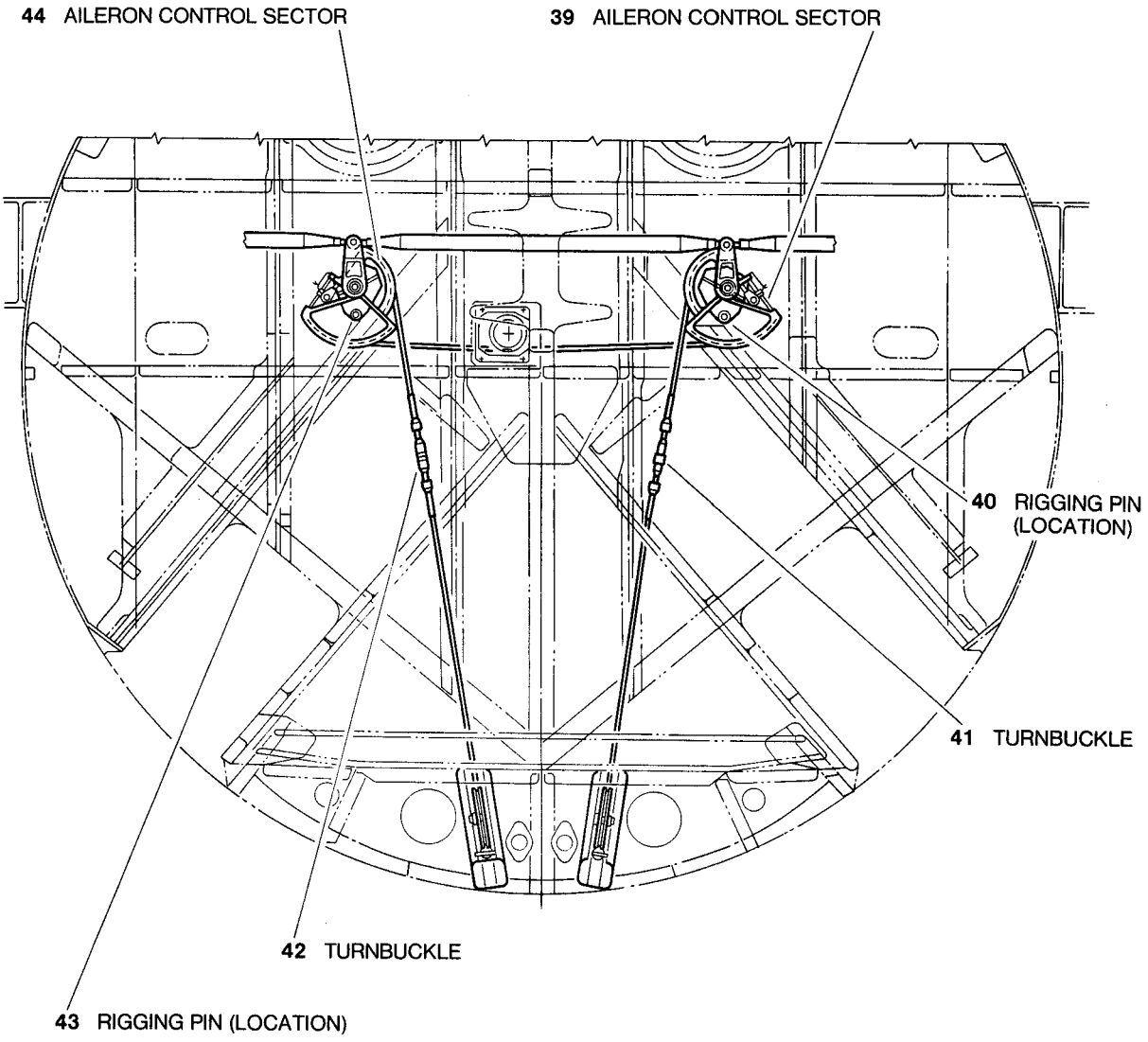

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Fig. 204 - Control Column - Removal/Installation (Sheet 2 of 2)

(14) Remove the nut (18), washer (17) and bolt (16) which connect the torque tube bellcrank (21) to the push-pull rod (38).

(15) Remove the two floor beams above the torque tube (24) (Refer to 53-10-00).

(16) Support the column assembly.

(17) Remove and discard the cotter pins (12, 22) then remove the pins (6, 30) from the pivot pins (8, 29).

(18) Remove the four bolts (10) and washers (11), and the four bolts (26) and washers (27) which secure the bearing and support assemblies (9, 28) to the structure.

(19) Pull the bearing and support assemblies (9, 28) away from the structure to remove the pivot pins (8, 29) from the torque tube (24).

(20) Remove the control column assembly.

9. Control Columns - Installation (Ref. to Fig. 204)

A. Consumable Materials

Lockwire	04-008

B. Expendable Parts

Cotter Pin (Fig. 204, item 12 and 22) Qty. 2	MS24665-208

C. Reference Information

Maintenance Manual Chapter 53-10-00
Maintenance Manual Chapter 27-10-00
Maintenance Manual Chapter 52-82-00
Maintenance Manual Chapter 25-10-00

D. Procedure

(1) Put the control column assembly into position and support it so that the torque tube (24) centerline is aligned with the centers of the holes in the structure.

(2) Install the bearing and support assemblies (9, 28) complete with the pivot pins (8, 29).

(3) Adjust the parts as necessary to enable the installation of the pins (6, 30); when the pins are installed, safety the pins in place with new cotter pins (12, 22).

(4) Install the four bolts (10) and washers (11) and the four bolts (26) and washers (27) to secure the bearing and support assemblies (8, 28) to the structure.

(5) Install the two floor beams above the torque tube (Refer to 53-10-00).

(6) Connect the torque tube bellcrank (21) to the push-pull rod (38) with the bolt (16), washer (17) and nut (18). Make sure that the bushing (19) is properly in place.

(7) Connect the electrical plugs (7, 37) located near the base of the control columns.

(8) Put the aileron control cables into position as follows:
  (a) Attach the applicable cable ball ends (33, 34) to the ends of the two lengths of string outside the base of the control columns (13, 23).
  (b) Pull the lengths of string up through the control columns until the cables are positioned on their pulleys at the base of the columns.
  (c) Detach the cable ball ends from the strings and install the ball ends in their locations at the inboard sides of the control wheel sectors (1, 3).
  (d) Make sure that the cables are correctly seated in their pulleys and control wheel sectors.
(9) Safety the cable ball ends in their locations with lockwire.
(10) Install the retaining pins (14, 15) at the pulley at the base of the two control columns.
(11) Tighten the turnbuckles (41, 42) of the aileron control cables.
(12) Rig, inspect and check the aileron control system as detailed in 27-10-00 page block 501.
(13) Rig, inspect and check the elevator control system as detailed in page block 501.
(14) Close the left and right rear doors of the main landing gear (Refer to 52-82-00).
(15) Install the control wheel sector covers (3, 31) and the control column base covers (5, 20, 25, 35).
(16) Install the control pedestal (Refer to 27-10-00).
(17) Install the pilot's and copilot's seats (Refer to 27-10-00).

ELEVATOR - ADJUSTMENT/TEST

1. General

A. The following rigging procedures are to be done with the horizontal stabilizer at the neutral (0 degrees) position, except for when the procedure specifies a horizontal stabilizer position of -4°30' for relieving the elevator spring force.

B. Each rigging and test procedure is complete, including instruction for the removal/installation of access panels/doors etc. If more than one procedure is to be done at any one time, take note of the procedural requirements and minimize the number of times panels, pins etc. are removed/installed. Some panels may have been removed during a removal/installation procedure.

2. Adjustment (Rigging)

A. Fixtures, Test and Support Equipment

LH Elevator Travel Board	TEM-273000-005 (80-909165-801)
RH Elevator Travel Board	TEM-273000-004 (80-909165-802)
Rigging Pin (Qty.3)	Not Specified
Tensiometer	T5-2002-104-00 (Pacific Scientific) or equivalent
Inclinometer	Not Specified
Warning Notice	Not Specified
Spring Scale (0-110 lbs/0-50 kg)	Not Specified
Wooden Board (or similar)	Not Specified

B. Reference Information

Maintenance Manual Chapter 25-20-00
Maintenance Manual Chapter 52-82-00
Maintenance Manual Chapter 22-00-00
Maintenance Manual Chapter 27-00-00
Maintenance Manual Chapter 08-20-00

C. Procedure

(1) Put a warning notice in the flight compartment to tell other persons not to move the flight controls or operate the pitch trim system.
(2) Remove the carpet from the center aisle of the passenger compartment (Refer to 25-20-00).
(3) Remove center floor panels 211CLF, 212BRF, 211DLF, 211GLF, 231ALF, 231FLF, 231MLF, 231QLF and 231RLF.
(4) Remove the panels at the left and right of the control pedestal. In the baggage compartment remove floor panel 281BZ.
(5) Open the rear door of the right main landing gear (Refer to 52-82-00).

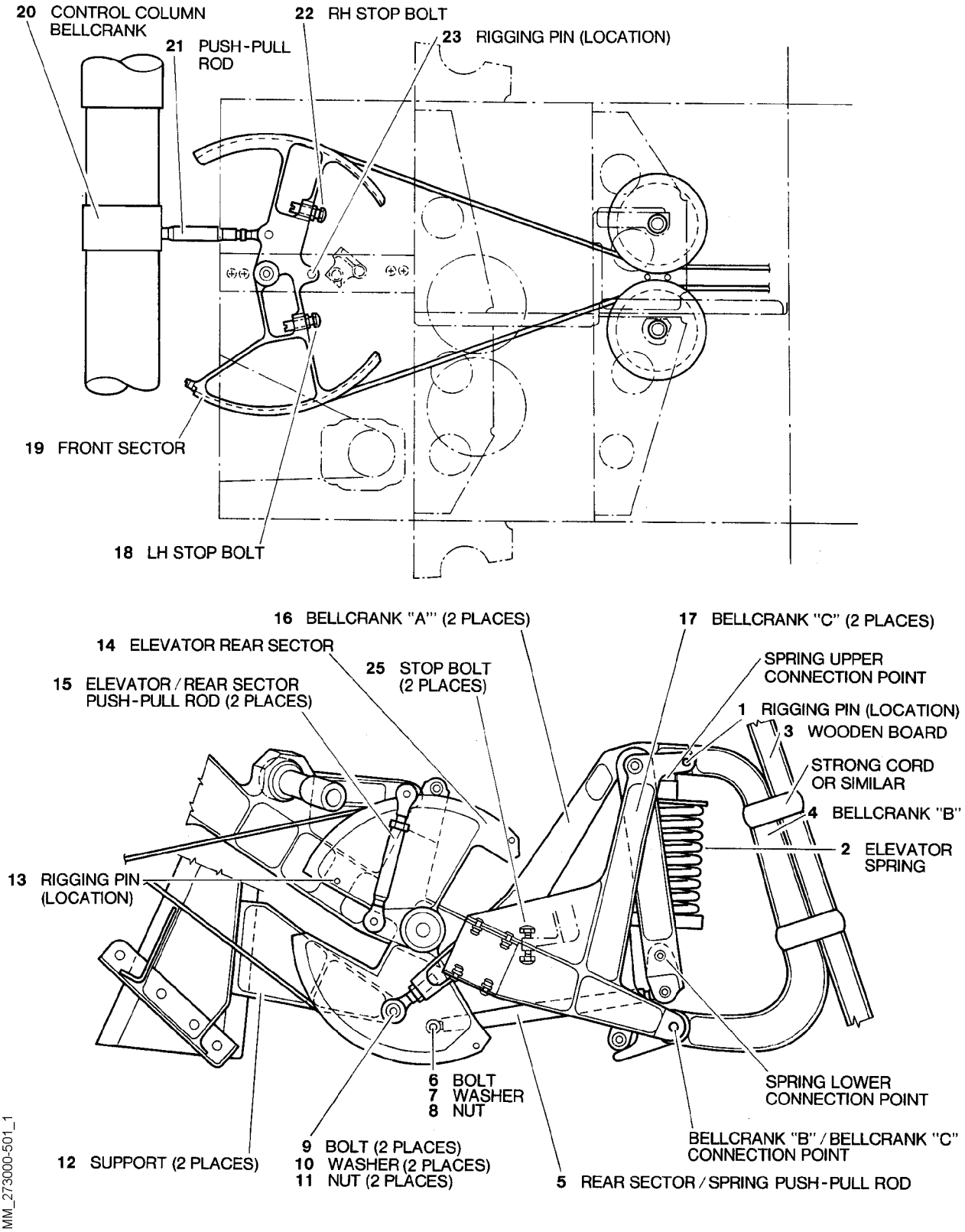

Fig. 501 - Elevator Control System - Rigging (Sheet 1 of 3)

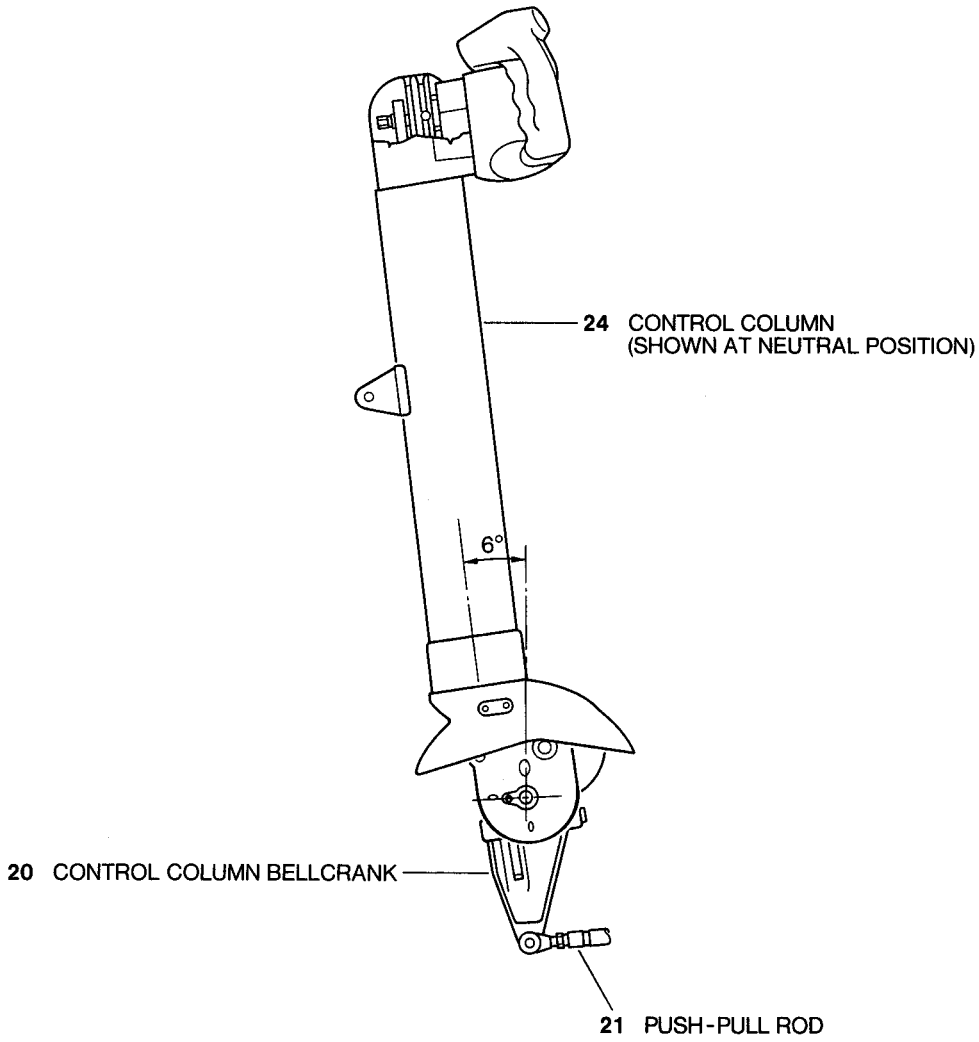

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Fig. 501 - Elevator Control System - Rigging (Sheet 2 of 3)

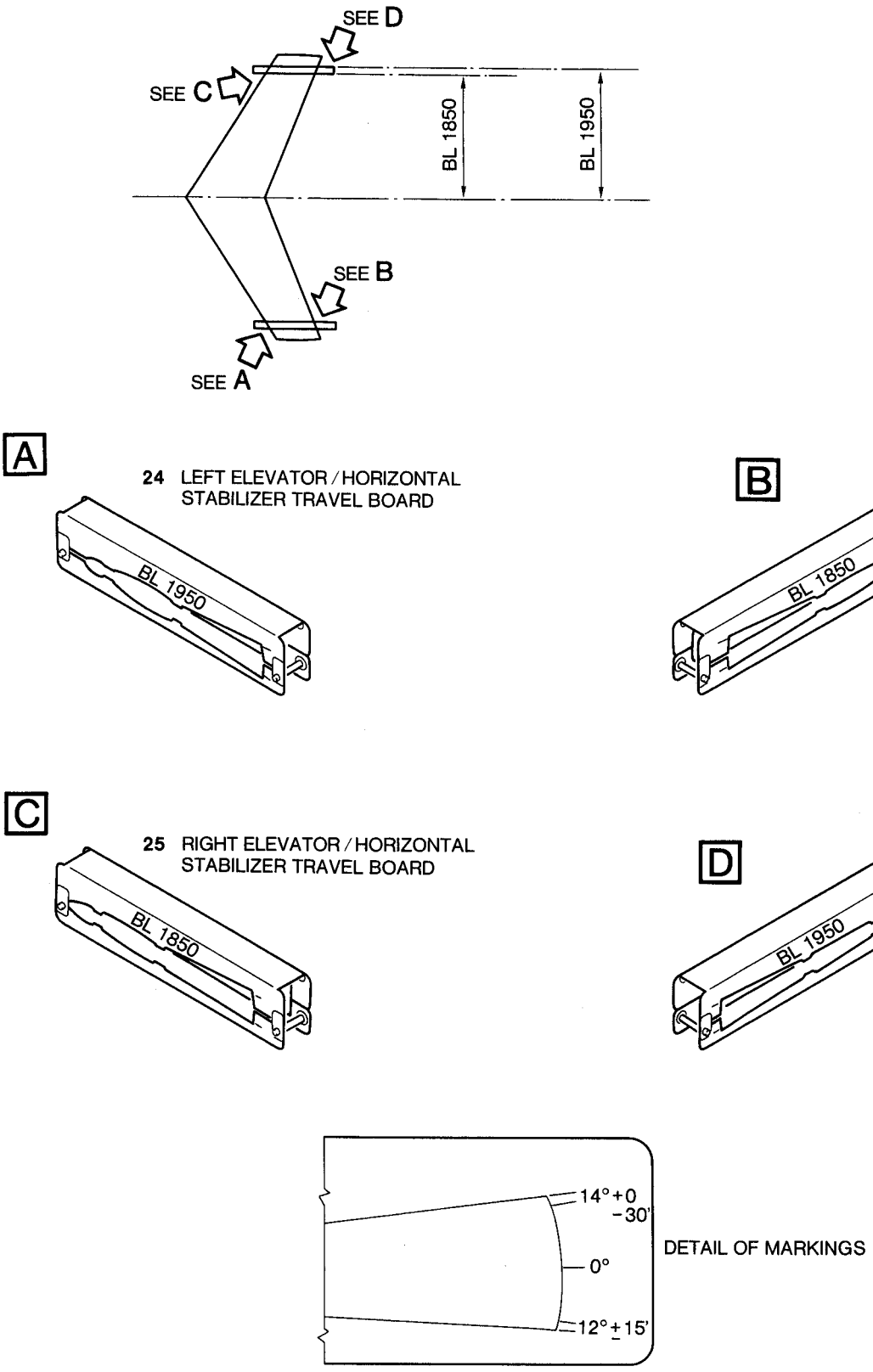

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Fig. 501 - Elevator Control System - Rigging (Sheet 3 of 3)

(6) Remove the fillet from both sides of vertical stabilizer at the horizontal stabilizer/elevator root.

(7) Remove the rear fairing from the top of the vertical stabilizer.

(8) Disconnect the autopilot servo cables from the elevator rear sector (14). The turnbuckles of the autopilot servo cables are located in the upper part of the vertical stabilizer. (Refer to 22-00-00).

WARNING: BE VERY CAREFUL WHEN YOU DO ANY WORK AT THE SPRING ASSEMBLY. THE SPRING TENSION/ COMPRESSION IS APPROXIMATELY 290 POUNDS (131.5 KILOGRAMS), AND CAN CAUSE INJURY/DAMAGE IF THE RIGGING PROCEDURES ARE NOT FOLLOWED EXACTLY.

CAUTION: MAKE SURE THAT THE WOODEN BOARD (OR SIMILAR), AND THE MEANS OF ATTACHMENT, WILL NOT DAMAGE BELLCRANK "B" IN ANY WAY. USE SOFT PADDING AS REQUIRED TO PROTECT THE SURFACES/EDGES OF THE BELLCRANK.

(9) Attach a suitably-sized wooden board (3) or similar to bellcrank "B" (4). Refer to Fig. 501 for an example of the location and method of attachment.

(10) Install the LH and RH elevator travel boards.

(11) Reduce the tension/compression forces of the elevator spring (2) as follows:

(a) Operate the pitch trim switch as required to set the horizontal stabilizer to 0°.

(b) Place the inclinometer on either of the elevator travel boards and set the inclinometer to 0°.

(c) Operate the pitch trim switch as required to set the horizontal stabilizer to -4°30’ (as measured by the inclinometer).

NOTE: When the horizontal stabilizer is at -4°30’, the center of the two (upper and lower) spring connection points should be in line with the center of the bellcrank "C"/bellcrank "B" connection point.This is the position at which spring forces are lowest.

(12) Hold the bellcrank "B" in its position; use the wooden board (3) as required to counteract any remaining spring force.

(13) Remove the nuts (11), washers (10) and Hi Lok pins (9) which secure the lower end of the two bellcranks "A" (16) to their supports (12).

(14) Slowly release the counteracting force of the wooden board and allow the spring force to release completely.

(15) Remove the nut (8), washer (7) and bolt (6) which secure the forward end of the rear sector push-pull rod (5) to the elevator rear sector (14).

(16) Make the airplane level (Refer to 08-20-00).

(17) Operate the pitch trim switch to set the horizontal stabilizer to the neutral (0°) position.

(18) Install a rigging pin into the front sector location (23) and the rear sector location (13).

(19) Check the neutral position of the control column (24). At neutral the column should be 6° forward of vertical (Refer to Sheet 2 of Fig. 501); if required, adjust the push-pull rod (21) to get the correct angle.

(20) Check the neutral position of the elevators. At neutral, the trailing edges of the elevators should align with the 0° marking on the travel boards. If required, adjust the elevator/rear sector push-pull rods (15) to get the correct elevator neutral position.

(21) Check that the elevator control cables are at the correct tension. (Refer to 27-00-00).

(22) Attach the autopilot servo cables to the rear sector (14) and rig the autopilot pitch servo system (Refer to 22-00-00).

(23) Check again the tension of the elevator control cables, and make sure that the turnbuckles are safetied.

(24) Make sure that the bushing is in place then install the bolt (6), washer (7) and nut (8) to secure the rear sector/spring push-pull rod (5) to the rear sector (14).

(25) Apply force (as required) to the wooden board (3) so that a rigging pin can be inserted in the location (1) at the top of bellcrank "C" (17) and bellcrank "B" (4).

(26) When the rigging pin is in its location (1), connect the lower end of the two bellcrancks "A" (16) to their support (12) by installing a Hi Lok pins (9), washer (10) and nut (11) at each of the two places. If required, adjust the bellcrank "A" eye end to align the eye end with its support.

(27) Remove the rigging pin from the location (1) at the top of bellcrank "C" (17) and bellcrank "B" (4).

(28) Remove the wooden board (3) from bellcrank "B" (4).

(29) Remove the rigging pins from the rear sector location (13) and the front sector location (23).

(30) Operate the pitch trim switch as required to set the horizontal stabilizer to -4°30'.

(31) Check that the rear sector stop bolts (25) are set so that maximum elevator up travel is 14°(+0/-30') and maximum down travel is 12°(±15'). If required, adjust the rear sector stop bolts to get the correct maximum travel. Safety the stop bolts on completion of adjustment.

(32) With the spring scale, apply a force of 75 lb (34 kg) at the center of the control wheel escutcheon to push the column forward. Check that the RH stop bolt (22) on the front sector (19) is just contacting the stop; adjust the stop bolt if required.

(33) With the spring scale, apply a force of 75 lb (34 kg) to pull the control column rearwards; apply the force at the location on the control wheel cover in line with the center of the escutcheon. Check that the LH stop bolt (18) is just contacting the stop; adjust the stop bolt if required.

(34) Do the friction test of the elevator control system (Refer to Para. 3).

3. Test

A. Fixtures, Test and Support Equipment

LH Elevator Travel Board	80-909165-801
RH Elevator Travel Board	80-909165-802
Inclinometer	Not Specified
Spring Scale (0-55lb/0-25 kg)	Not Specified
Warning Notice	Not Specified

B. Procedure - Elevator Control Operational Test

(1) Do the test:

	Action	Result
(a)	Gently push the control column fully forward.	The trailing edge of the elevators will move down.
(b)	Gently push the control column fully rearward.	The trailing edge of the elevators will move up.

C. Procedure - Elevator Spring Force and System Friction Test (Ref. to Fig. 502)

(1) Install the elevator travel board and the inclinometer at the horizontal stabilizer.

(2) Operate the pitch trim switch to set the horizontal stabilizer at an inclination of +2°.

(3) Attach the spring scale to the top of the left-hand control column (at the control wheel escutcheon).

(4) Begin the test with the control columns at the fully forward position (elevators fully down). This is Point A on Graph 1 of Fig. 502.

NOTE: Sheet 1 of Fig. 502 gives spring force test details in pounds; Sheet 2 gives the same details in kilograms. Fig. 502 includes blocks for making the required notes of readings. Do not use the original sheet - copy Fig. 502 as required.

(5) Do the test:

	Action	Result
(a)	Gently pull the spring scale rearward and make a note of the scale reading when the columns start to move rearward. Refer to Fig. 502, Graph 1, Point A.	–

	Action	Result
(b)	Continue to gently pull the spring scale rearward and make a note of the scale reading just as the columns reach the fully rearward position. Refer to Fig. 502, Graph 1, Point B.	–
(c)	Release the rearward pull force until the control columns start to move forward. Make a note of the scale reading when the columns start to move forward. Refer to Fig. 502, Graph 1, Point C.	–
(d)	Continue to let the control columns move forward and make a note of the scale reading just as the columns reach the fully forward position. Refer to Fig. 502, Graph 1, Point D.	–
(e)	Do steps (a) thru (d) two more times.	–
(f)	Add the three readings at Points A, B, C and D and divide the result by three to get the average at each point.	The average of the readings at Point A, B, C and D should be within the tolerances given in Fig. 502.

NOTE: The readings A, B, C and D are the result of spring force and system friction at +2° inclination of the horizontal stabilizer.
Use the following formula to find the friction:

$$\frac{A+B}{2} = x \qquad \frac{C+D}{2} = y \qquad \frac{X-Y}{2} = friction$$

The value of friction must be ..... lbs (.... kg) or less.

(6) Operate the pitch trim switch to set the horizontal stabilizer at 0°.
(7) Begin this continuation of the test with the control columns at the fully forward position. This is Point E on Graph 2 of Fig. 502.

(8) Continue the test:

	Action	Result
(g)	Gently pull the spring scale rearwards and make a note of the scale reading when the columns start to move rearward. Refer to Fig. 502, Graph 2, point E.	–
(h)	Continue to gently pull the spring scale rearward and make a note of the scale reading just as the columns reach the fully rearward position. Refer to Fig. 502, Graph 2, Point F.	–
(i)	Release the rearward pull force until the control columns start to move forward. Make a note of the scale reading when the columns start to move forward. Refer to Fig. 502, Graph 2, Point G.	–
(j)	Continue to let the control columns move forward and make a note of the scale reading just as the columns reach the fully forward position. Refer to Fig. 502, Graph 2, Point H.	–
(k)	Do steps (g) thru (j) two more times.	–
(l)	Add the three readings at Points E, F, G and H and divide the result by three to get the average at each point.	The average of the readings at Point E, F, G and H should be within the tolerances given in Fig. 502.

NOTE: The readings E, F, G and H are the result of spring force and system friction at 0° inclination of the horizontal stabilizer.
Use the following formula to find the friction:

$$\frac{E+F}{2} = x \qquad \frac{G+H}{2} = y \qquad \frac{X-Y}{2} = friction$$

The value of friction must be ..... lbs (.... kg) or less.

WARNING: THE CONTROL COLUMNS WILL MOVE RAPIDLY REARWARD WHEN THE HORIZONTAL STABILIZER MOVES TO THE -8° SETTING, AND COULD CAUSE INJURY OR DAMAGE. USE HAND FORCE AS REQUIRED TO DAMPEN THE SPEED OF THE REARWARD MOVEMENT OF THE COLUMNS.

(9) Operate the pitch trim switch to set the horizontal stabilizer at -8° inclination.

(10) Begin this continuation of the test with the control columns at the fully rearward position. This is Point I on Graph 3 of Fig. 502.

(11) Continue the test:

	Action	Result
(m)	Gently push the spring scale forward and make a note of the scale reading when the columns start to move forward. Refer to Fig. 502, Graph 3, point I.	–
(n)	Continue to gently push the spring scale forward and make a note of the scale reading just as the columns reach the fully forward position. Refer to Fig. 502, Graph 3, Point J.	–
(o)	Release the forward push force until the control columns start to move rearward. Make a note of the scale reading when the columns start to move rearward. Refer to Fig. 502, Graph 3, Point K.	–
(p)	Continue to let the control columns move rearward and make a note of the scale reading just as the columns reach the fully rearward position. Refer to Fig. 502, Graph 3, Point L.	–
(q)	Do steps (m) thru (p) two more times.	–

	Action	Result
(r)	Add the three readings at Points I, J, K and L and divide the result by three to get the average at each point.	The average of the readings at Point I should be between 2.5 and 6.5 pounds (1 and 3 kg); at Point J between 5 and 9 pounds (2 and 4 kg); at Point K between 17 and 21 pounds (7.5 and 9.5 kg), and at Point L between 13.5 and 17.5 pounds (6 and 8 kg).

NOTE: The readings J, I, L and K are the result of spring force and system friction at -8° inclination of the horizontal stabilizer.
Use the following formula to find the friction:

$$\frac{J+I}{2} = x \qquad \frac{L+K}{2} = y \qquad \frac{X-Y}{2} = friction$$

The value of friction must be ..... lbs (.... kg) or less.

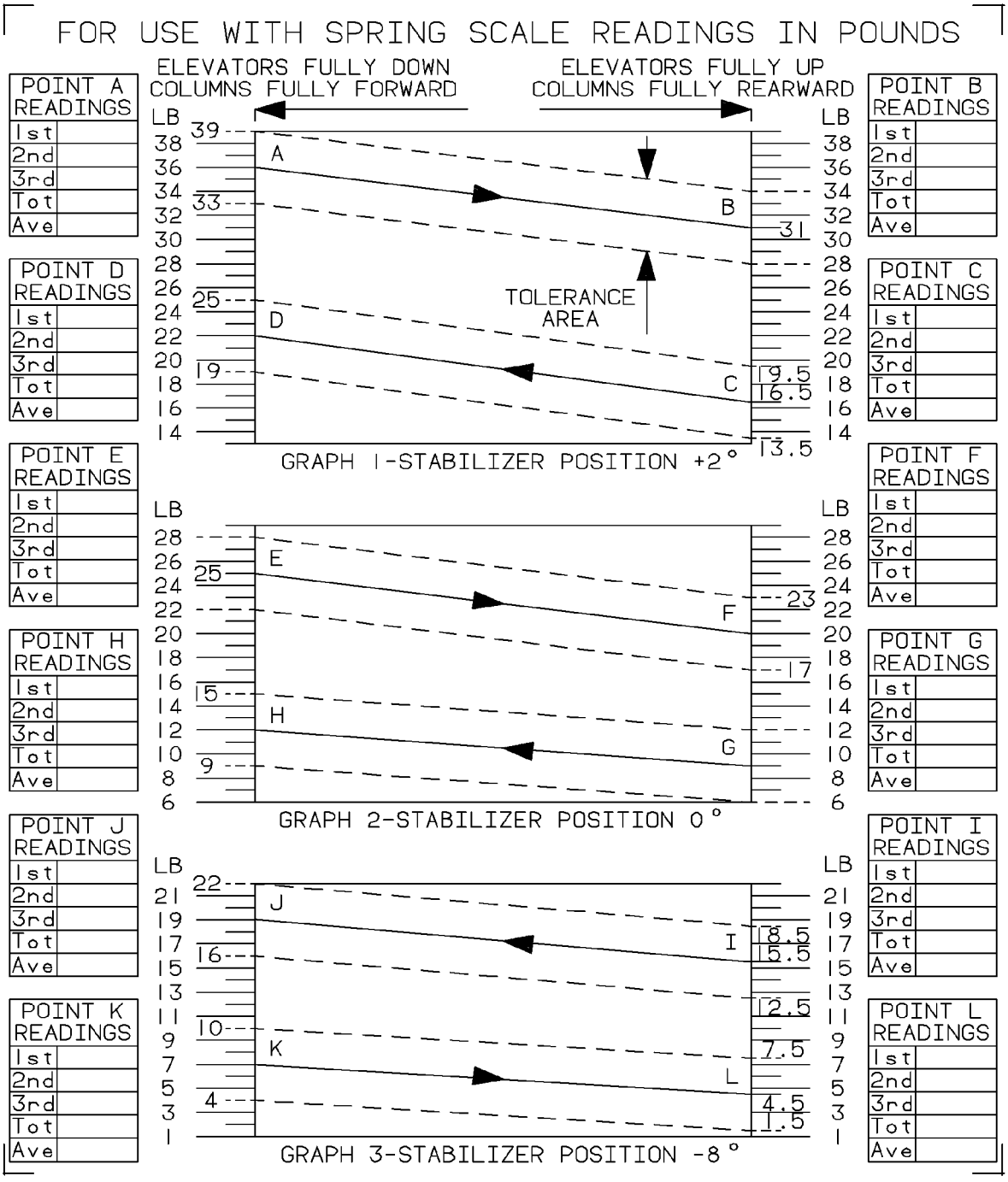

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Fig. 502 - Elevator Spring Force Test (Sheet 1 of 2)

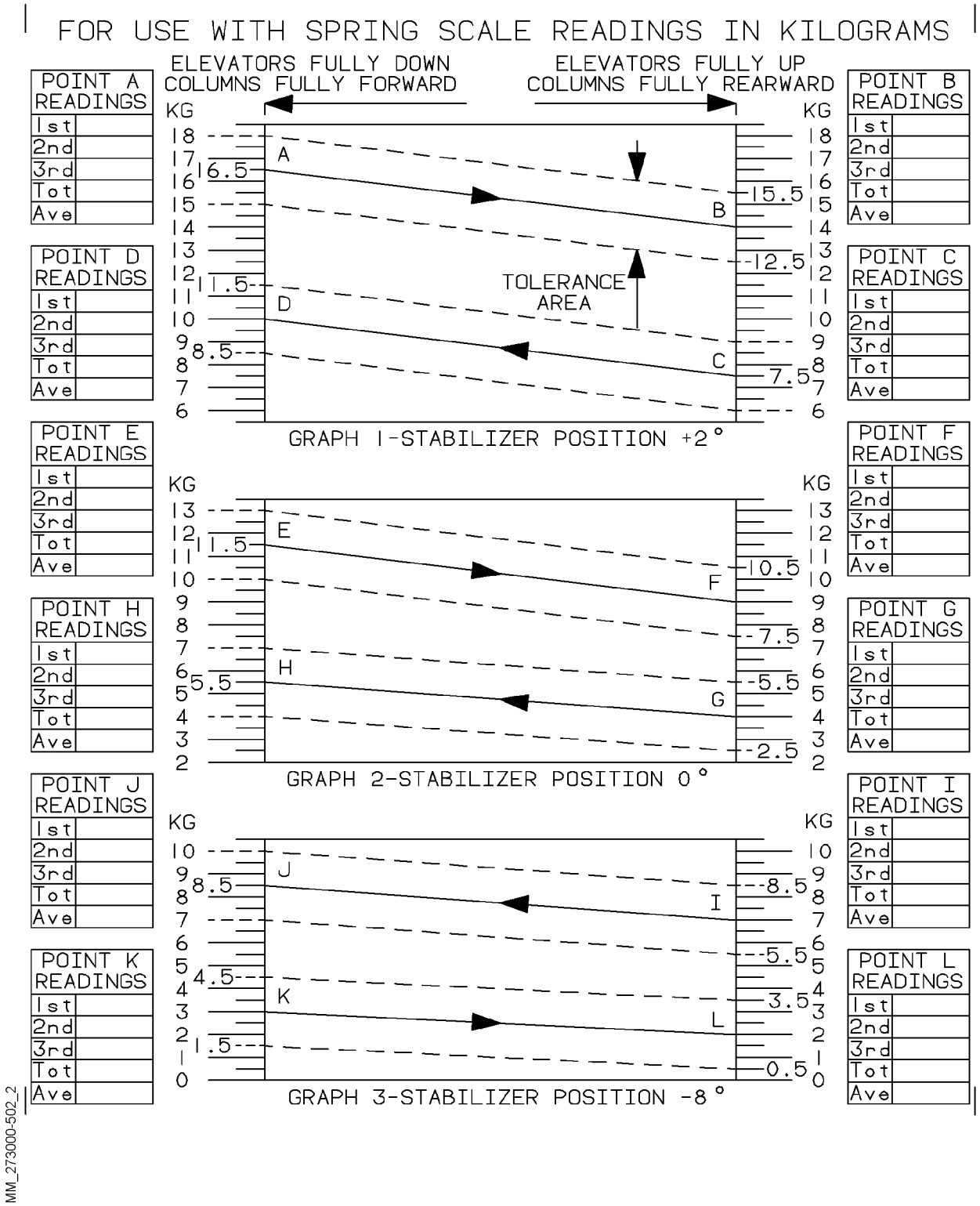

Fig. 502 - Elevator Spring Force Test (Sheet 2 of 2)

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STALL WARNING - DESCRIPTION AND OPERATION

1. General

A. Angle of attack controls the lift coefficient from negative values through zero and to the greatest positive value attainable, beyond which the airplane stalls.

B. A stall warning system provides the crew with visual and aural warning of an impending stall.

2. Description (Ref. Fig. 1)

A. The stall warning system consists of:

- an angle of attack transmitter on the right fuselage
- a stall warning computer
- an aural warning box in the nose section
- a stall warning caption on the instrument panel
- a weight switch in the left main landing gear leg and a potentiometer for indicating flaps position driven by the main wing outboard flap control system
- a STALL FAIL amber caution caption on the annunciator panel which gives indication of a failure of any of the system components.

3. Operation

A. Airstream direction data are sensed by the angle of attack (AOA) transmitter and are transmitted as an electrical analog signal to the stall warning computer. The computer, using the input from the AOA transmitter as its primary input, generates discrete outputs for warning and pre-flight test and continuous outputs to the AOA transmitter and the flap position potentiometer. The computer employs the external system of the main wing flaps position data to select the proper angle of attack threshold for stall warning and to select normalization parameters.
The system provides the pilot with the adequate information (visible and acoustical) when the airplane is approaching the stall threshold. The AOA transmitter, if enabled, gives information on the direction of the air flow (compared with a reference axis aligned with the airplane); the stall warning computer makes comparison with the threshold stall by the connection to the electronic control unit (ECU) of the flaps control system which permits the calculation of this threshold according to the position of the flaps.
An inpending stall situation causes operation of the warning acoustical signal (generated from the aural warning box as a result of the signal which is transmitted by the computer) and the lighting of the amber STALL caption on the left and right side of the instrument panel. A microswitch located on the left leg of the main landing gear disables the system when the aircraft is on the ground.
The system, powered from the essential bus, can be checked on the ground by setting the SYSTEM TEST selector in the STALL position and pushing the pushbutton.

When the selector is in STALL position a signal of "Test Request" is sent to the stall warning computer, to check the operation of the stall warning system. The sequence activated by the computer simulates an AOA transmitter failure and causes annunciation of the amber STALL FAIL caption. At the same time, the computer simulates an impending stall situation and causes the amber STALL caption to come on while the Aural Warning Box sends out an acoustical signal.

B. A further Low Speed Cues provide an approximation of stall speed, but not serve as a warning system substitute. The indication is represented on the PFD (Primary Flight Display) Airspeed Tape (Ref. Fig. 2)

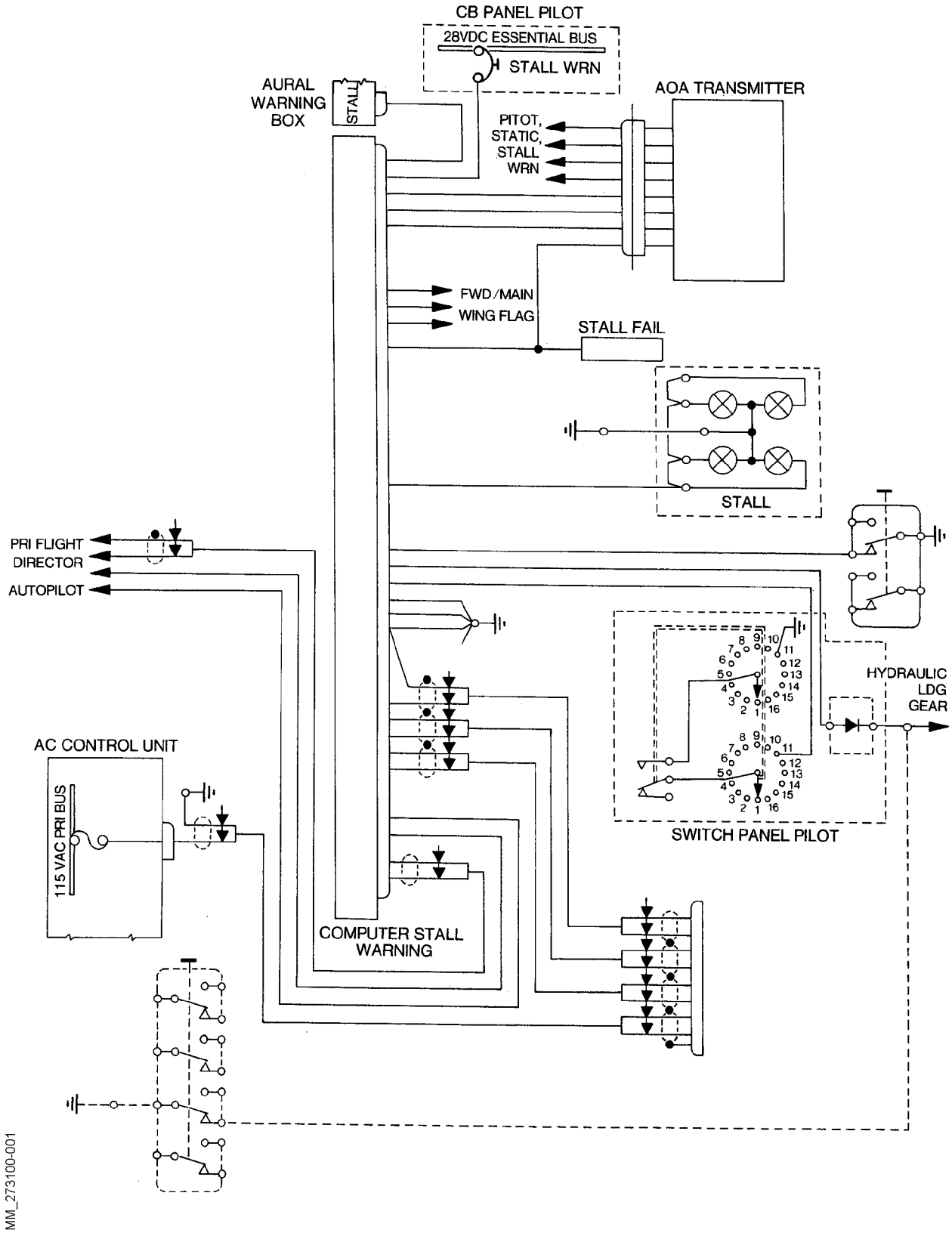
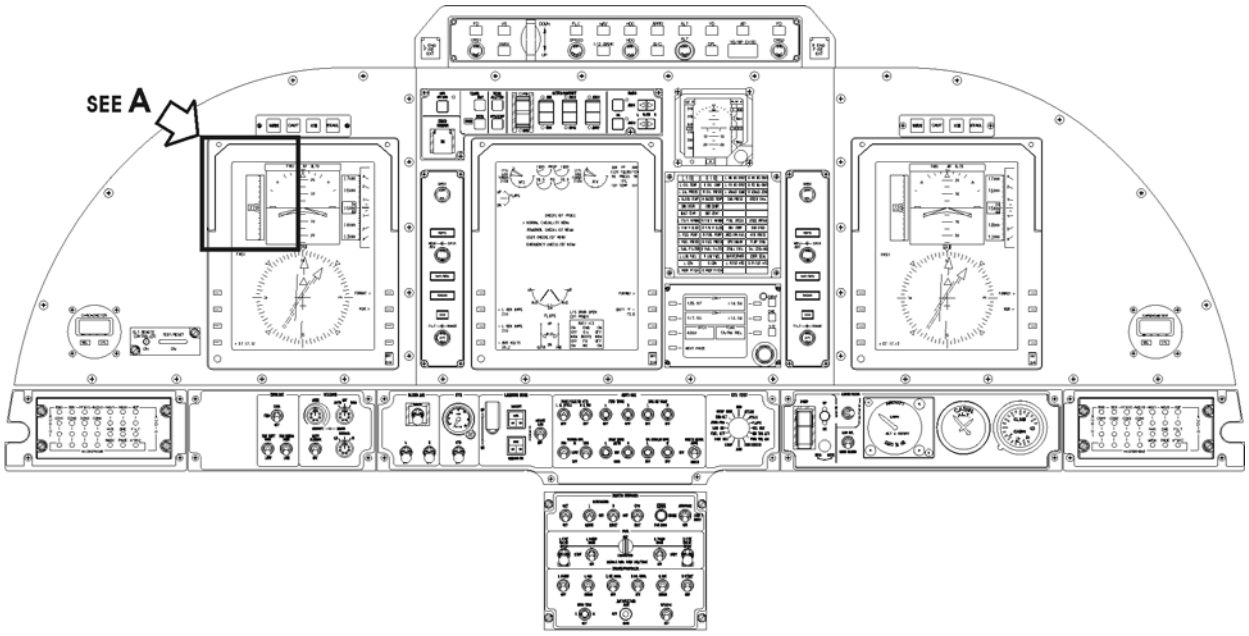


Fig. 1 - Stall Warning Electrical System Control Schematic



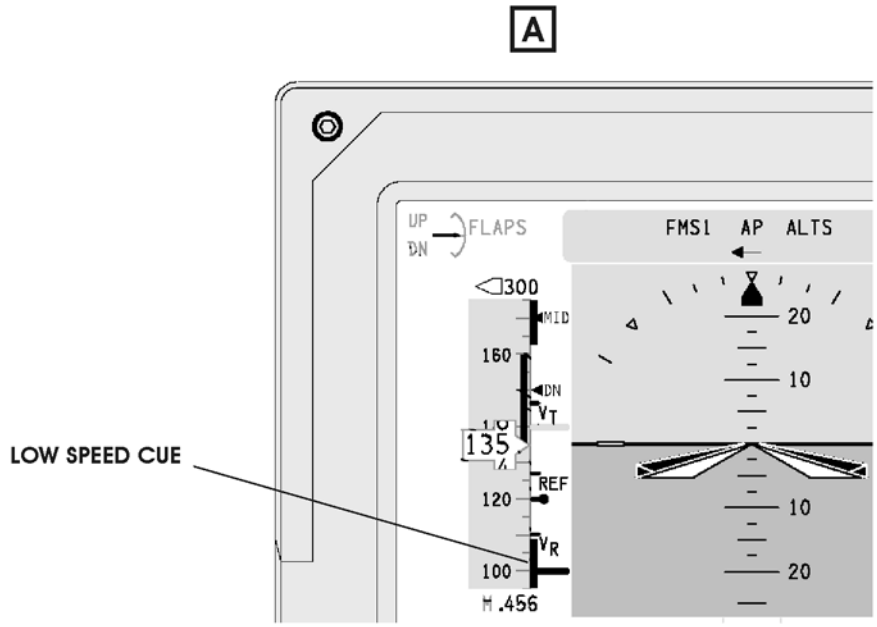


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Fig. 2 - Low Speed Cue Indication

STALL WARNING - MAINTENANCE PRACTICES

1. General

A. The AOA transmitter is located on the right side of the fuselage at FS 3425. The stall warning computer is installed in the flight compartment behind the center instrument panel. The red STALL caption is located on the upper left of the LH instrument panel.

2. AOA Transmitter - Removal (Ref. to Fig. 201)

A. Referenced Information

Maintenance Manual Chapter 25-20-00

B. Procedure

(1) Remove the trim panel from the right side of the passenger compartment in the area of FS 3425 (Refer to 25-20-00).

(2) Disconnect the electrical plug (9) from its connector.

NOTE: The correct installation angle of the transmitter is noted on a placard placed above the transmitter. In case the placard is unreadable make a note of the angle of the indexing ring in relation to the reference plate.

(3) Remove the four self-locking nuts (7) and the four step-washer clamps (8) which secure the AOA transmitter (4) to the reference plate (1).

(4) Remove the transmitter (4) complete with the indexing ring (6).

(5) Remove the indexing ring (6) from the transmitter.

(6) Make sure that the O-ring (3) remains in place or, if it becomes detached, that it is put where it will be safe.

3. AOA Transmitter - Installation (Ref. to Fig. 201)

A. Referenced Information

Maintenance Manual Chapter 25-20-00

B. Procedure

(1) Check the O-ring for damage and general condition; replace if required. Details of the O-ring will be found in the CMM for the transmitter.

(2) Make sure that the contact surfaces of the adapter ring (2) and the transmitter (4) are clean and free of damage.

(3) Install the indexing ring (6) on the transmitter (4); make sure that the dowels (5) engage in the holes in the indexing ring.

(4) Make sure the O-ring (3) is in place in the groove of the adapter ring (2), then install the transmitter and indexing ring assembly so that the transmitter flange is in full contact with the adapter ring (2).

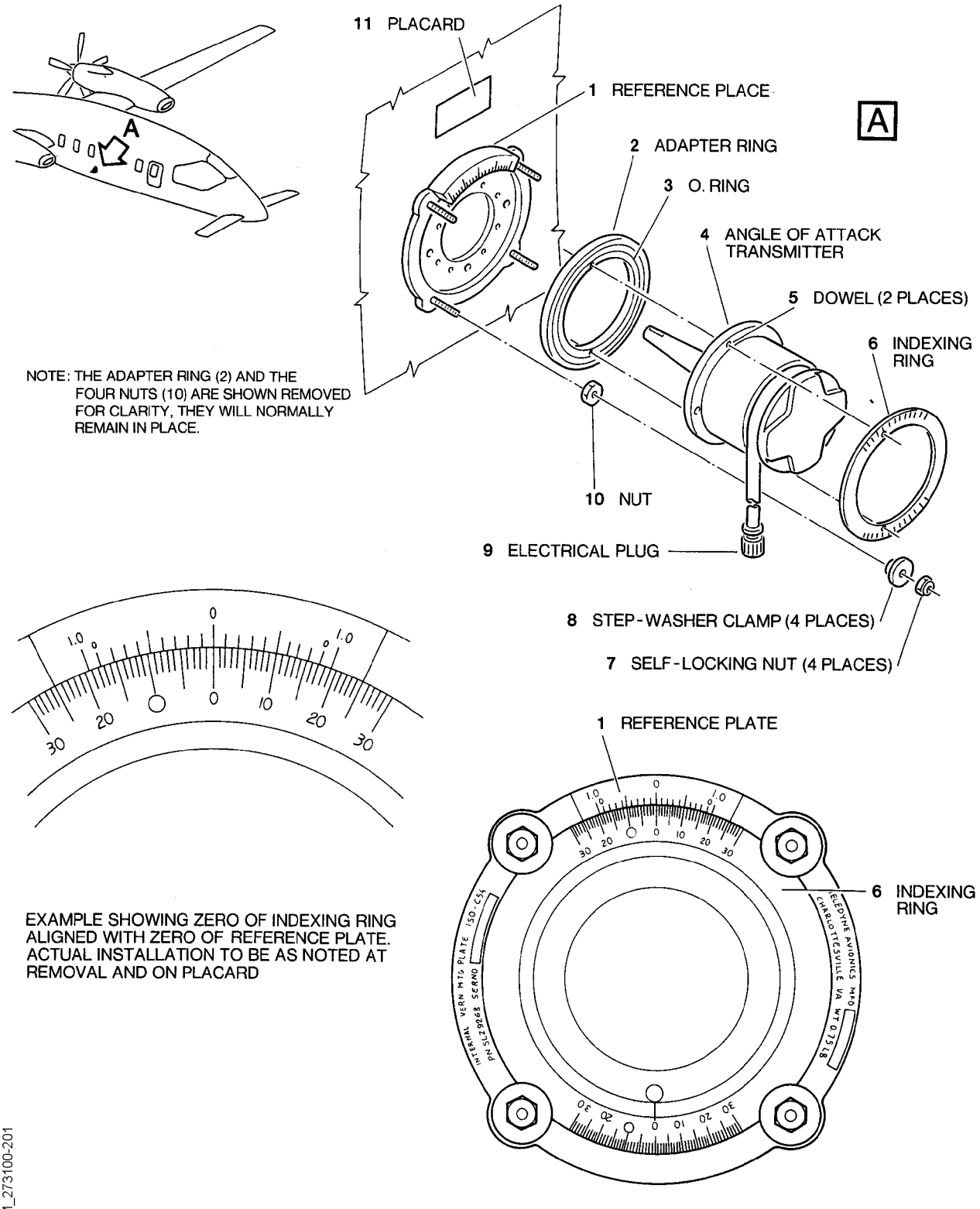

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Fig. 201 - AOA Transmitter - Removal/Installation

NOTE: A change in the position of the indexing ring (6) in relation to the reference plate (1) changes the stall warning speed. For example, if the indexing ring is repositioned 1 degree counterclockwise the stall warning speed will be reduced by approximately 4 knots.

(5) Position the transmitter (4) so that the zero of the indexing ring (6) is aligned with the reference plate (1) angle noted at removal and marked on the placard (11).
(6) Secure the transmitter and indexing ring assembly to the reference plate (1) with the four step-washer clamps (8) and self-locking nuts (7). Do not overtighten the nuts.
(7) Make sure that the indexing ring (6) is still aligned with the reference plate (1) within 0.2°.
(8) Connect the electrical plug (9) to its connector.
(9) Make sure that the transmitter cone is free to rotate.
(10) Do an operational test of the AOA transmitter as detailed in Page Block 501.
(11) Install the trim panel at the right side of the passenger compartment (Refer to 25-20-00).

4. Stall Warning Computer - Removal (Ref. to Fig. 202)

A. Referenced Information

Maintenance Manual Chapter 31-10-00

B. Procedure

(1) Make sure that the battery master switch is set to OFF.
(2) Remove the center instrument panel (Refer to 31-10-00).
(3) Disconnect the electrical plug (1) from the computer (2).
(4) Remove the four screws (3) which secure the computer (2) to its support.
(5) Remove the computer.

5. Stall Warning Computer - Installation (Ref. to Fig. 202)

A. Referenced Information

Maintenance Manual Chapter 31-10-00

B. Procedure

(1) Put the computer (2) into position on its support so that the electrical connector is towards the nose of the airplane.
(2) Secure the computer to its support with the four screws (3).
(3) Connect the electrical plug (1) to the connector.
(4) Install the center instrument panel (Refer to 31-10-00).
(5) Do an operational test of the stall warning system as detailed in Page Block 501.

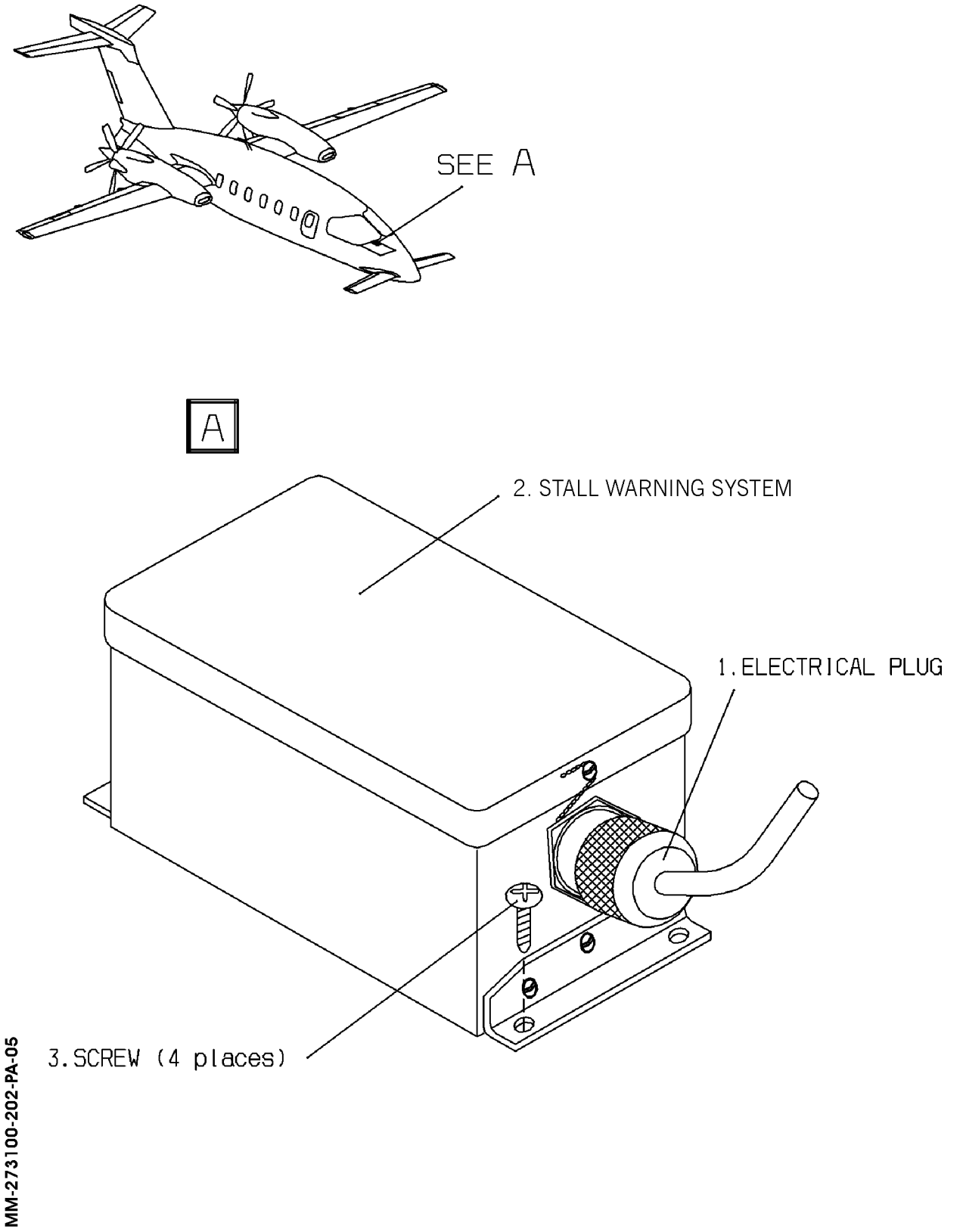

Fig. 202 - Stall Warning Computer - Removal/Installation

STALL WARNING - ADJUSTMENT/TEST

1. General

A. The STALL FAIL amber caption light comes on for the following reasons:

- when the battery switch is in ON position and the LH PITOT/STATIC HTR switch is in the OFF position.
- when a probe heater has failed.
- during the functional check.
- when the transmitter has failed.
- when the flap position signal has failed.
- when the electrical/signal supplies have failed.
- when the weight on wheels switch is made during flight or open when the airplane is on the ground.
- when the aural warning box has failed.

B. The STALL red caption comes on for the following reasons:

- when the airplane is in impending stall situation.
- when the flap position signal has failed.
- when the aural warning box has failed.

2. Test

A. Procedure - Stall Warning System Operational Test

(1) Set the battery master switch to BAT.

(2) Do the test:

	Action	Result
(a)	Set the SYS TEST selector to STALL and press the center button.	The red STALL caption comes on and the aural warning tone is activated. The amber STALL FAIL caption comes on then, after 15 to 20 seconds, goes off.
(b)	Release the center button.	The red STALL caption goes off and the aural warning tone is de-activated.

(3) Set the battery master switch to OFF.

B. Procedure - AOA Transmitter - Operational Test

NOTE: The AOA transmitter has two heating systems, one for the external cone and the other for the transmitter housing. The cone heating system is actuated by setting the LH PITOT/STATIC HTR switch to L & STALL, the housing heating system is actuated by setting the battery master switch to BAT.

(1) Do the test:

	Action	Result
(a)	Set the battery master switch to BAT.	The amber STALL FAIL caption comes on.

CAUTION: DO NOT HAVE THE LH PITOT/STATIC HTR SWITCH SET TO L & STALL FOR LONGER THAN IS NECESSARY TO DO THE TEST. THE HEATERS GENERATE MORE HEAT THAN CAN BE DISSIPATED WITHOUT A COOLING AIR FLOW AND CAN CAUSE DAMAGE.

(b)	Set the LH PITOT/STATIC HTR switch to L & STALL.	The amber STALL FAIL caption goes off and the transmitter cone starts to get hot.
(c)	Set the LH PITOT/STATIC HTR switch to OFF.	The amber STALL FAIL caption comes on.
(d)	Set the battery master switch to OFF.	The amber STALL FAIL caption goes off.

3. Stall Warning Check With "SYS TEST" (Visual and Acoustic Warning)

A. Procedure

(1) Close the following circuit breakers:

CB102 - AURAL WRN	Pilot panel
CB76 - STALL WRN	Pilot panel
CB95 - AOA HTR	Pilot panel
CB75 - L PITOT/STATIC HTR	Pilot panel

(2) To perform the following check the airplane must be on ground; if necessary this condition can be simulated by keeping both the nose landing gear and the right main landing gear microswitches pressed.

(3) Set the battery switch to BAT.

(4) Set the SYS TEST selector to STALL and momentarily press the test button as long as necessary to perform the test.

(5) Check that the STALL FAIL light on the annunciator panel and the two amber lights CAUT (MASTER WARNING LIGHT/RESET BUTTON) on the instrument panel, pilot and copilot side, come on.

(6) Successively the STALL FAIL light goes off, after 15÷20 seconds, the STALL red lights on the left upper side of the instrument panel as well as the related acoustic tone of the AURAL WARNING come on.

(7) The following checks should be performed:

Operation of the angle of attach transmitter and electrical circuit;
Operation of the stall warning computer;
Operation of the STALL FAIL and STALL lights and electrical cirucits.
Operation of the weight switch contact and flap position indicator potentiometer.

4. Stall Transmitter - Functional Check

A. Procedure

(1) With the airplane on ground (weight switch pressed) set the battery swtich to BAT.

(2) Carefully operate the stall transmitter cone (check the initial position and then rotate it either clockwise or counterclockwise) located exterior to the fuselage on the right side, flight direction.

(3) Check that neither acoustic or visual warnings come on.

(4) Put the airplane on jacks and check that both nose landing gear and main landing gear microswitches are not pressed and operate the stall transmitter cone as detailed in previous para.2.

(5) Check that both the STALL red light and the acoustic tone come on.

(6) The following checks should be performed:

Operation and activation of the weight switch.
Operation of the stall warning system.

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HORIZONTAL STABILIZER - DESCRIPTION AND OPERATION

1. General (Ref. to Fig. 1)

   A. The movable horizontal stabilizer serves as the pitch trim control surface. The stabilizer is attached to the vertical stabilizer at two points. The rear attachment is the pivot point and consists of two precision hinges. The forward attaching point is connected to a heavy duty electrical actuator. The actuator is hinged to the vertical stabilizer forward spar.

   B. The screwjack-type actuator moves the horizontal stabilizer to provide airplane longitudinal trim. The unit provides either manual or autopilot control of the stabilizer. The manual primary mode control is through two motors that provide different travel speeds of the horizontal stabilizer according to its position: low speed in the range from +2° to -2° degrees and high speed in the range from -2° to -8° degrees. The autopilot control and the manual emergency operations are through a third motor. A position transmitter within the actuator sends a signal to the pitch trim indicator located on the control pedestal in the flight compartment.

2. Operation (Ref. to Fig. 2 and 3)

   A. The horizontal stabilizer has a primary and a secondary mode of operation. The autopilot mode of operation is covered in Chapter 22-00-00. Primary and secondary modes are controlled through a three-position switch (PRI-OFF-SEC) located in the trim switch panel on the control pedestal. When in primary mode (switch set to PRI) the actuator can be either manually controlled by the trim and trim arming switch located on pilot and copilot control wheels, or driven by the autopilot. When in secondary mode (switch set to SEC) the actuator can only be controlled by a three-position momentary switch (NOSE UP-OFF-NOSE DOWN) located on the trim control panel on the control pedestal. In this condition the trim and trim arming switch and the autopilot are disconnected while only the low speed motor is engaged allowing stabilizer low speed travel in the +2° to -8° degrees range. In case of trim tab actuator runaway, two switches (Control Wheel Master Switches) are provided on both control wheels to deenergize the trim actuator itself.

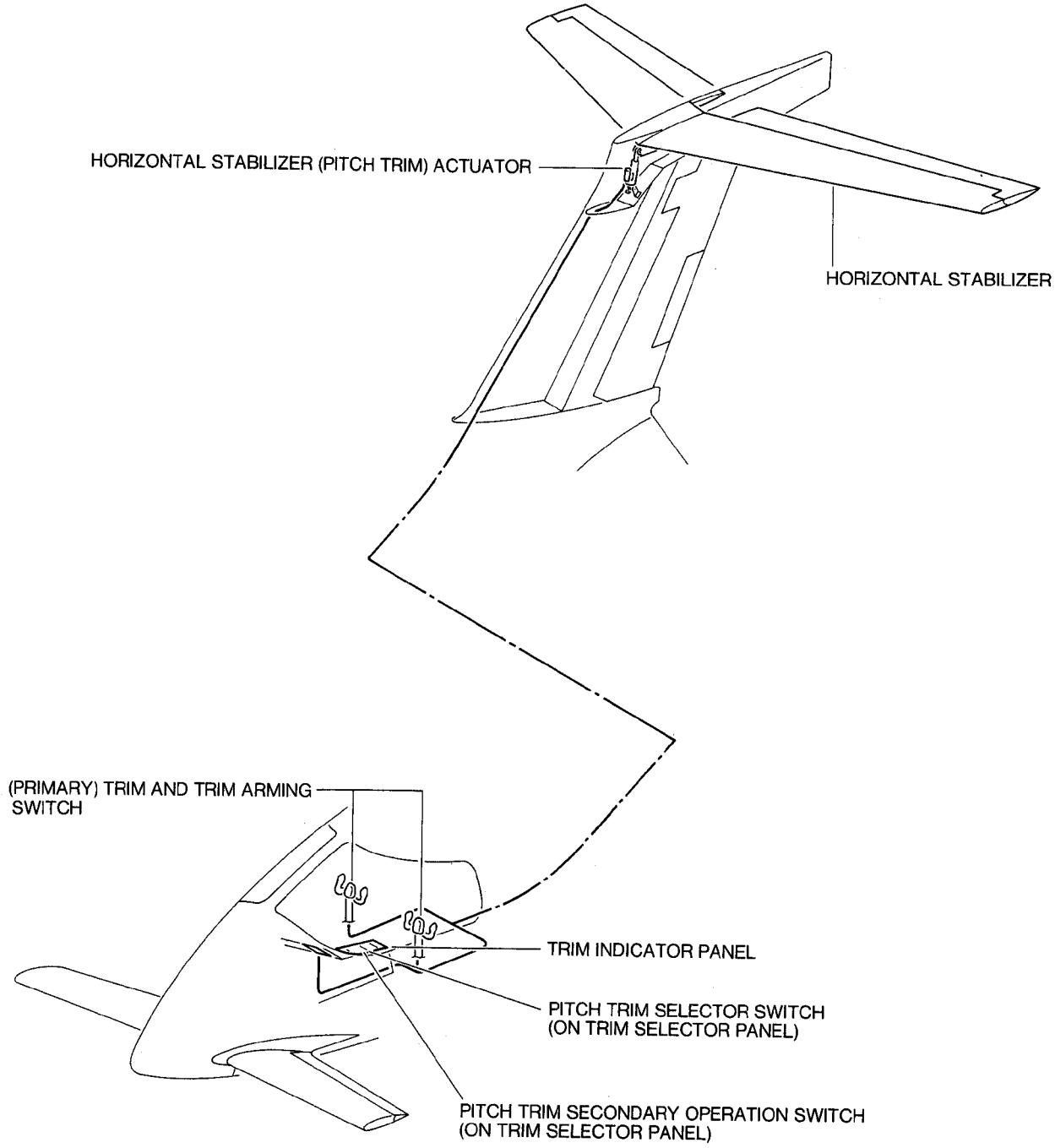

Fig. 1 - Horizontal Stabilizer (Pitch) Trim System

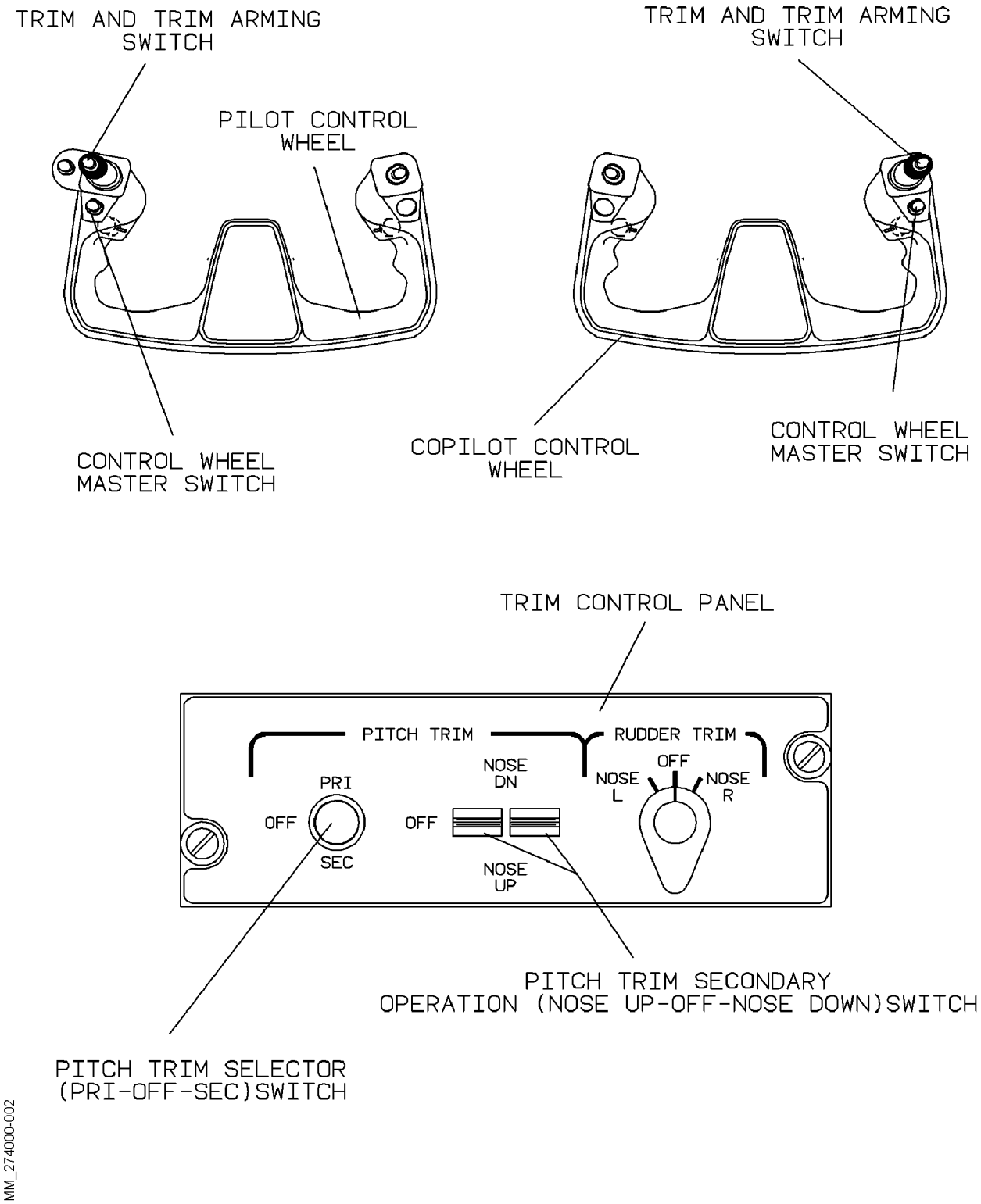

Fig. 2 - Pitch Trim Manual Controls Locations

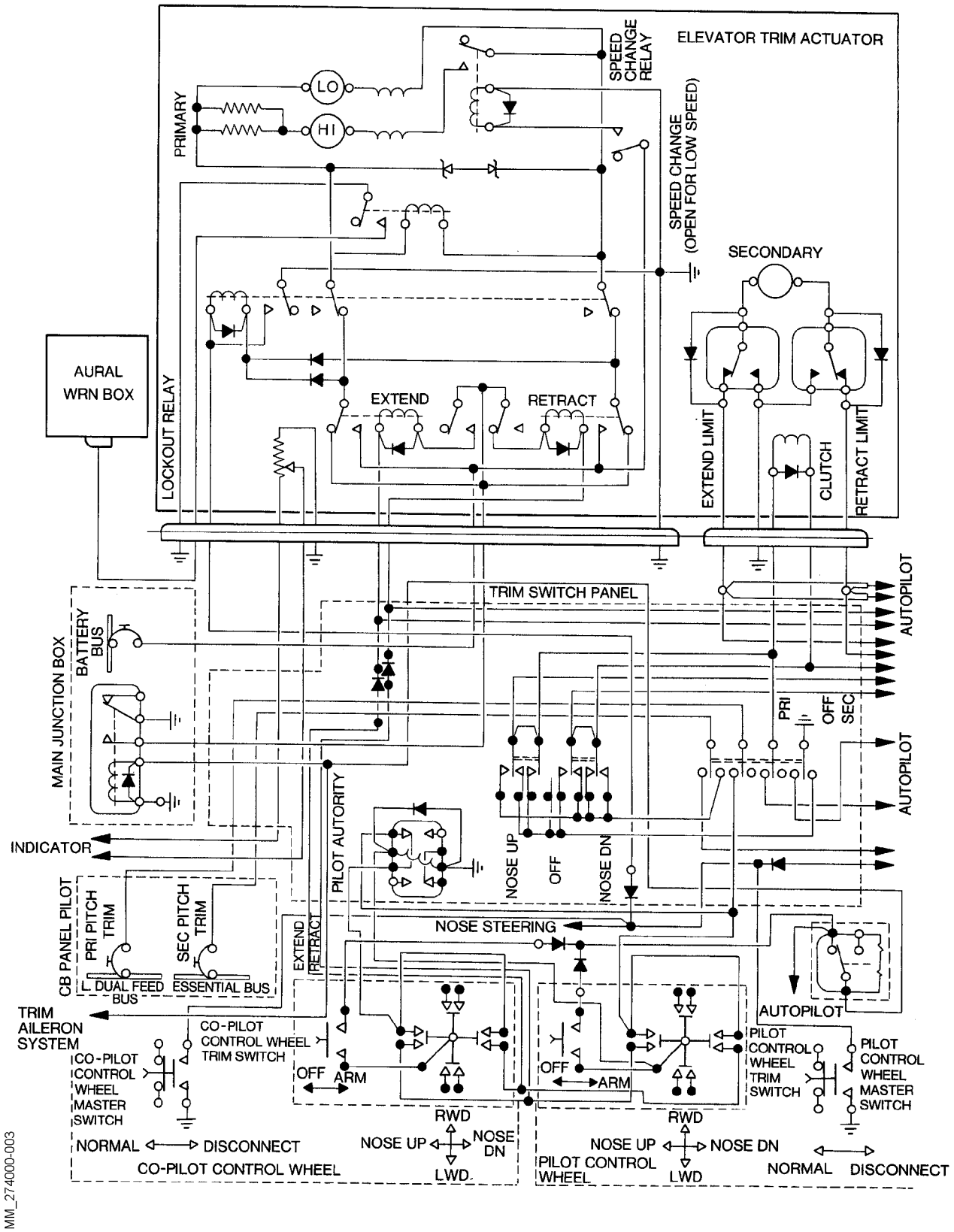

Fig. 3 - Pitch Trim Control Electrical Schematic

HORIZONTAL STABILIZER - MAINTENANCE PRACTICES

1. General

A. The horizontal stabilizer is attached to the vertical stabilizer at a dual hinge point and to the horizontal stabilizer (pitch trim) actuator.

B. Access to the horizontal stabilizer hinge is through access covers on the bottom surface of the horizontal stabilizer, each side of the vertical stabilizer.

2. Horizontal Stabilizer - Removal (Ref. to Fig. 201)

A. Fixtures, Test and Support Equipment

Warning Notice	Not Specified
Lifting Equipment and Sling	Not Specified

B. Referenced Information

Maintenance Manual Chapter 27-30-00
Maintenance Manual Chapter 22-00-00
Maintenance Manual Chapter 25-60-00
Maintenance Manual Chapter 33-42-00

C. Procedure

(1) Operate the pitch trim switch as required to set the horizontal stabilizer at -4°30' inclination.
(2) Put a warning notice in the flight compartment to tell other persons not to move the control columns or operate the pitch trim system.
(3) Remove both of the elevators (Refer to 27-30-00).
(4) Remove the elevator control cables from the elevator rear sector (Refer to 27-30-00).
(5) Remove the autopilot cables from the elevator rear sector (Refer to 22-00-00).
(6) Remove the nut (5), washer (4) and bolt (3) which secure the lower end of each of the two bellcranks "A" (1) to their supports (2).
(7) Remove the nut which secures the bonding jumper to the stabilizer near the hinges; disconnect the bonding jumper from the stabilizer.
(8) Remove the front fairing from the top of the vertical stabilizer.
(9) Remove the emergency locator transmitter (ELT) from the support plate at the top front of the vertical stabilizer (Refer to 25-60-00).
(10) Remove the power supply unit from the support plate at the top front of the vertical stabilizer (Refer to 33-42-00).
(11) Remove the six nuts, washers and bolts which secure the support plate to the vertical stabilizer; remove the support plate.

CAUTION: MAKE SURE THAT THE LIFTING EQUIPMENT AND SLING ARE CAPABLE OF SUPPORTING A LOAD OF AT LEAST 100 LBS (45 KG); THE HORIZONTAL STABILIZER WEIGHS 85 LBS (38.5 KG) APPROXIMATELY. MAKE SURE THAT THE SLING WILL NOT CAUSE ANY DAMAGE TO THE HORIZONTAL STABILIZER: USE SOFT PADDING AS REQUIRED BETWEEN THE SLING AND THE STABILIZER SURFACES.

(12) Install the lifting sling and take up the weight of the horizontal stabilizer.

(13) Remove and discard the cotter pin (13) at the stabilizer actuator upper attachment (12).

(14) Remove the nut (14) and washer (15) from the bolt (11).

(15) Remove the bolt (11). The bolt may be tight inside the hollow bolt (6); grip, turn and pull the bolthead to remove the bolt (11) together with the countersunk washer (10).

(16) Remove the lockwire from the nut (8) and remove the nut (8) and washer (9).

(17) Remove the hollow bolt (6) together with the countersunk washer (7).

(18) Remove and discard the two cotter pins (26) at the bellcrank "C" (16)/vertical stabilizer rear spar location.

(19) Remove the two nuts (25) and plain washers (22) from the bolts (18).

(20) Remove the two bolts (18). The bolts may be tight inside the hollow bolts (21); grip, turn and pull the bolthead to remove the bolt (18) together with the countersunk washers (19).

(21) Remove the lockwire from the two nuts (17) and remove the nuts (17) and four plain washers (20).

(22) Remove the two hollow bolts (21).

(23) Carefully maneuver the horizontal stabilizer rearwards and upwards to clear the vertical stabilizer.

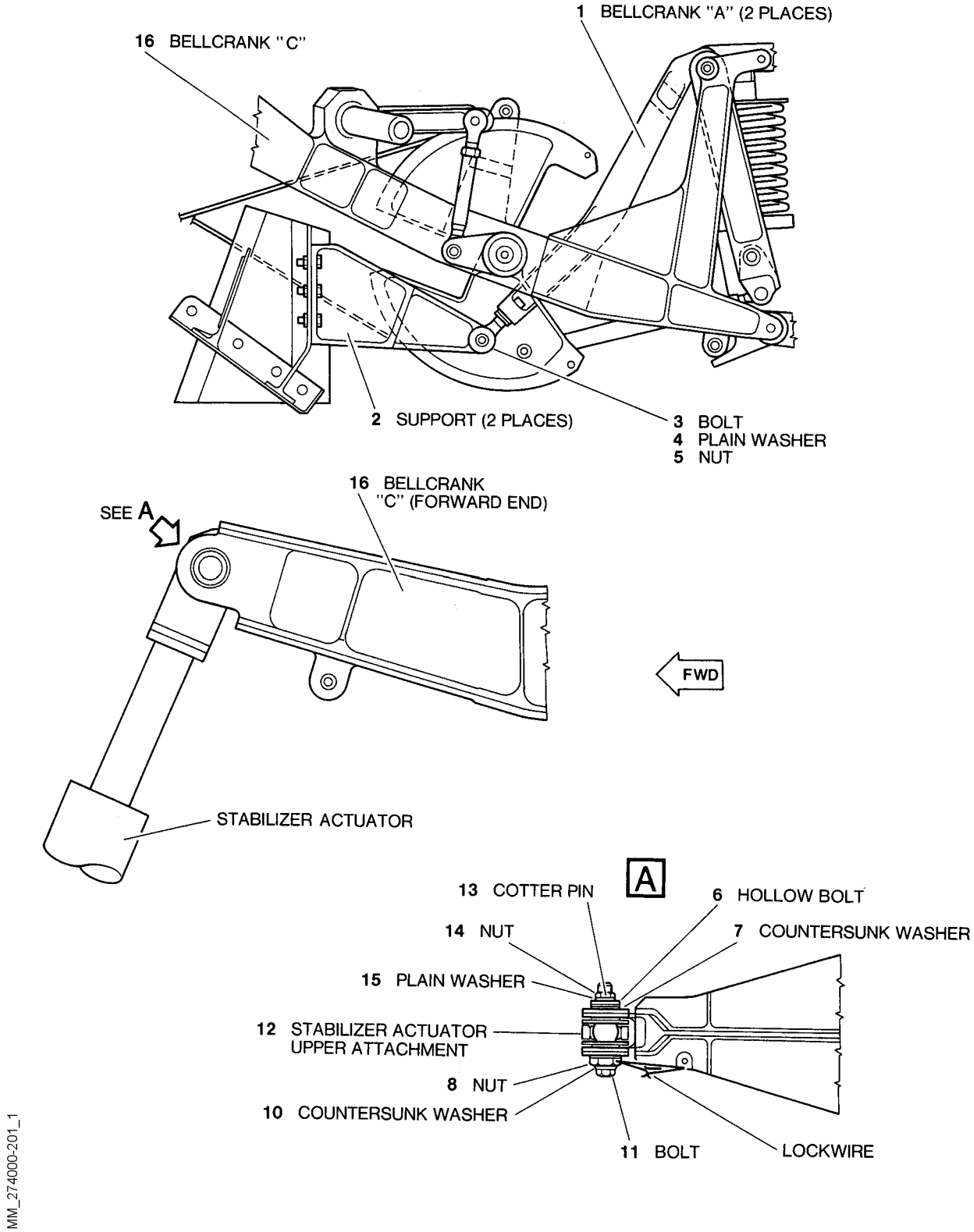

Fig. 201 - Horizontal Stabilizer - Removal/Installation (Sheet 1 of 2)

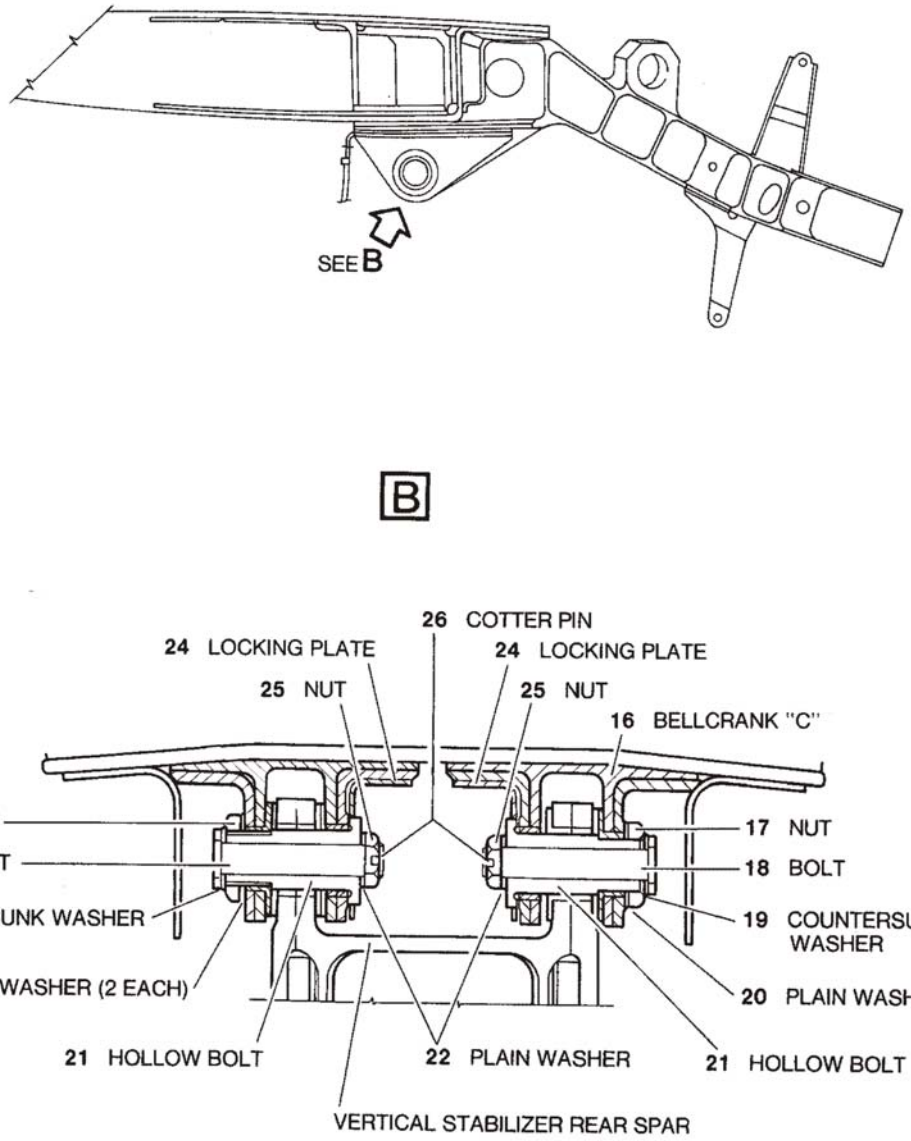

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Fig. 201 - Horizontal Stabilizer - Removal/Installation (Sheet 2 of 2)

3. Horizontal Stabilizer - Installation (Ref. to Fig. 201)

A. Tools

Torque Wrench	Not Specified

B. Consumble materials

Lockwire	04-008

C. Expendable Parts

Cotter pin (Fig. 201, item 26) Qty 2	MS 24665-302
Cotter pin (Fig. 201, item 13)	MS 24665-300

D. Referenced Information

Maintenance Manual Chapter 33-42-00
Maintenance Manual Chapter 25-60-00
Maintenance Manual Chapter 22-00-00
Maintenance Manual Chapter 27-30-00

E. Procedure

WARNING: WITHIN THIS PROCEDURE IT MAY BE NECESSARY TO CHILL BOLTS BEFORE THEY ARE INSTALLED; IF SO, DO NO TOUCH A CHILLED BOLT WITH BARE HANDS. USE PROTECTIVE GLOVES AND AN APPROPRIATE TOOL TO PICK UP THE CHILLED BOLT AND TO PUT THE BOLT INTO PLACE.

CAUTION: THE BOLTS AND HOLLOW BOLTS INSTALLED IN THIS PROCEDURE ARE OF THE CLOSE TOLERANCE FIT TYPE, AND MAY HAVE TO BE CHILLED BEFORE INSTALLATION. DO NOT USE A HAMMER OR OTHER SUCH TOOL TO INSTALL THE BOLTS; IF A BOLT CAN NOT BE INSTALLED BY HAND FORCE ONLY, CHILL THE BOLT AS REQUIRED TO ENABLE INSTALLATION WITHOUT EXCESSIVE FORCE. ALLOW TIME FOR THE BOLT TO REACH AMBIENT TEMPERATURE BEFORE TORQUE TIGHTENING.

NOTE: It is assumed that the lifting equipment and sling used during the removal procedure are in place and that the sling is installed in such a way that no damage to the horizontal stabilizer will result.

(1) Carefully lift and maneuver the horizontal stabilizer into position at the top of the vertical stabilizer so that the hinge fittings of the bellcrank "C" are aligned with the hinge fittings of the vertical stabilizer rear spar (Refer to Detail B of Fig. 201).
(2) Make sure that the bushings are correctly installed within the hinge fittings.
(3) Install the two hollow bolts (21) so that the boltheads are aligned inside the locking plates (24).

(4) Install two plain washers (20) and a nut (17) on each of the two hollow bolts (21).
(5) Torque tighten the nuts (17) to 100 lbf.in. (11.3 Nm) and safety the nuts with lockwire.
(6) Install a countersunk washer (19) on each of the two bolts (18) with the countersunk face of the washer against the bolthead.
(7) Install the two bolts (18).
(8) Install a plain washer (22) and a nut (25) on each of the two bolts (18).
(9) Torque tighten the nuts (25) to between 20 and 190 lbf.in. (2,26 and 21,47 Nm).

NOTE: It should be possible to align one of the cotter pin slots of the nut with the hole in the bolt within the torque range. If necessary, it is permissible to increase the torque to achieve alignment.

(10) Safety the two nuts (25) with new cotter pins (26).
(11) Make sure that the bushings are correctly installed within the upper attachment of the stabilizer actuator (12) and the forward end of the bellcrank "C".
(12) Align the holes of the actuator upper attachment and the forward end of bellcrank "C".
(13) Install a countersunk washer (7) on the hollow bolt (6) with the countersunk face of the washer against the bolthead.
(14) Install the hollow bolt (6) from the LH side.
(15) Install a plain washer (9) and nut (8) on the hollow bolt (6).
(16) Torque tighten the nut (8) to 100 lbf.in (11.3 Nm) and safety the nut with lockwire.
(17) Install a countersunk washer (10) on the bolt (11) with the countersunk face of the washer against the bolthead.
(18) Install the bolt (11) from the RH side.
(19) Install a plain washer (15) and nut (14) on the bolt (11).
(20) Torque tighten the nut (14) to between 100 and 270 lbf.in (11,3 and 30,5 Nm).

NOTE: It should be possible to align one of the cotter pin slots of the nut with the hole in the bolt within the torque range. If necessary, it is permissible to increase the torque to achieve the alignment.

(21) Safety the nut (14) with a new cotter pin (13).
(22) Connect the bonding jumper to the stabilizer.
(23) Install the support plate (of the ELT and power supply unit) at the top front of the vertical stabilizer; secure the support plate in place with the six bolts, washers and nuts.
(24) Install the power supply unit (Refer to 33-42-00).
(25) Install the ELT (Refer to 25-60-00).
(26) Install the front fairing at the top of the vertical stabilizer.
(27) Install the bolt (3), plain washer (4) and nut (5) to secure the lower end of each of the two bellcranks "A" (1) to its respective support (2).
(28) Install the ends of the elevator control cables at the elevator rear sector (Refer to 27-30-00).
(29) Install the autopilot cables at the elevator rear sector (Refer to 22-00-00).

(30) Install both of the elevators (Refer to 27-30-00).

(31) Do a functional test of the horizontal stabilizer as detailed in page block 501.

4. Horizontal Stabilizer (Pitch Trim) Actuator - Removal (Ref. to Fig. 202)

A. Procedure

WARNING: THE ELEVATOR SPRING PUTS A LOAD OF UP TO 290 LBS (131.5 KG) ON THE HORIZONTAL STABILIZER; THIS FORCE CAN CAUSE INJURY AND DAMAGE IF IT IS NOT NEUTRALIZED OR COUNTERACTED WHEN THE ACTUATOR ATTACHMENT BOLTS ARE REMOVED. FOR THIS REMOVAL PROCEDURE, THE STABILIZER SHOULD, IF POSSIBLE, BE SET AT THE -4°30' POSITION; THIS IS THE POSITION AT WHICH SPRING FORCE IS LOWEST. IF IT IS NOT POSSIBLE TO ACHIEVE THE -4°30' POSITION (DUE TO THE COMPLETE FAILURE OF THE ACTUATOR FOR EXAMPLE), IT WILL BE NECESSARY TO COUNTERACT SPRING FORCE TO PERMIT EASY REMOVAL OF THE ATTACHMENT BOLTS AND PREVENT INJURY AND DAMAGE.

(1) Operate the pitch trim switch as required to set the horizontal stabilizer at -4°30' inclination (Refer to the WARNING above).

(2) Open, tag and safety these circuit breakers:

Pilot CB Panel:

PRI PITCH TRIM

SEC PITCH TRIM

A/P SERVO AIL/RUD

A/P SERVO ELEV

(3) Remove the fillets from both sides of the horizontal stabilizer at the location where it meets the vertical stabilizer.

(4) Remove the front fairing from the top of the vertical stabilizer.

(5) Disconnect the two electrical plugs of the actuator from the connectors secured to the vertical stabilizer.

(6) Remove and discard the cotter pin (9) at the actuator upper attachment (8).

(7) Remove the nut (10) and washer (11) from the bolt (5).

(8) Remove the bolt (5). The bolt may be tight inside the hollow bolt (1); grip, turn and pull the bolthead to remove the bolt (5) together with the countersunk washer (4).

(9) Remove the lockwire from the nut (6) and remove the nut (6) and plain washer (7).

(10) Remove the hollow bolt (1) together with the countersunk washer (2). Refer to the WARNING given at the start of this procedure.

(11) Remove and discard the cotter pin (20) from the bolt (19).

(12) Remove the nut (21) and washer (22) from the bolt (16).

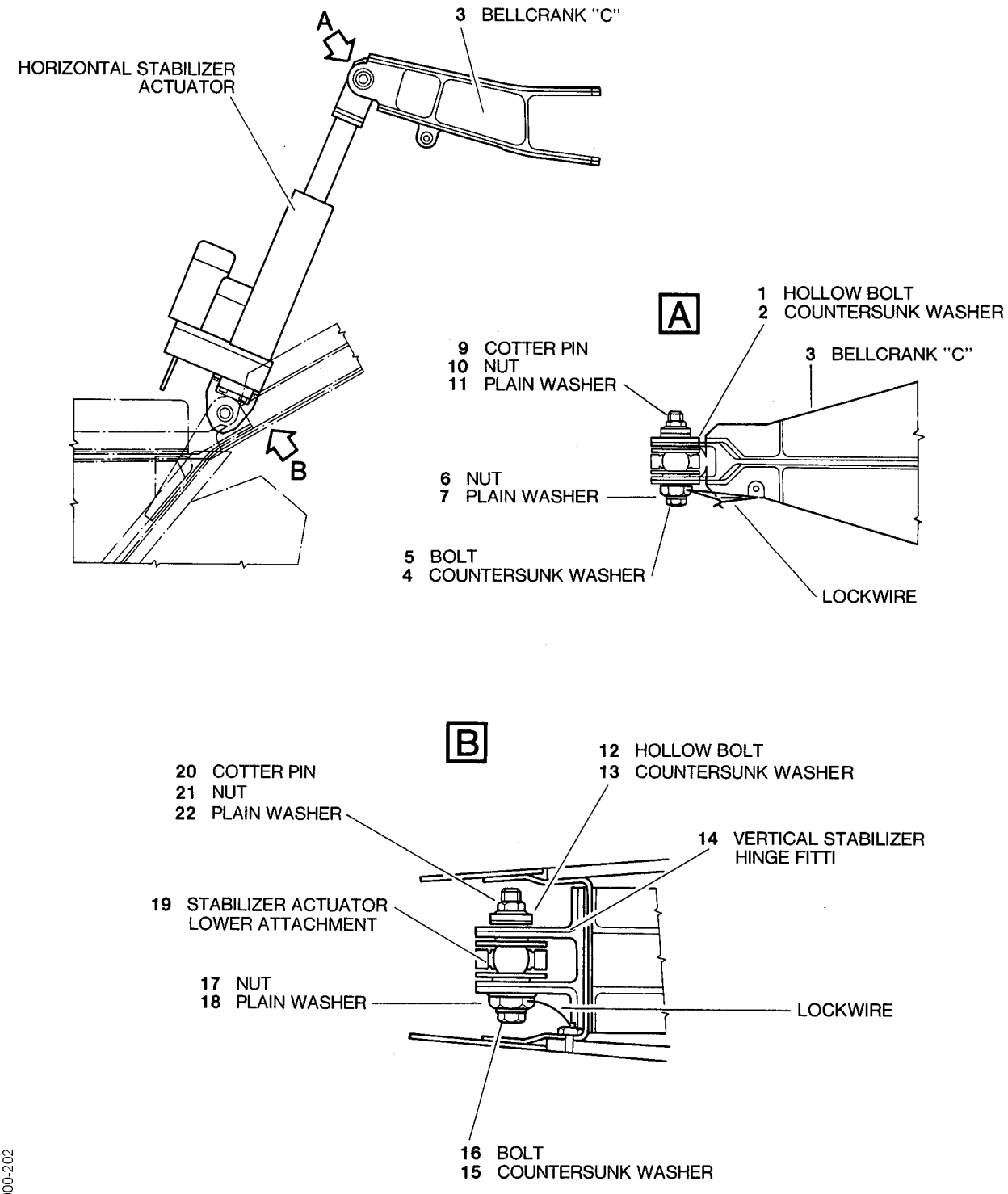

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Fig. 202 - Pitch Trim Actuator - Removal/Installation

(13) Remove the bolt (16). The bolt may be tight inside the hollow bolt (12); grip, turn and pull the bolthead to remove the bolt (16) together with the countersunk washer (15).
(14) Remove the lockwire from the nut (17) and remove the nut (17) and plain washer (18).
(15) Support the weight of the actuator.
(16) Remove the hollow bolt (12) together with the countersunk washer (13).
(17) Remove the actuator.

5. Horizontal Stabilizer (Pitch Trim) Actuator - Installation (Ref. to Fig. 202)

A. Tools

Torque Wrench	Not Specified

B. Consumble materials

Lockwire	04-008

C. Expendable Parts

Cotter Pin (Fig. 202 items 9 and 20) Qty.2	MS24665-300

D. Procedure

(1) Make sure that these circuit breakers are open, tagged and safetied:

Pilot CB Panel:
PRI PITCH TRIM
SEC PITCH TRIM
A/P SERVO AIL/RUD
A/P SERVO ELEV

WARNING: WITHIN THIS PROCEDURE IT MAY BE NECESSARY TO CHILL BOLTS BEFORE THEY ARE INSTALLED; IF SO, DO NO TOUCH A CHILLED BOLT WITH BARE HANDS. USE PROTECTIVE GLOVES AND AN APPROPRIATE TOOL TO PICK UP THE CHILLED BOLT AND TO PUT THE BOLT INTO PLACE.

CAUTION: THE BOLTS AND HOLLOW BOLTS INSTALLED IN THIS PROCEDURE ARE OF THE CLOSE TOLERANCE FIT TYPE, AND MAY HAVE TO BE CHILLED BEFORE INSTALLATION. DO NOT USE A HAMMER OR OTHER SUCH TOOL TO INSTALL THE BOLTS; IF A BOLT CAN NOT BE INSTALLED BY HAND FORCE ONLY, CHILL THE BOLT AS REQUIRED TO ENABLE INSTALLATION WITHOUT EXCESSIVE FORCE. ALLOW TIME FOR THE BOLT TO REACH AMBIENT TEMPERATURE BEFORE TORQUE TIGHTENING.

(2) Put the actuator into position as shown in Fig. 202.
(3) Align the holes of the actuator lower attachment (19) and the vertical stabilizer hinge fitting (14).
(4) Make sure that all bushings are correctly located within the actuator attachment (19) and the hinge fitting (14).
(5) Install the countersunk washer (13) on the hollow bolt (12) with the countersunk face of the washer against the bolthead.
(6) Install the hollow bolt (12) from the LH side.
(7) Install the plain washer (18) and nut (17) on the hollow bolt (12).
(8) Torque tighten the nut (17) to 100 lbf.in.(11.3 Nm) and safety the nut with lockwire.
(9) Install the countersunk washer (15) on the bolt (11) with the countersunk face of the washer against the bolthead.
(10) Install the bolt (11) from the RH side.
(11) Install a plain washer (22) and nut (21) on the bolt (11).
(12) Torque tighten the nut (21) to between 100 and 270 lbf.in (11,3 and 30,5 Nm).

NOTE: It should be possible to align one of the cotter pin slots of the nut with the hole in the bolt within the torque range. If necessary, it is permissible to increase the torque to achieve the alignment.

(13) Safety the nut (21) with a new cotter pin (20).
(14) Align the holes of the actuator upper attachment (8) and the bellcrank "C" (3) hinge fitting.
(15) Make sure that all bushings are correctly located within the actuator attachment (8) and the bellcrank "C" (3) hinge fitting.'
(16) Install the countersunk washer (2) on the hollow bolt (1) with the countersunk face of the washer against the bolthead.
(17) Install the hollow bolt (1) from the LH side.
(18) Install the plain washer (7) and nut (6) on the hollow bolt (1).
(19) Torque tighten the nut (6) to 100 lbf.in.(11.3 Nm) and safety the nut with lockwire.
(20) Install the countersunk washer (4) on the bolt (5) with the countersunk face of the washer against the bolthead.
(21) Install the bolt (5) from the RH side.
(22) Install the plain washer (11) and nut (10) on the bolt (5).
(23) Torque tighten the nut (10) to between 100 and 270 lbf.in (11,3 and 30,5 Nm).

NOTE: It should be possible to align one of the cotter pin slots of the nut with the hole in the bolt within the torque range. If necessary, it is permissible to increase the torque to achieve the alignment.

(24) Safety the nut (10) with a new cotter pin (9).
(25) Connect the two electrical plugs to the connectors secured to the vertical stabilizer.
(26) Install the front fairing at the top of the vertical stabilizer.
(27) Install the fillets at both sides of the horizontal stabilizer.

(28) Remove the tags and close these circuit breakers:

Pilot CB Panel:
PRI PITCH TRIM
SEC PITCH TRIM
A/P SERVO AIL/RUD
A/P SERVO ELEV

(29) Do a functional test of the horizontal stabilizer as detailed in page block 501.
(30) Adjust the Pitch Trim Indicator (Refer to Para 8).

6. Pitch Trim Position Indicator - Removal (Ref. to Fig. 203)

A. Procedure

(1) Unlock the two fasteners of the trim indicator panel located on the flight compartment control pedestal.
(2) Pull the trim indicator panel from the pedestal to get access to the electrical plug at the rear.
(3) Disconnect the electrical plug and remove the trim indicator panel.

7. Pitch Trim Position Indicator - Installation (Ref. to Fig. 203)

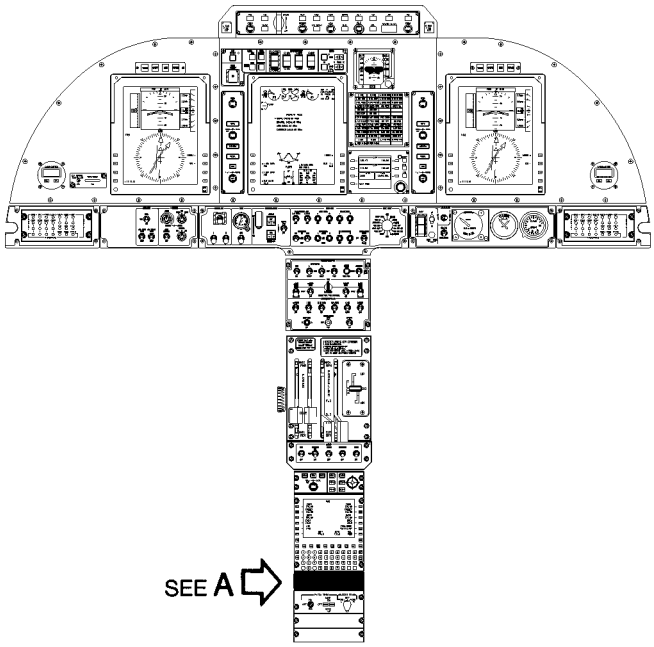
A. Procedure

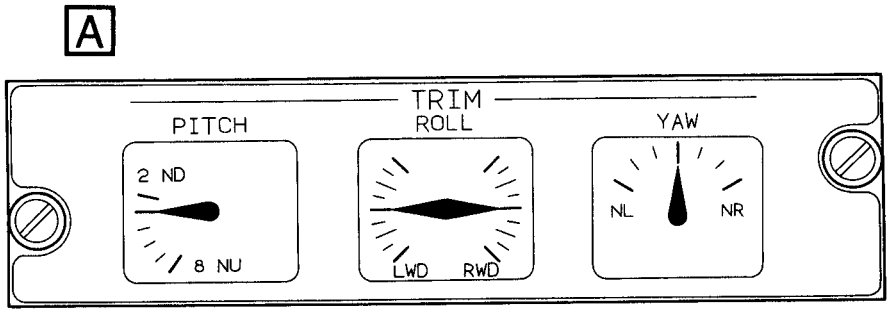
(1) Connect the electrical plug at the rear.
(2) Position the trim indicator panel in the pedestal and lock it in position with the fasteners.
(3) Do the indicator operational test (Refer to page block 501).

8. Pitch Trim Indicator - Adjustment(Ref. to Fig. 203

A. Procedure

(1) Level the Airplane (Refer to Chapter 8).
(2) With Pitch Trim selector to PRI position move the HTTA to full retracted position.
(3) Measure the Stabilizer inclination (8° NU).
(4) Adjust the "zero" Pitch potentiometer to have 8° NU indication.
(5) Move the HTTA to full extended position.
(6) Measure the Stabilizer inclination (2° ND).
(7) Adjust the "full scale" Pitch potentiometer to have 2 ND indication.





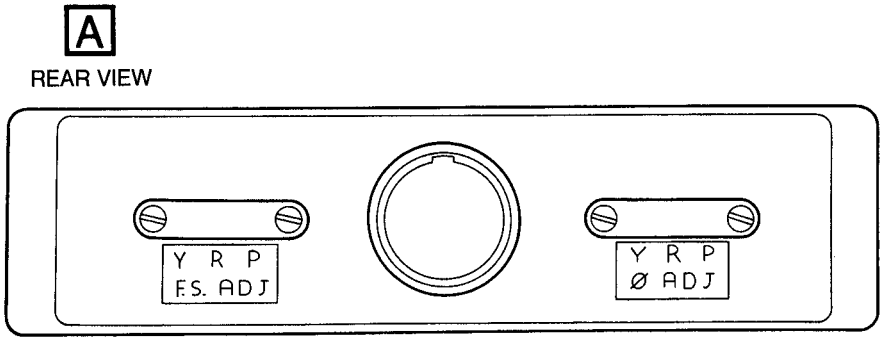


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Fig. 203 - Pitch Trim Position Indicator - Removal/Installation

HORIZONTAL STABILIZER - ADJUSTMENT/TEST

1. General (Ref. Fig. 501)

   A. During the adjustment/test procedures the pitch trim indicator is used as a means of checking the nose up or nose down position of the horizontal stabilizer. Accurate measurements of the angle of incidence of the horizontal stabilizer is done using an inclinometer placed on top of an elevator travel board which installs on the stabilizer.

   B. There are no adjustment procedures for the horizontal stabilizer. The extent of movement of the stabilizer is controlled by the actuator which incorporates pre-set limit switches to stop movement when full angular deflection is reached.

   C. Unless otherwise specified, the pitch trim selector switch is set to the PRI position during the test procedures.

2. Test

   A. Fixtures, Test and Support Equipment

Elevator Travel Board (LH or RH)	80-909165-801 or -802
Inclinometer	Not Specified
Warning Notice	Not Specified
Stopwatch	Not Specified

   B. Referenced Information

   Maintenance Manual Chapter 08-20-00
   Maintenance Manual Chapter 24-00-00

   C. Procedure - Horizontal Stabilizer Operational Test

   (1) Make sure that electrical power is available (Refer to 24-00-00).
   (2) Do the test:

	Action	Result
(a)	Press and hold the trim and trim arming switch (on the pilot's control wheel) to the NOSE DN position.	The leading edge of the horizontal stabilizer moves up and the pitch indicator pointer moves to the 2 ND position.
(b)	Press and hold the trim and trim arming switch to the NOSE UP position.	The leading edge of the horizontal stabilizer moves down and the pitch indicator pointer moves to the 8 NU position.

Action	Result
(c) Press and hold the trim and trim arming switch to the NOSE DN position until the pitch indicator pointer moves one full increment (2 degrees); this is the 0° position of the stabilizer.	The leading edge of the stabilizer moves up to the neutral position.

D. Procedure - Horizontal Stabilizer Functional Test

(1) Put a warning notice in the flight compartment to tell other persons not to move the control columns or to operate the pitch trim system.
(2) Install the elevator travel board and the inclinometer at the horizontal stabilizer.
(3) Make the airplane level (Refer to 08-20-00).
(4) Make sure that electrical power is available (Refer to 24-00-00).
(5) Do the test:

Action	Result
(a) Operate the pitch trim switch to set the horizontal stabilizer at the neutral (0*) position as measured at the inclinometer.	The pointer of the pitch trim indicator should be horizontal in line with the increment which equates to 0°.
(b) Press and hold the trim and trim arming switch to the NOSE DN position (until the stabilizer stops moving).	The leading edge of the stabilizer moves up and the pitch indicator pointer moves to the 2 ND position.
(c) Make a note of the angle of the horizontal stabilizer as measured by the inclinometer.	The measured angle should be 2° (-0° +30').
(d) Start the stopwatch and, at the same time, press and hold the trim and trim arming switch to the NOSE UP position. Stop the watch when the stabilizer stops moving.	The leading adge of the stabilizer moves down and the pitch indicator pointer moves to the 8 NU position. As the stabilizer moves through the -2* position the high rate motor of the actuator starts.

	Action	Result
(e)	Make a note of the time recorded on the stopwatch. Set the stopwatch to zero.	The time taken from the full nose down position to the full nose up position should be 35 ± 5 seconds.
(f)	Make a note of the angle of the horizontal stabilizer as measured by the inclinometer.	The measured angle should be -8° (-10' + 42') .
(g)	Start the stopwatch and, at the same time, press and hold the trim and trim arming switch to the NOSE DN position. Stop the watch when the stabilizer stops moving.	The leading edge of the stabilizer moves up and the pitch indicator pointer moves to the 2 ND position. As the stabilizer moves through the 2° position the high rate motor of the actuator stops.
(h)	Make a note of the time recorded on the stopwatch. Set the stopwatch to zero.	The time taken from the full nose up position to the full nose down position should be 35 ± 5 seconds.

(6) Set the pitch trim selector switch (located on the trim control panel at the rear of the control pedestal) to the SEC position.

(7) Continue the test:

(i)	Start the stopwatch and, at the same time, set and hold both halves of the secondary trim switch to the NOSE UP position. Stop the watch when the stabilizer stops moving.	The leading edge of the stabilizer moves down and the pitch indicator pointer moves to the 8 NU position.
(j)	Make a note of the time recorded on the stopwatch. Set the stopwatch to zero.	The time taken from the full nose down position to the full nose up position should be between 52.5 and 67.5 seconds.
(k)	Start the stopwatch and, at the same time, set and hold both halves of the secondary trim switch to the NOSE DN position. Stop the watch when the stabilizer stops moving.	The leading edge of the stabilizer moves up and the pitch indicator pointer moves to the 2 ND position.

(l)	Make a note of the time recorded on the stop watch. Set the stopwatch to zero.	The time taken from the full nose up position to the full nose down position should be between 52.5 and 67.5 seconds.

(8) If any of the measurements of stabilizer angular travel are not within the specified limits do the functional test again. If the angular measurement(s) is(are) still outside the specified limits replace the actuator and do the test again until satisfactory.

(9) If any of the times noted for the full range of travel (fully up to fully down or fully down to fully up) are not within the specified limits do the functional test again. If the time(s) is(are) still outside the specified limits replace the actuator and do the test again until satisfactory.

(10) Set the pitch trim selector switch to the PRI position.

(11) Operate the trim and trim arming switch (on the control wheel) as required to set the stabilizer at the 0* (neutral) position.

(12) Remove the inclinometer and the elevator travel board from the horizontal stabilizer.

(13) Remove the warning notice from the flight compartment.

(14) Depending on the method used to make the airplane level:

(a) Lower the airplane and remove the jacks.

or

(b) Inflate the shock absorbers and tires to the correct pressures.

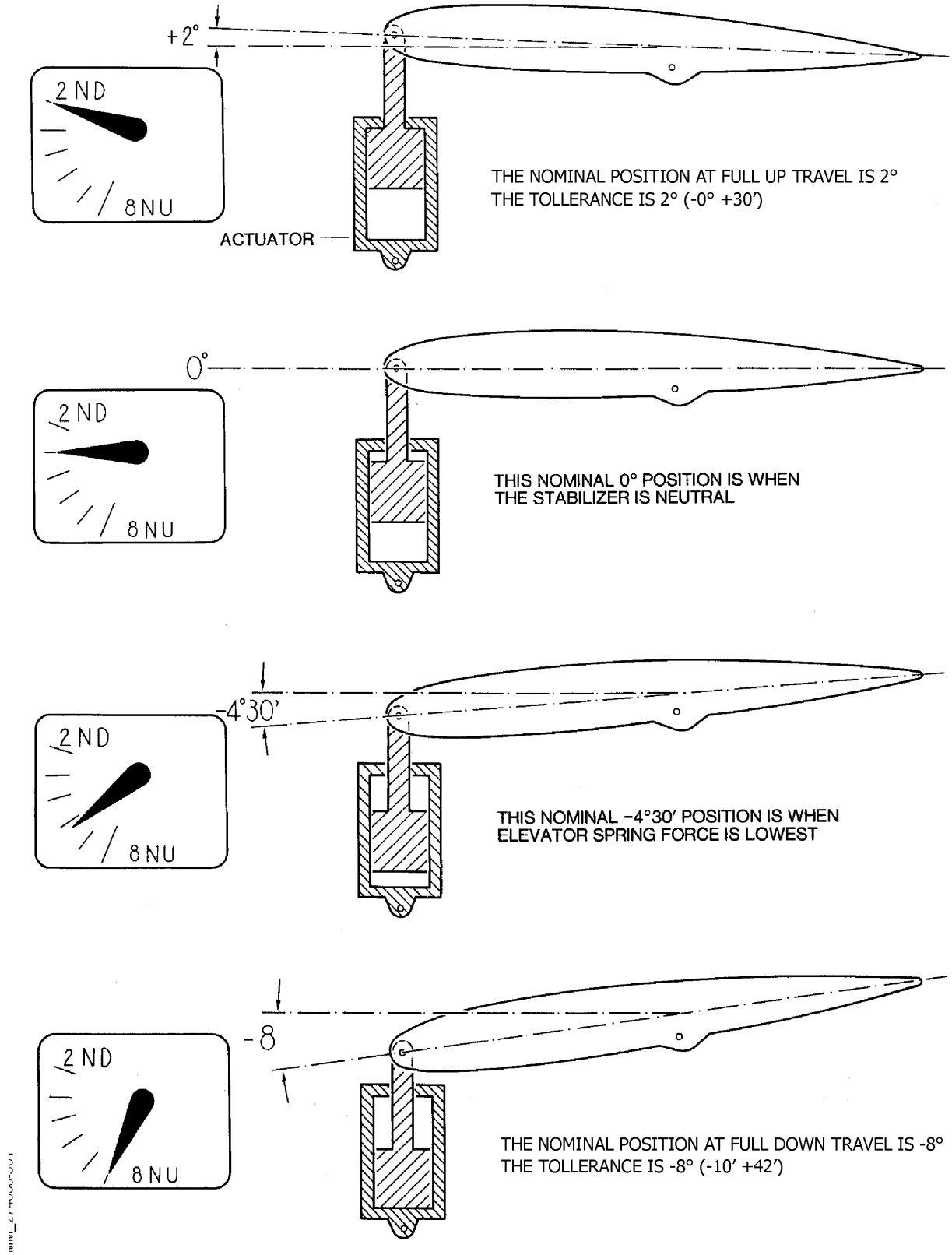

Fig. 501 - Horizontal Stabilizer Travel Limits - Schematic

3. Horizontal Stabilizer - Friction Test(Refer to Figg. 201 Ch. 27-40-00, 203 Ch. 27-30-00, 502 of this Section)

A. Procedure

(1) Operate the pitch trim switch as required to set the horizontal stabilizer at -4°30' inclination.

(2) Put a warning notice in the flight compartment to tell other persons not to move the control columns or operate the pitch trim system.

(3) Open, tag and safety the following circuit breakers:
- PRI PITCH TRIM
- SEC PITCH TRIM
- A/P SERVO AIL/RUD
- A/P SERVO ELEV

(4) Remove the front fairing from the top of the vertical stabilizer.

WARNING: THE ELEVATOR SPRING PUTS A LOAD OF UP TO 290 LBS (131.5 KG) ON THE HORIZONTAL STABILIZER; THIS FORCE CAN CAUSE INJURY AND DAMAGE IF IT IS NOT NEUTRALIZED OR COUNTERACTED WHEN THE ACTUATOR ATTACHMENT BOLTS ARE REMOVED. FOR THIS REMOVAL PROCEDURE, THE STABILIZER SHALL BE SET AT THE -4°30' POSITION; THIS IS THE POSITION AT WHICH SPRING FORCE IS LOWEST. IF IT IS NOT POSSIBLE TO ACHIEVE THE -4°30' POSITION (DUE TO THE COMPLETE FAILURE OF THE ACTUATOR FOR EXAMPLE), IT WILL BE NECESSARY TO COUNTERACT SPRING FORCE TO PERMIT EASY REMOVAL OF THE ATTACHMENT BOLTS AND PREVENT INJURY AND DAMAGE.

(5) From step 6 to step 10 refer to Refer to Figure 201.

(6) Remove and discard the cotter pin (13) at the stabilizer actuator upper attachment (12).

(7) Remove the nut (14) and washer (15) from the bolt (11).

(8) Remove the bolt (11). The bolt may be tight inside the hollow bolt (6); grip, turn and pull the bolt head to remove the bolt (11) together with the countersunk washer (10).

(9) Remove the lock wire from the nut (8) and remove the nut (8) and washer (9).

(10) Remove the hollow bolt (6) together with the countersunk washer (7).

(11) Insert the lock pin on the elevator spring assy as indicated in Figure 203 detail "L".

(12) Insert a wooden plug between the stabilizer fwd arm and the fwd vertical fin spar. (Refer to Figure 502)

(13) Remove the nut (5), washer (4) and bolt (3) which secure the lower end of each of the two bell cranks "A" (1) to their supports (2). (Refer to Figure 201)

NOTE: The horizontal stabilizer with the wooden plug shall be positioned at NOSE DOWN angle.

(14) Connect the dynamometer to the Horizontal Stabilizer fwd clevis (HTTA connection – point A in fig. 201) and move down the Horizontal Stabilizer along the four position indicated in table 1. For each movement record the required force from dynamometer. The applied force shall not be greater than 40 Kg. If an higher value is required contact Piaggio Aero Industries Customer Support Department, otherwise no other action are required.

Table 1: Recorded Values of Friction

Nose pos.	1st Meas.	2nd Meas.	3rd Meas.	Average Meas.
NOSE DOWN				
25%				
50%				
75%				
NOSE UP				

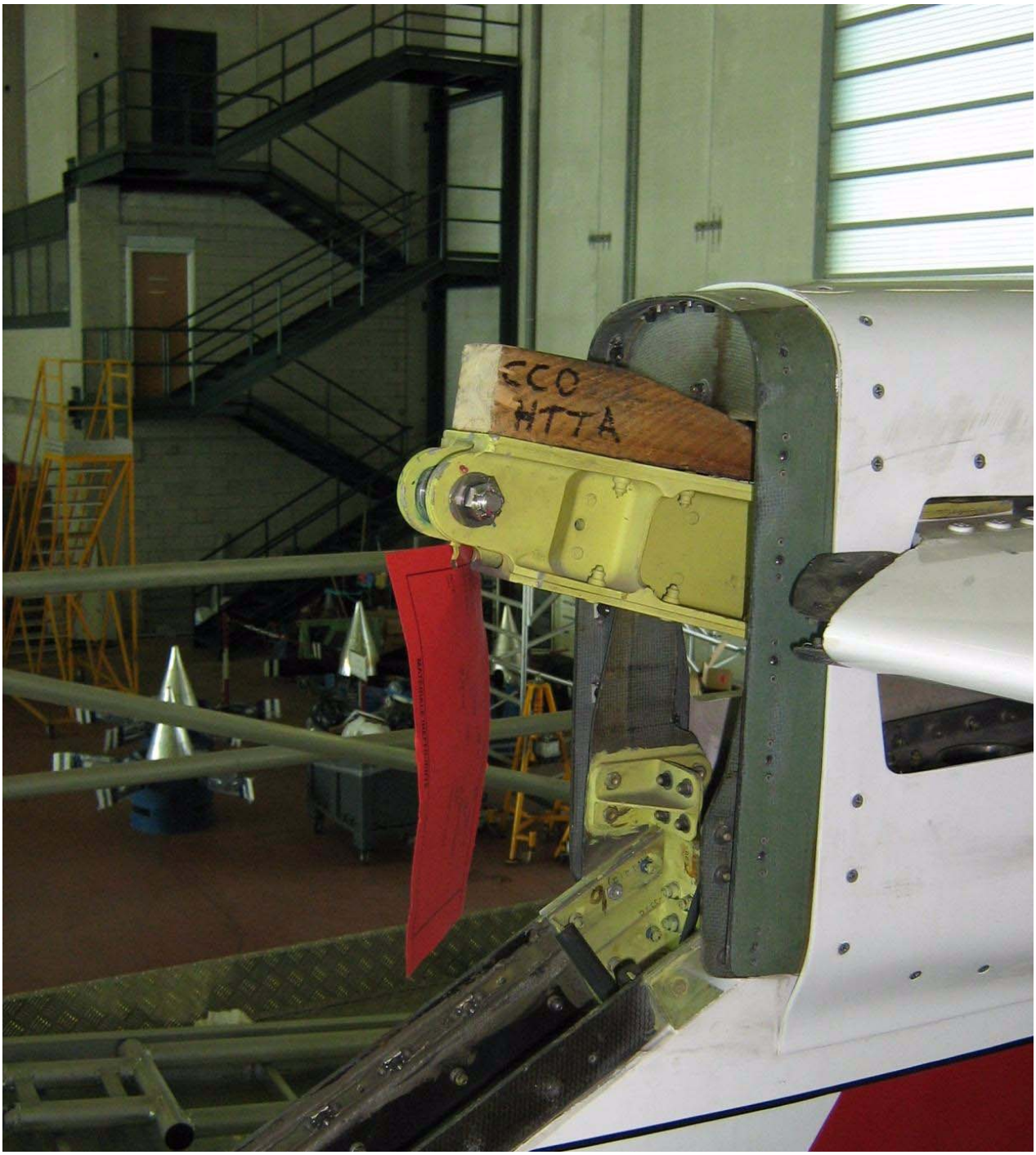

Fig. 502 - Horizontal Stabilizer - Friction Test

FLAPS - DESCRIPTION AND OPERATION

1. General

The electronically-controlled and electromechanically-operated flaps provide the required extra lift to the wings when partially extended, and the required lift and drag (to reduce airplane speed for landing) when fully extended.
The flap system comprises four subsystems:

- Main Wing Outboard Flaps (MWOF)
- Main Wing Inboard Flaps (MWIF)
- Forward Wing Left Flap (FWLF)
- Forward Wing Right Flap (FWLF)

2. Description (Ref. to Fig. 1 and 2)

A. The flap system comprises:

- flaps (of the single-slotted type) on both the main and forward wings
- an electrical actuator for each of the two forward wing flaps
- a drive unit consisting of two electrical motors, one for the main wing outboard flaps and one for the main wing inboard flaps
- a FLAP control lever
- an electronic control unit
- a flaps position indication, displayed on the MFD (Multifunction Display) System Page.
- associated potentiometers, microswitches and electrical/mechanical interconnections.

B. The left and right forward wings each have a flap (FWLF and FWRF) which extends the full length of the trailing edge. Each flap is hinged to the rear spar of the forward wing at two locations and is operated by its own (independent) actuator which is located in the forward wing.

C. The left and right main wings each have inboard and outboard flaps (MWIF and MWOF); the inboard flap extends from the root of the wing trailing edge to the inboard side of the nacelle, and the ouboard flap extends from the outboard side of the nacelle to the inboard end of the aileron.
The inboard flaps are operated by an electric motor through a rotating drive rod and screwjack system. The centrally located motor has two drives which extend to the screwjack of the left and right inboard flap.
The outboard flaps are operated in the same way as the inboard flaps (by their own electric motor) except that each outboard flap has two screwjacks. Each outboard flap tapers (toward the outboard end) and the ends extend at slightly different rates; the two screwjacks are of different lengths but have the same number of threads, so the shorter (outboard) screwjack moves a shorter distance for the same number of turns as the longer screwjack.

D. Flaps position is selected by operation of the FLAPS control lever located on the control pedestal in the flight compartment. The lever, which is "gated" to prevent inadvertent movement, has three positions:

UP - all flaps fully retracted (CLEAN configuration)
MID - all flaps partially extended (TAKEOFF configuration)
DN - all flaps fully extended (LANDING configuration).

The lever operates a flap selector switch which is connected to the flap motors and actuators through an Electronic Control Unit (ECU).

E. The flap ECU controls the motion sequence of the four subsystems (MWOF, MWIF, FWLF and FWRF) according to the selection made at the control lever. The ECU is located in the forward section of the baggage compartment near the main electrical junction box.
The ECU receives inputs from the lever-operated selector switch and the position potentiometers, processes the inputs and sends the correct signals to the motors, actuators and indication system.

F. The movement of each subsystem is detected continuously by a potentiometer (keyed to the corresponding motor). The potentiometer is fed the "ECU" and provides it with a signal containing instantaneous position information, wich is subsequently displayed on the multifunction display "MFD" (Ref. Fig. 3). Each subsystem is controlled by means of four micro-switches activated by a camshaft connected to the transmission of each individual actuator, allowing the position assumed by the flap to be measured in a discrete parts (UP-MID-DOWN).

G. Potentiometers on the actuators of the FWLF and FWRF and on the motors of the MWOF and MWIF provide the flaps position signal to the ECU which processes the signals and sends the correct signals to the indicator.

H. Microswitches installed into the four subsystems give signals to the ECU when the flaps have reached the selected position and the ECU stops the movement of the flaps accordingly. In addition, mechanical stops are installed at the UP and DN positions to provide a fail-safe feature.
In case of a failure, or incorrect position of the flap(s), in anyone of the four subsystems, the ECU will cause a FLAPS SYNC amber caption on the annunciator panel to come on.

I. An acoustic warning will be generated whenever the flaps are lowered to the DN position and the landing gear is not locked down. In addition the acoustic warning will be generated whenever the flaps are in the MID position, the landing gear is not locked down and the power levers are retarded approximately below the half travel position. The 326 Hz warning tone cannot be silenced by the mute switch and will continue until either the landing gear is extended or the flaps are retracted to the clean (UP) setting.

3. Operation

A. When the FLAP control lever is moved from the UP to the MID position, the flap selector switch sends the command signal to the ECU. The ECU schedules flap extension as follows:

– The MWOF starts to extend immediately while the MWIF, FWLF and FWRF remain retracted
– after a nominal nine seconds of MWOF movement, the FWLF and FWRF start to extend then stop after one second; the MWOF continues to extend and the MWIF remain retracted
– after a nominal five seconds the MWIF will start to extend and the FWLF and FWRF will start again; the MWOF continues to extend
– after a further two seconds all flaps reach the MID position.

When the flaps reach the MID position, microswitches operate to send the required signal to the ECU that the sequence is complete and the ECU cuts the power to the motors.

B. When the FLAP control lever is moved from the MID to the DN position, the flap selector switch sends the command signal to the ECU. The ECU schedules all flaps to move to the fully extended position at the same time. The time taken from the MID to DN position is five seconds (nominal).
When the flaps are fully extended, microswitches send the required signal to the ECU that the sequence is complete and the ECU cuts the power to the motors.

C. When the FLAP control lever is moved from DN to MID, or MID to UP, all flaps start to retract at the same time. Retraction time from DN to MID is five seconds (nominal) and from MID to UP is 16 seconds (nominal).

4. Indicating

The Flap Position display consists of an analog indication for the main wing outboard flaps, main wing inboard flaps, left forward wing flap and right forward wing flap (Ref. Fig. 3).

– The main wing outboard flaps and main wing inboard flaps show on the vertical scales on the System Page. The left scale is the main wing outboard flaps position and the right scale is the main wing inboard flaps position. The scale shows UP, MID, and DN between the scales in line with the upper, middle and lower tickmarks respectively. A white flap position pointer is positioned at the respective flap position on the scale.
– The left front wing flap and right front wing flap positions show on the angular scales on the System Page. The left scale is the left forward wing flap position and the right scale is the right forward wing flap position. The scale show UP, MID, and DN in line with the upper, middle and lower tickmarks respectively. A white flap position pointer is positioned at the respective flap position on the scale.
– The legend FLAPS show between the forward and main wing flaps scales. The legend is normally grey but turns yellow when the flaps are not syncronized. A yellow FLAPS message shows below line select key R4 on all formats other than the System Page when the flaps are not syncronized. Both the FLAPS legend and message flash for 5 seconds when they first turn yellow.
– The flap position pointer is removed if the respective flap position value is failed.

A. PFD Flap Position Display

– The PFD Flap Position display consists of a full-time analog indication of flap position in the upper left of the PFD.

- The scale shall have a tickmark at each end and one at the midpoint on the inside of the scale.
- The legends "UP" and "DOWN" shall be displayed in grey to the left of the scale.
- The annunciation "FLAPS" shall be displayed to the right of the scale (Ref. to Fig. 3).
- The annunciation shall be grey when the discrete input Flaps Not Syncronized is false and yellow when Flap Not Syncronized is true.
- The annunciation shall flash for 5 seconds when it first turns yellow, it stops flashing if it turns grey in less than the 5 seconds time period.
- The flap position pointer shall be positioned at a valid flap position value according to the following priority order:
  - Main Wing Outboard Flaps
  - Main Wing Inboard Flaps
  - Left Front Wing Flap
  - Right Front Wing Flap

  NOTE: If Main Wing Outboard Flaps position value was NCD, Fail or missing then the Main Wing Inboard Flaps position value would be used.

- The flap position pointer shall use the scale factor and limits of the priority flap position value.
- The flap position pointer shall be white when the discrete input Flaps Not Syncronized is false and yellow when Flaps Not Syncronized is true.
- The flap position pointer shall be removed if all flap position values are NCD, Fail or missing.
- The flap position pointer shall flash for 5 seconds when it first turns yellow, it stop flashing if it turns white in less than the 5 second time period.
- Only a single data source for each flap position shall be used as indicated in the Inputs section.
-

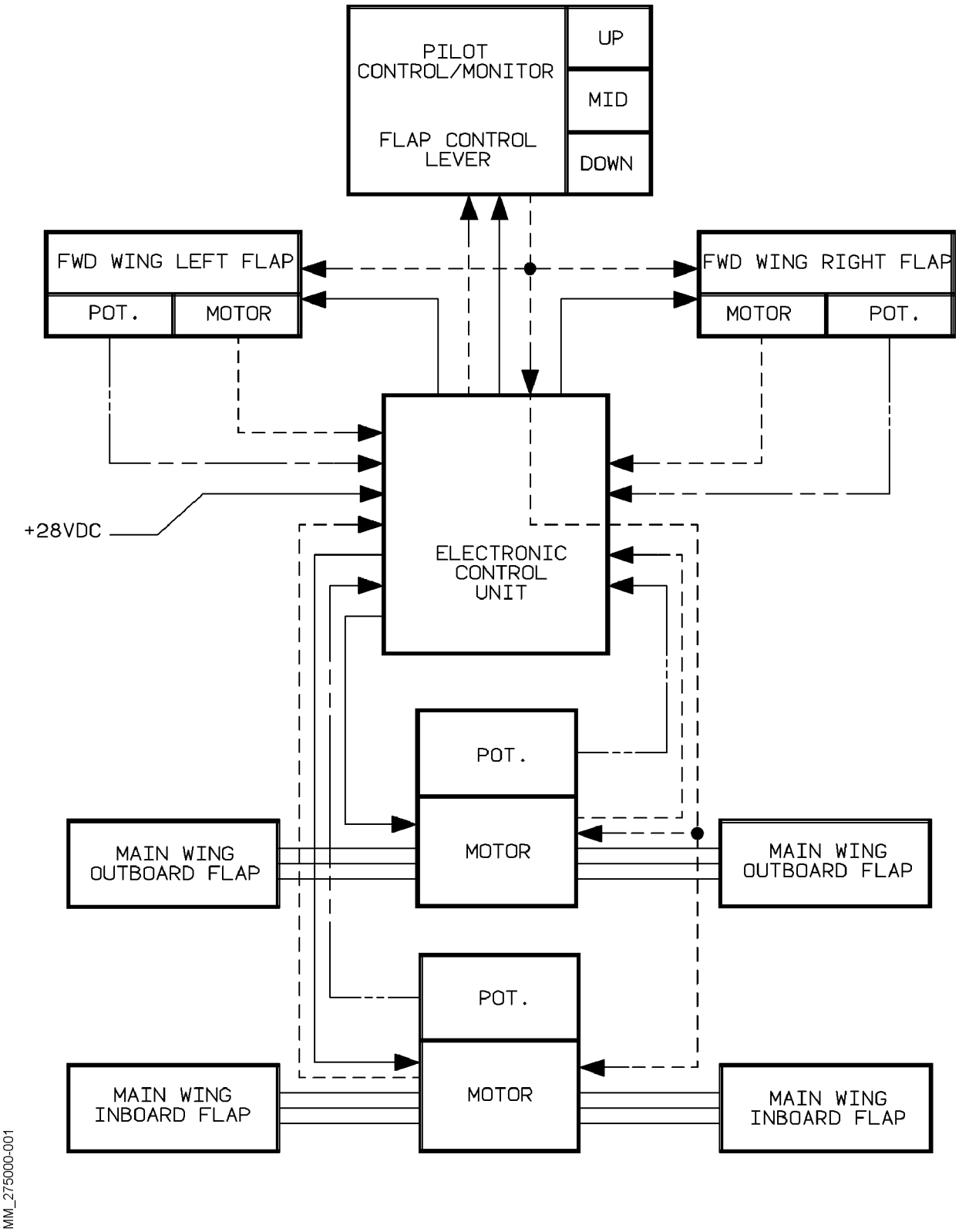

Fig. 1 - Flap Electrical Control Schematic

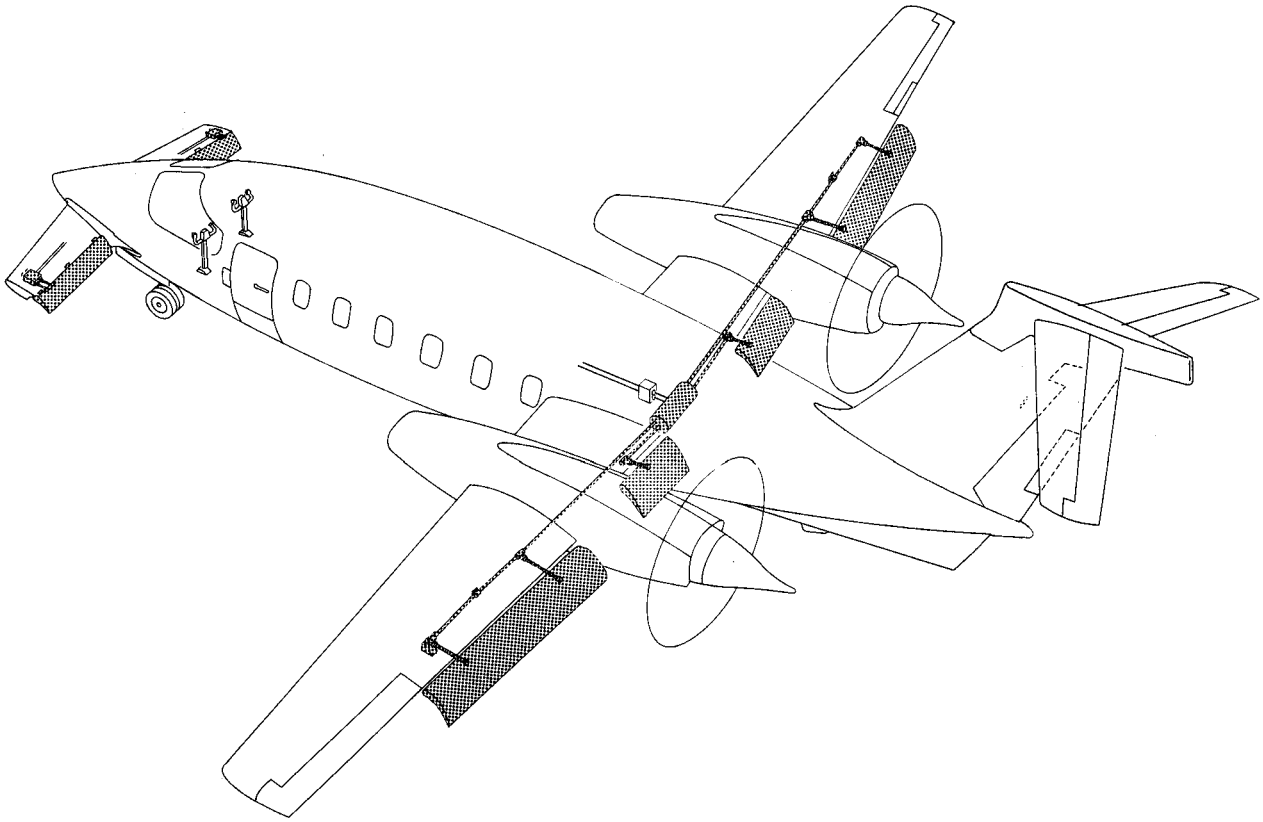

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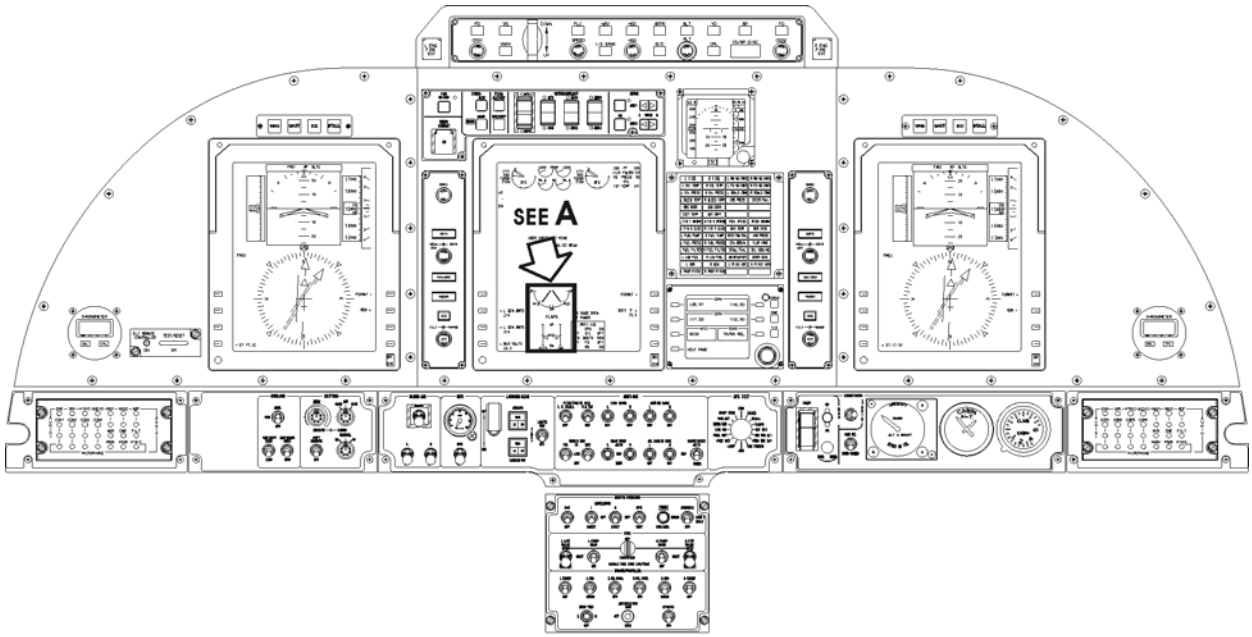
Fig. 2 - Flap System



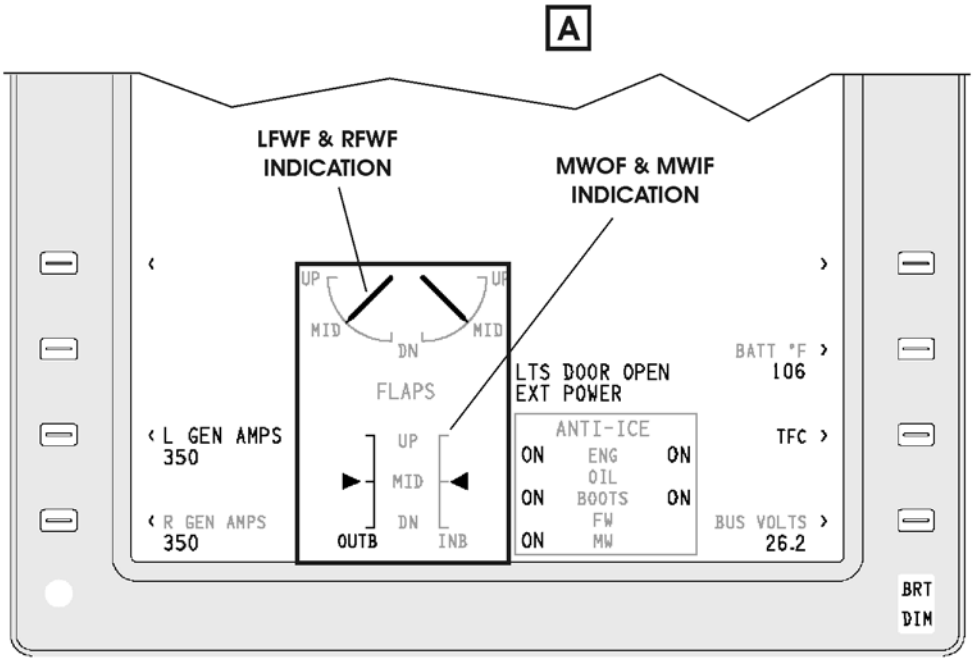


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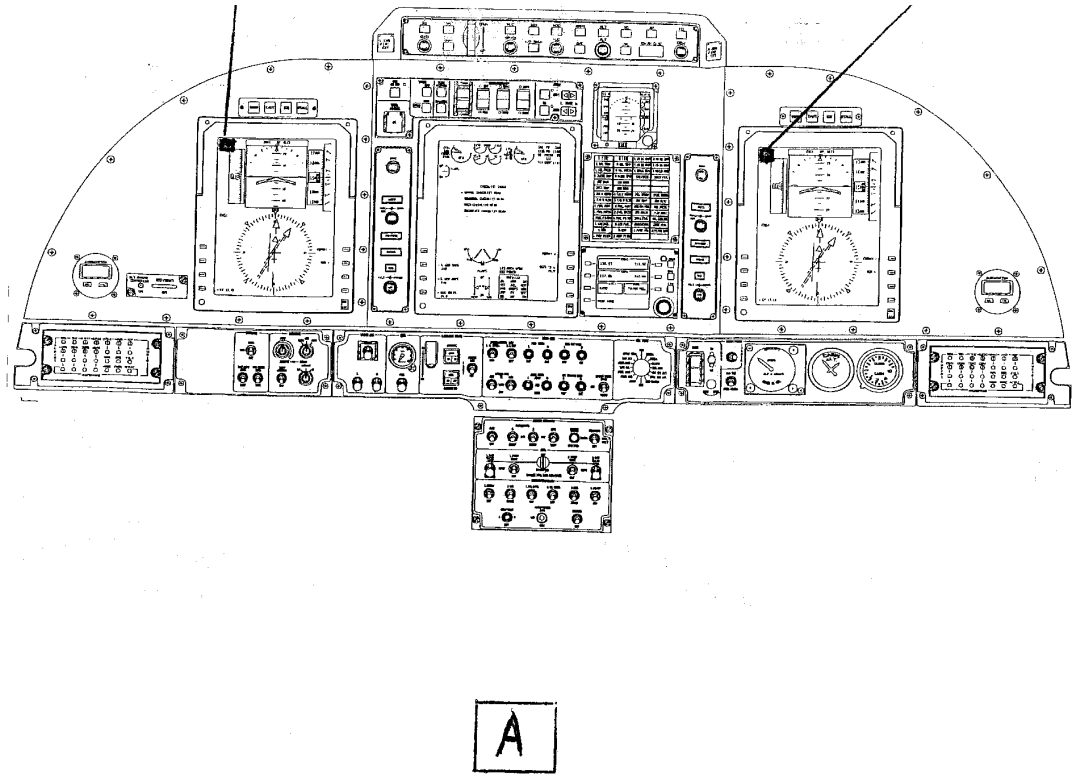
Fig. 3 - MFD - Flap Position Indication (Sheet 1 of 2)



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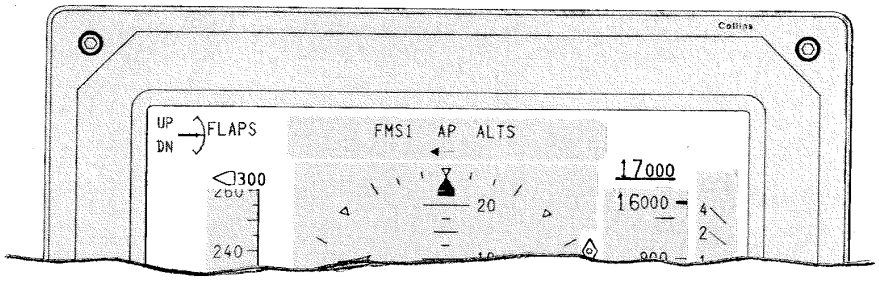

Fig. 3 - PFD - Flap Position Indication (Sheet 2 of 2)

FLAPS - MAINTENANCE PRACTICES

1. General

A. Because the left and right flap systems are symmetrical, the maintenance practices are given for one side only and apply to both sides.

CAUTION: DURING THE FOLLOWING SHAFT REMOVAL PROCEDURES IT IS NECESSARY TO PREVENT ROTATION OF THE SHAFTS SO THAT THE SYSTEM RIGGING IS MAINTAINED. THE METHOD OF PREVENTING ROTATION IS AT THE DISCRETION OF THE OPERATOR, BUT HE MUST MAKE SURE THAT ANY METHOD USED WILL NOT DAMAGE ANY PART OF THE SYSTEM.

2. Main Wing Outboard Flap (MWOF) - Removal (Ref. to Fig. 201)

A. Referenced Information

Maintenance Manual Chapter 24-00-00
Maintenance Manual Chapter 57-50-00

B. Procedure

(1) Make sure that electrical power is available (Refer to 24-00-00).
(2) Set the FLAPS control lever to DN.
(3) When the MWOF is completely extended, open, tag and safety this circuit breaker:

Copilot CB panel:
FLAPS PWR

(4) Remove the MWOF track covers (Refer to 57-50-00).
(5) Remove the screws (3) and (9) that secure the pins (6), (7), (12) and (13) to the female threaded blocks (5) and (11).
(6) Support the MWOF, then remove the pins (6), (7), (12), (13) and the shim washers (16, 17) from the blocks (5) and (11).

CAUTION: DURING AND AFTER REMOVAL OF THE FLAP, MAKE SURE THAT THE FEMALE THREADED BLOCKS DO NOT ROTATE ON THEIR RESPECTIVE SCREWJACKS. SYSTEM RIGGING MUST BE MAINTAINED.

(7) Remove the flap (2) from the tracks (4) and (10).

3. Main Wing Outboard Flap (MWOF) - Installation (Ref. to Fig. 201)

A. Referenced Information

Maintenance Manual Chapter 57-50-00

B. Procedure

WARNING: DO NOT LUBRICATE OR GREASE THE EXTERNAL SCREW OF THE SCREWJACK.

CAUTION: USE NEW SELF-LOCKING NUTS EACH TIME THE MAIN WINGOUTBOARD FLAP IS INSTALLED

(1) Make sure the FLAPS circuit breaker is open, tagged and safetied.
(2) If the same flap that was removed is the same one being installed, make sure that the female threaded blocks (5) and (11) are in the same position on their screwjacks as when the flap was removed. Refer to the CAUTION given in the removal procedure.
(3) If a replacement flap is being installed, proceed as follows:
  (a) Turn the female threaded blocks (5) and (11) fully out (rearward) until they are at the end of their travel on the screwjacks (1) and (8).
  (b) Turn the female threaded blocks (5) and (11) between one half and one full turn forward so that the holes are horizontal.
(4) Install the MWOF so that the roller supports (14) and (15) engage in the flap tracks (4) and (10).
(5) Position the MWOF so that the holes (for the pins) in the roller supports (14) and (15) are in line with the corresponding holes in the female threaded blocks (5) and (11).
(6) Install the shim washers (16, 17) and the pins (6), (7), (12), (13) in their respective holes.
(7) Install the screws (3) and (9) to secure the pins in place.
(8) Remove the safety tag and close this circuit breaker:

Copilot CB panel:

FLAPS PWR

(9) Check for correct installation of the MWOF as detailed in Page Block 501 of this section.
(10) Install the MWOF track covers (Refer to 57-50-00).

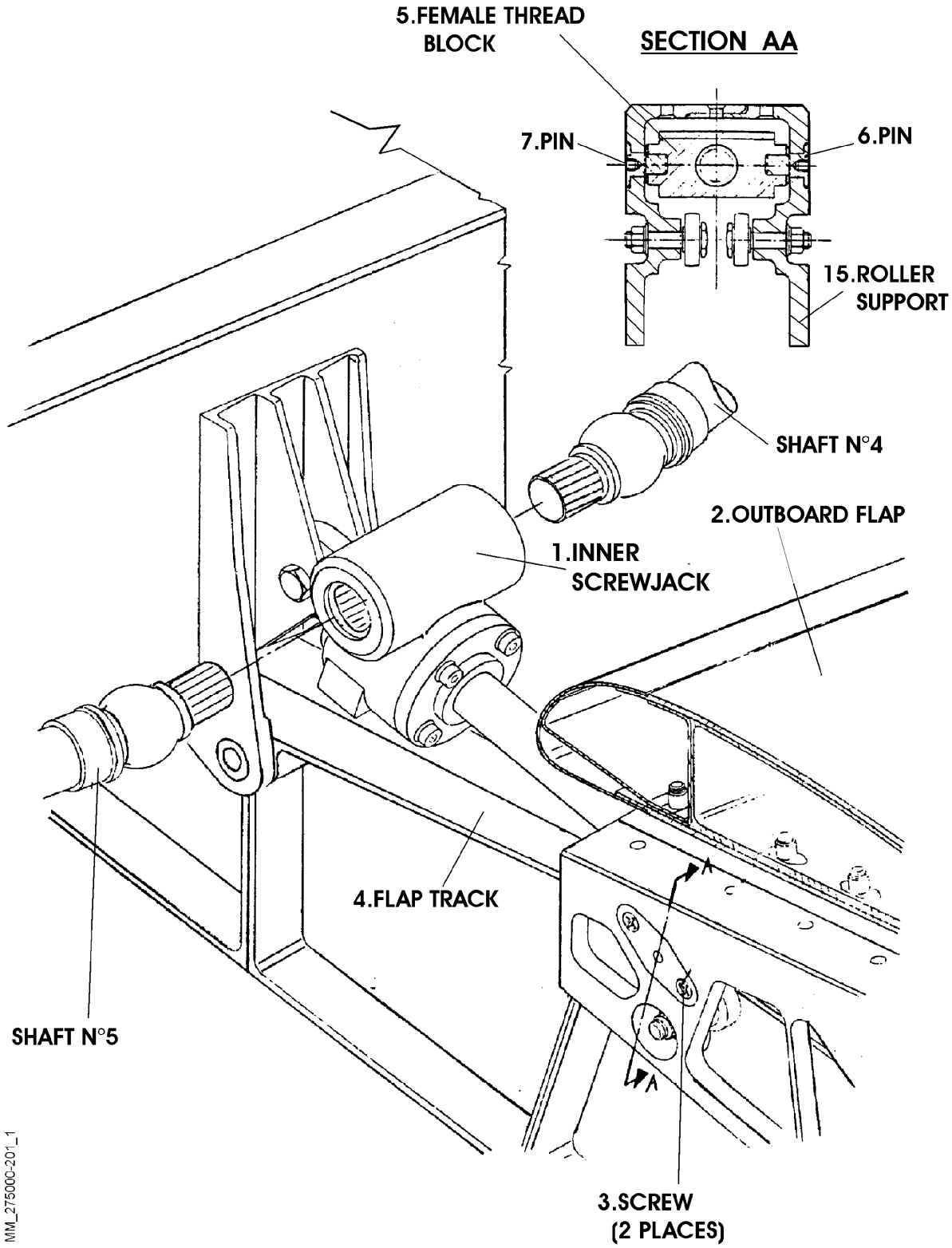

Fig. 201 - Main Wing Outboard Flap - Removal/Installation (Sheet 1 of 2)

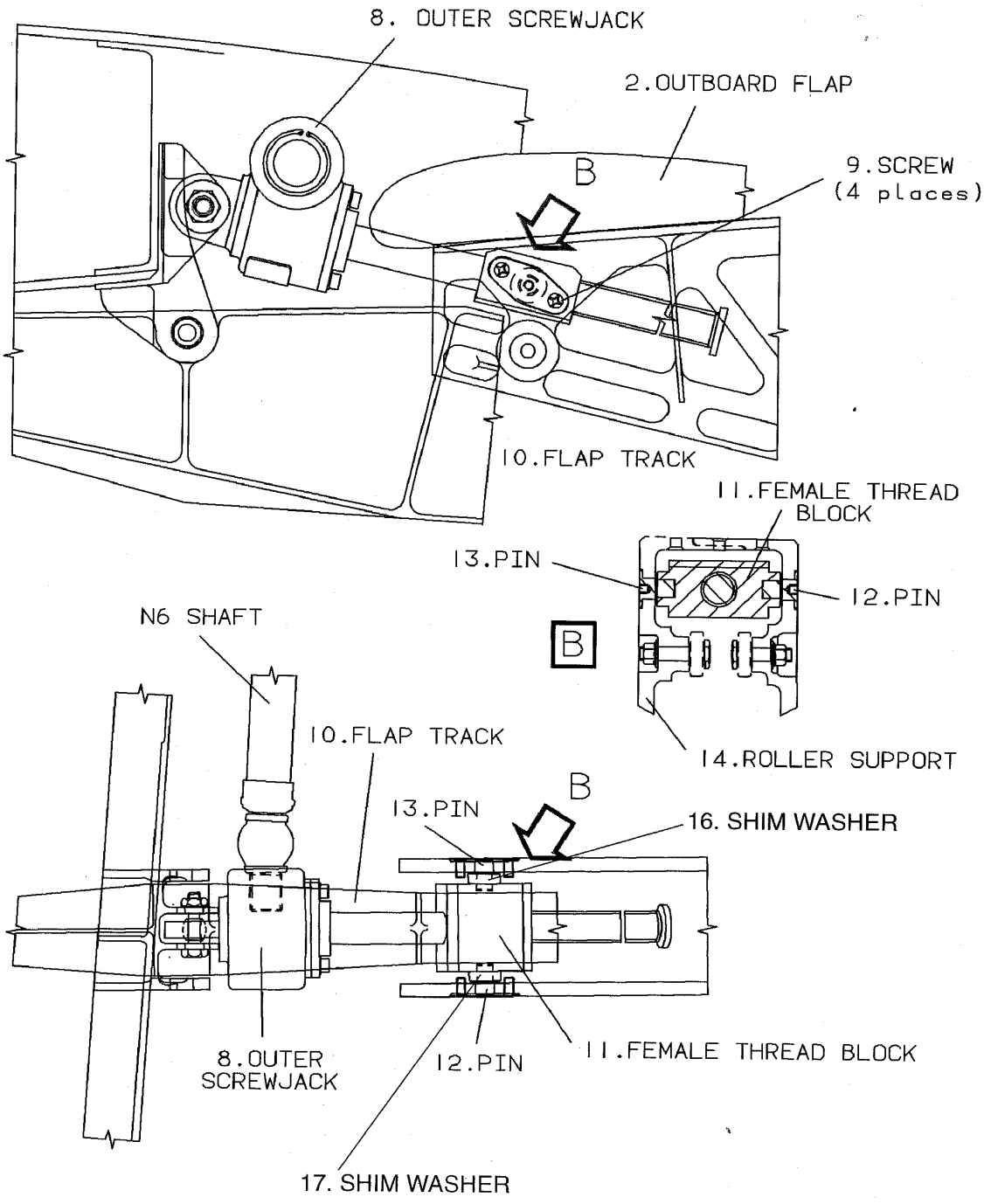

Fig. 201 - Main Wing Outboard Flap - Removal/Installation (Sheet 2 of 2)

4. Main Wing Inboard Flap (MWIF) - Removal (Ref. to Fig. 202)

A. Referenced Information

Maintenance Manual Chapter 24-00-00

B. Procedure

(1) Make sure that electrical power is available (Refer to 24-00-00).
(2) Set the FLAPS control lever to DN.
(3) When the MWIF is completely extended, open, tag and safety this circuit breaker:

Copilot CB panel:

FLAPS PWR

(4) Support the MWIF and remove the bolt (4), nut (5) and washer (6) which secure the inboard flap screwjack (1) to the flap hinge (6).

CAUTION: DURING AND AFTER REMOVAL OF THE FLAP, MAKE SURE THAT THE EYE-END OF THE INBOARD FLAP SCREWJACK DOES NOT ROTATE. SYSTEM RIGGING MUST BE MAINTAINED.

(5) Remove the flap (3) from its tracks (2) and (7).

5. Main Wing Inboard Flap (MWIF) - Installation (Ref. to Fig. 202)

A. Procedure

WARNING: DO NOT LUBRICATE OR GREASE THE EXTERNAL SCREW OF THE SCREWJACK.

(1) Make sure that the FLAPS circuit breaker is open, tagged and safetied.
(2) Install the MWIF so that its rollers engage in the tracks (2) and (7).
(3) Position the MWIF so that the hole in the eye-end of the screwjack (1) is in line with the holes in the hinge (6), then install and tighten the bolt (4), nut (5) and washer (6) to secure the screwjack to the hinge.
(4) Remove the safety tag and close this circuit breaker:

Copilot CB panel:

FLAPS PWR

(5) Check for correct installation of the MWIF as detailed in Page Block 501 of this section.

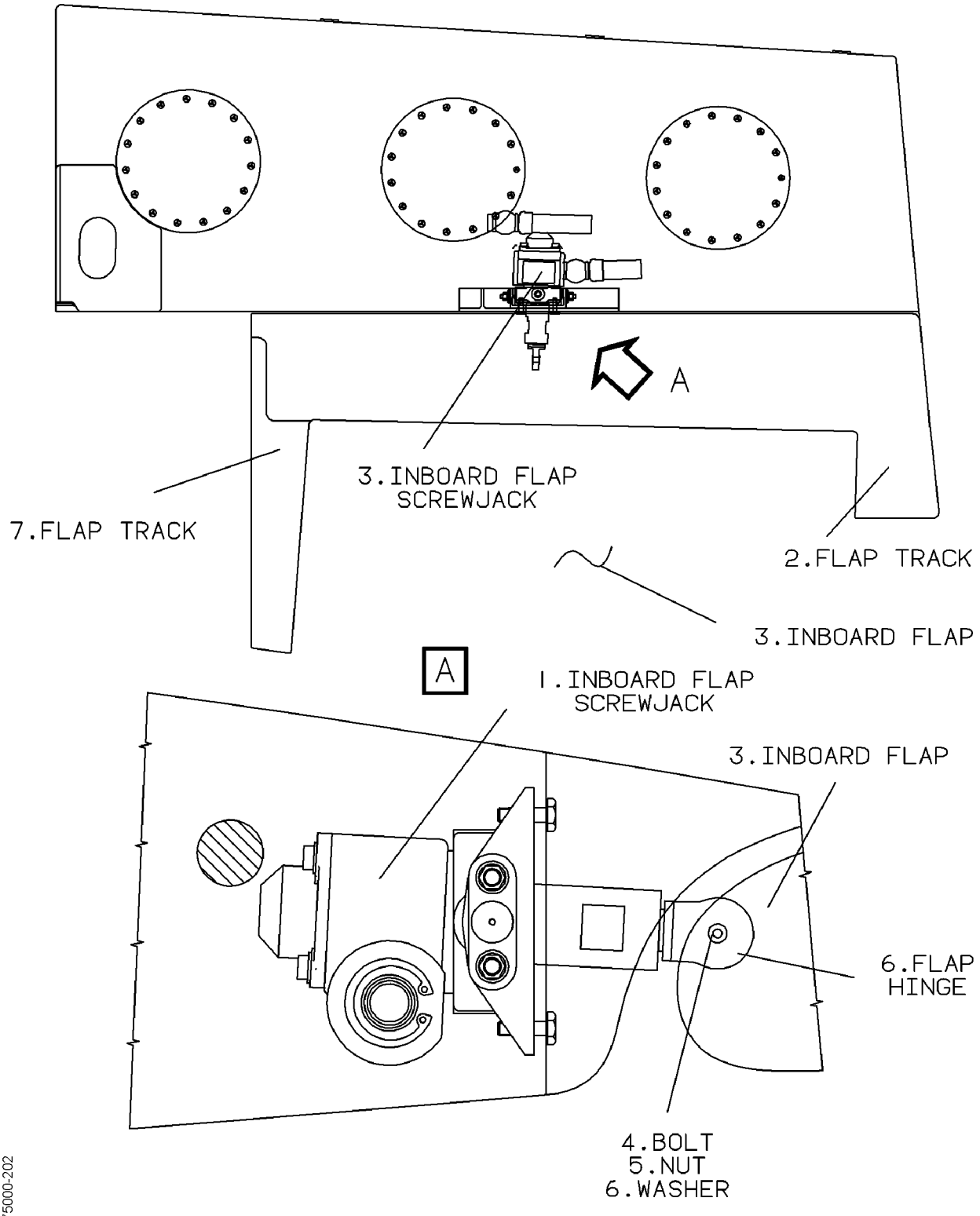

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Fig. 202 - Main Wing Inboard Flap - Removal/Installation

6. Main Wing Inboard Flap Screwjack - Lubrication(Ref. to Fig. 203)

A. Referenced Information

Maintenance Manual Chapter 24-00-00

B. Fixtures, Test and Support Equipment

Mini Greasa Gun	Not specified
Adaptor	AN911 nipple, pipe thread
Needle Tools	Macnaught - ACK-2 or equivalent

C. Procedure

(1) Make sure that electrical power is available (Refer to 24-00-00).
(2) Set the FLAPS control lever to DN.
(3) When the MWIF is completely extended, open, tag and safety this circuit breaker:

Copilot CB panel:

FLAPS PWR

(4) Depending on the High Pressure Lubrication Fitting position use the suitable shape needle to lubricate the screwjack. The figure show the High Pressure Lubrication Fitting in upper position.
(5) Insert the needle in the main wing inboard flap screwjack High Pressure Lubrication Fitting.
(6) Pump grease until all dirty grease comes out between the Female Thread and the Screw of the Screwjack.
(7) Wipe off any exceedance of grease.
(8) Remove the safety tag and close this circuit breaker:

Copilot CB panel:

FLAPS PWR

(9) Perform the flap extension and retraction three times then check if any exceedance grease occour, eventually wipe it.
(10) Set the FLAPS control lever to UP.

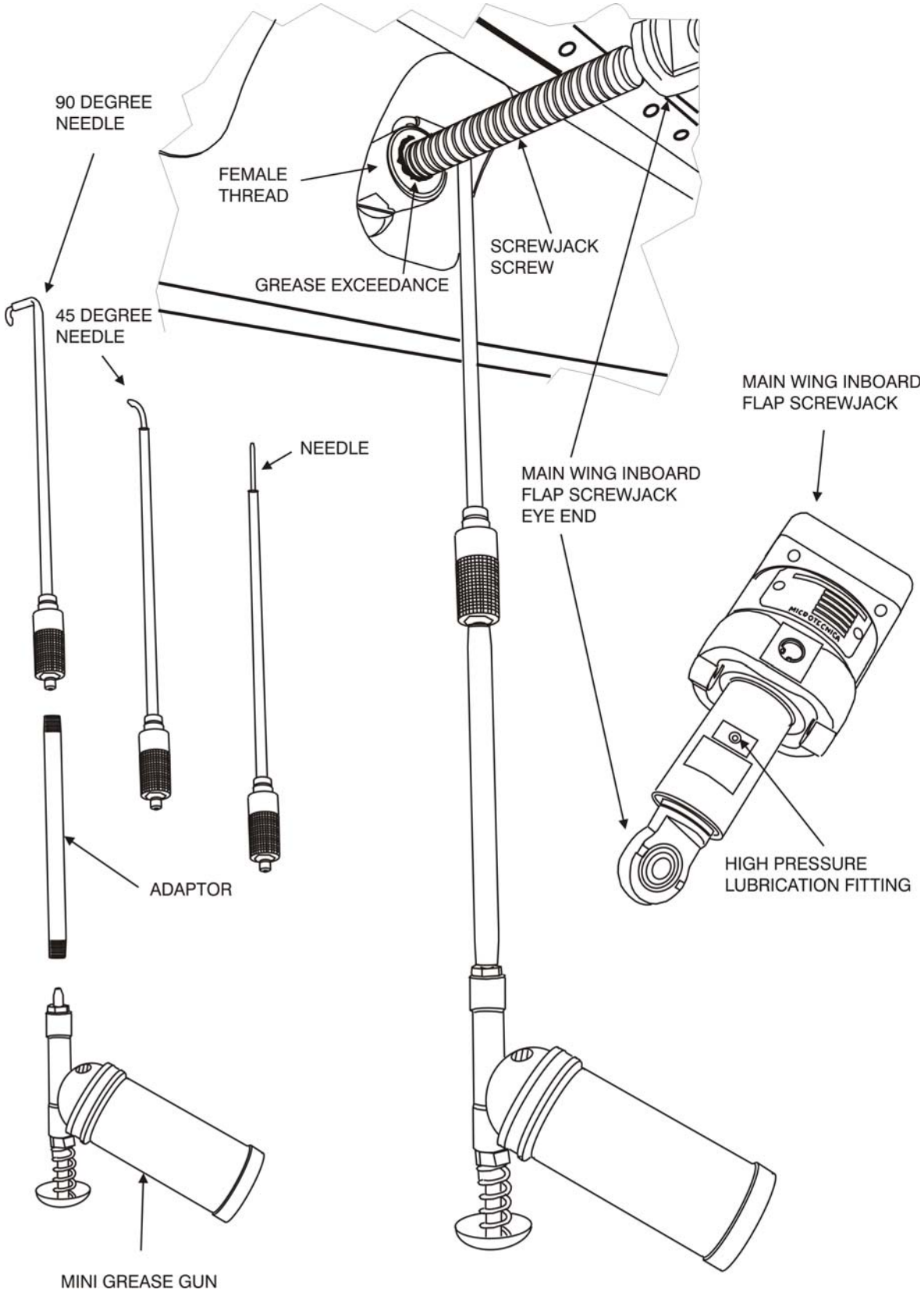

Fig. 203 - Main Wing Inboard Flap Screwjack - Lubrication

7. Forward Wing Flap (FWF) - Removal (Ref. to Fig. 204)

A. Referenced Information

Maintenance Manual Chapter 24-00-00

B. Procedure

(1) Make sure that electrical power is available (Refer to 24-00-00).
(2) Set the FLAPS control lever to DN.
(3) When the FWF is completely extended, open, tag and safety this circuit breaker:

Copilot CB panel:
FLAPS PWR

(4) Remove the two protection covers of the actuator rods.
(5) Remove the bolts (10), nuts (11) and washers (12) which secure the actuator rods (9) to the connecting rods (8).
(6) Remove and discard the cotter pins (3).
(7) Support the FWF and remove the bolts (4), nuts (5) and washers (6) which secure the FWF hinges to the forward wing hinges.
(8) For safekeeping, remove the bonding connection spring (2) from both hinges on the forward wing.
(9) Remove the FWF (1).

8. Forward Wing Flap (FWF) - Installation (Ref. to Fig. 204)

A. Expendable Parts

	IPC CSN
Cotter Pin (Qty 2)	275000 3-60

B. Procedure

(1) Make sure that the FLAPS circuit breaker is open, tagged and safetied.
(2) Install the bonding connection spring (2) in each of the two hinges on the forward wing.
(3) Install the FWF in position at the forward wing trailing edge so that the hinges on the wing and the flap are in line.
(4) Install the bolts (4), nuts (5) and washers (6) to secure the hinges.
(5) Tighten the nuts and safety them with new cotter pins (3).
(6) Position the FWF so that the holes in the connecting rods (8) are in line with the holes in the actuator rods (9).
(7) Install the bolts (10), nuts (11) and washers (12) to secure the connecting rods to the actuator rods.
(8) Install the two protection covers of the actuator rods.

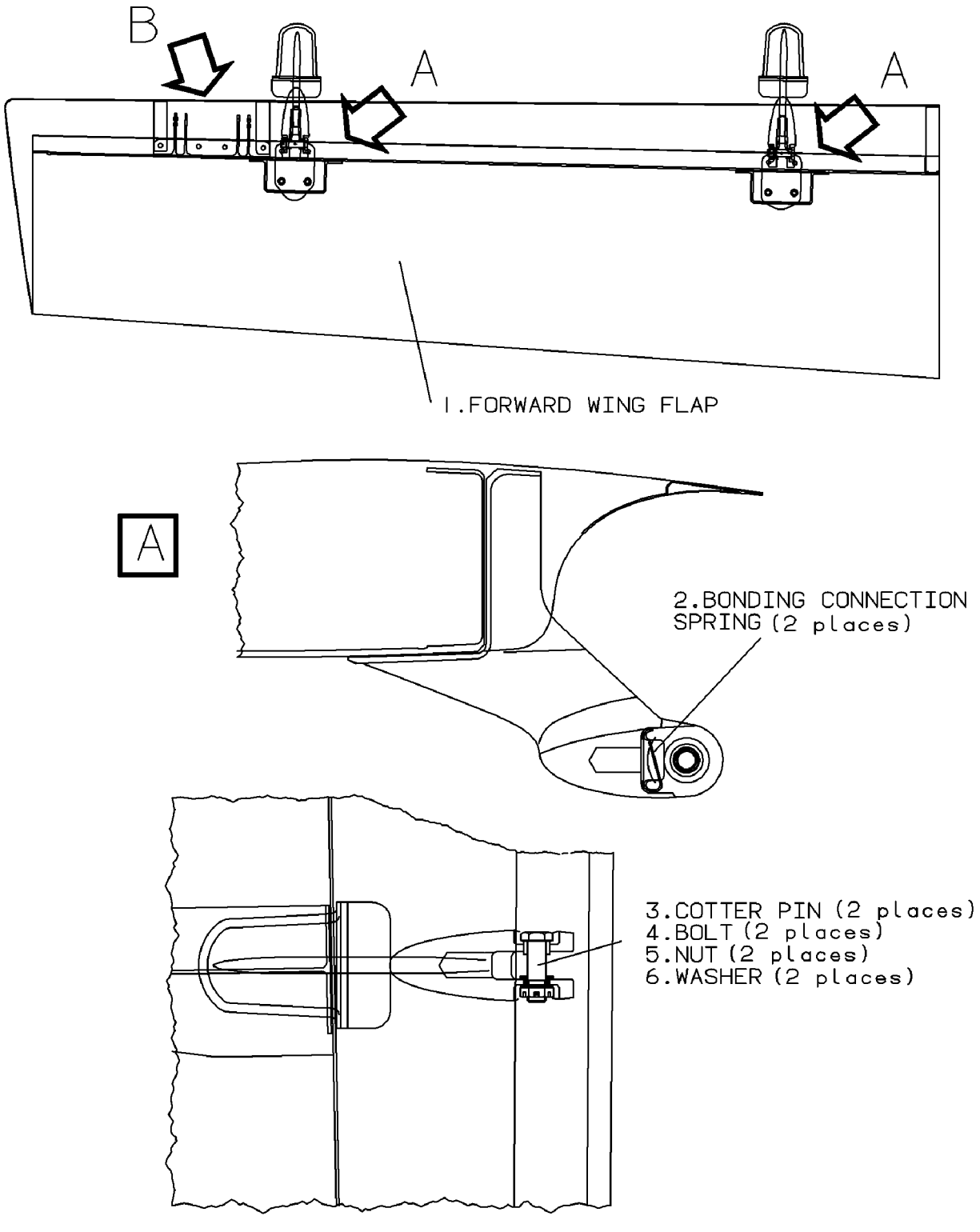

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Fig. 204 - Forward Wing Flap - Removal/Installation (Sheet 1 of 2)

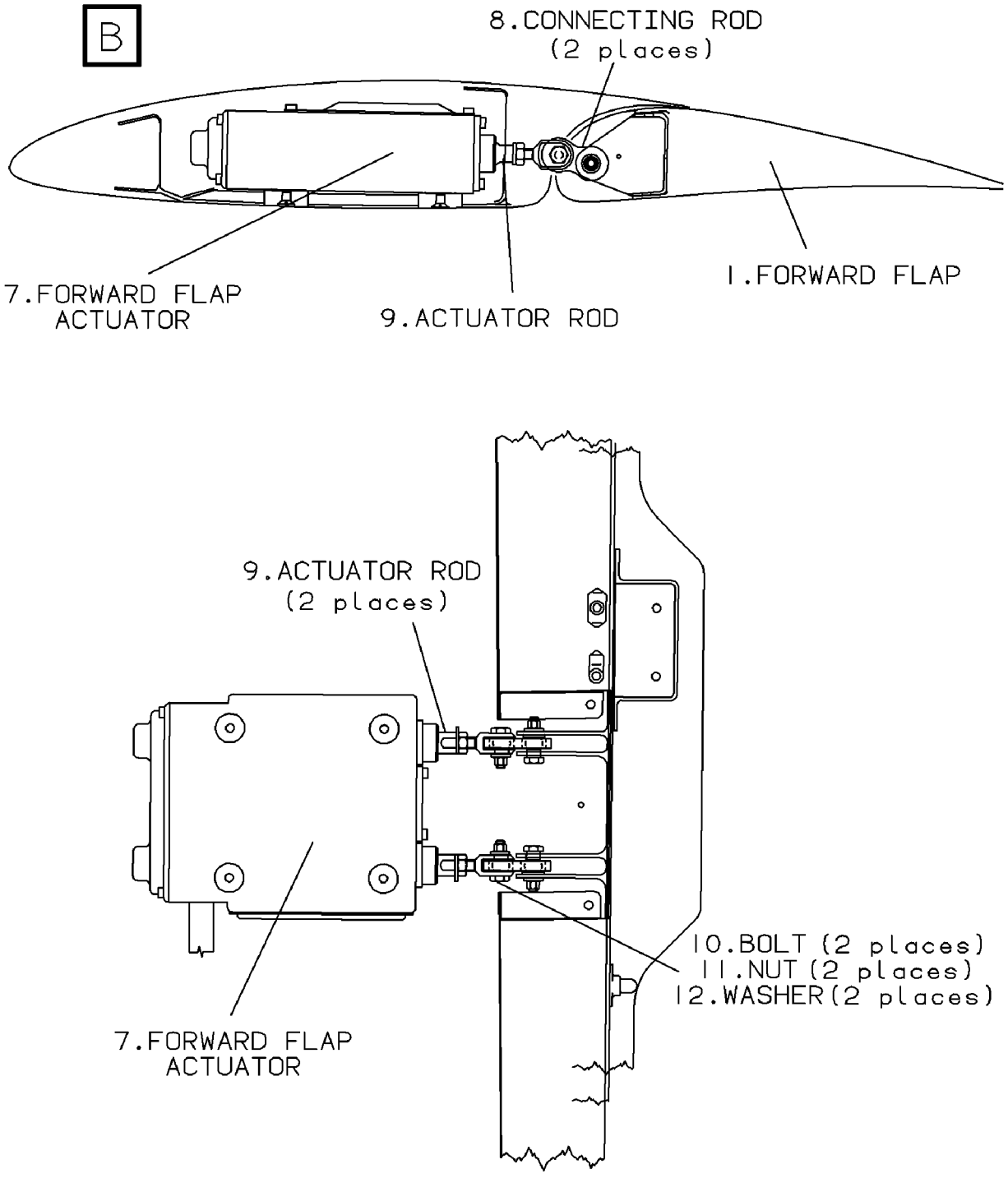

Fig. 204 - Forward Wing Flap - Removal/Installation (Sheet 2 of 2)

(9) Remove the safety tag and close this circuit breaker:

Copilot CB panel:

FLAPS PWR

(10) Check for correct installation of the FWF as detailed in Page Block 501 of this section.

9. MWOF Screwjacks - Removal (Ref. to Fig. 205)

A. Referenced Information

Maintenance Manual Chapter 57-50-00

B. Procedure

(1) Remove the main wing outboard flap as detailed in Para. 2 of this section.
(2) Remove the wing trailing edge (Refer to 57-50-00).
(3) Remove the bolts which secure the intermediate support of the MWOF No. 5 and No. 6 shafts. Refer to Para. 22.
(4) Move the screwjacks (4) and (5) as required to disengage the No. 5 and No. 6 shafts from their intermediate support and from the screwjacks themselves.
(5) Remove the No. 5 and No. 6 shafts from the airplane.
(6) Remove the bolt (6), nut (7) and washer (8) which secure the outer screwjack (5) to the wing rear spar.
(7) Remove the outer screwjack (5) from the airplane.
(8) Remove the bolt (1), nut (2) and washer (3) which secure the inner screwjack (4) to the rear spar.
(9) Remove the inner screwjack (4) from the airplane by moving it away (outboard) from the No. 4 shaft.

10. MWOF Screwjacks - Installation (Ref. to Fig. 205)

A. Referenced Information

Maintenance Manual Chapter 57-50-00

B. Procedure

WARNING: DO NOT LUBRICATE OR GREASE THE EXTERNAL SCREW OF THE SCREWJACK.

(1) Put the inner screwjack (4) in position so that the eye-end engages in the hinge and, at the same time, engage the end of the No. 4 shaft in the screwjack (4).
(2) Secure the inner screwjack (4) to its hinge with bolt (1), nut (2) and washer (3).
(3) Position the outer screwjack (5) so that the eye-end engages in the hinge and secure the screwjack to the hinge with bolt (6), nut (7) and washer (8).
(4) Install the No. 5 and No. 6 shafts as detailed in Para. 22 of this section.
(5) Install the wing trailing edge (Refer to 57-50-00).
(6) Install the main wing outboard flap as detailed in Para. 3 of this section.

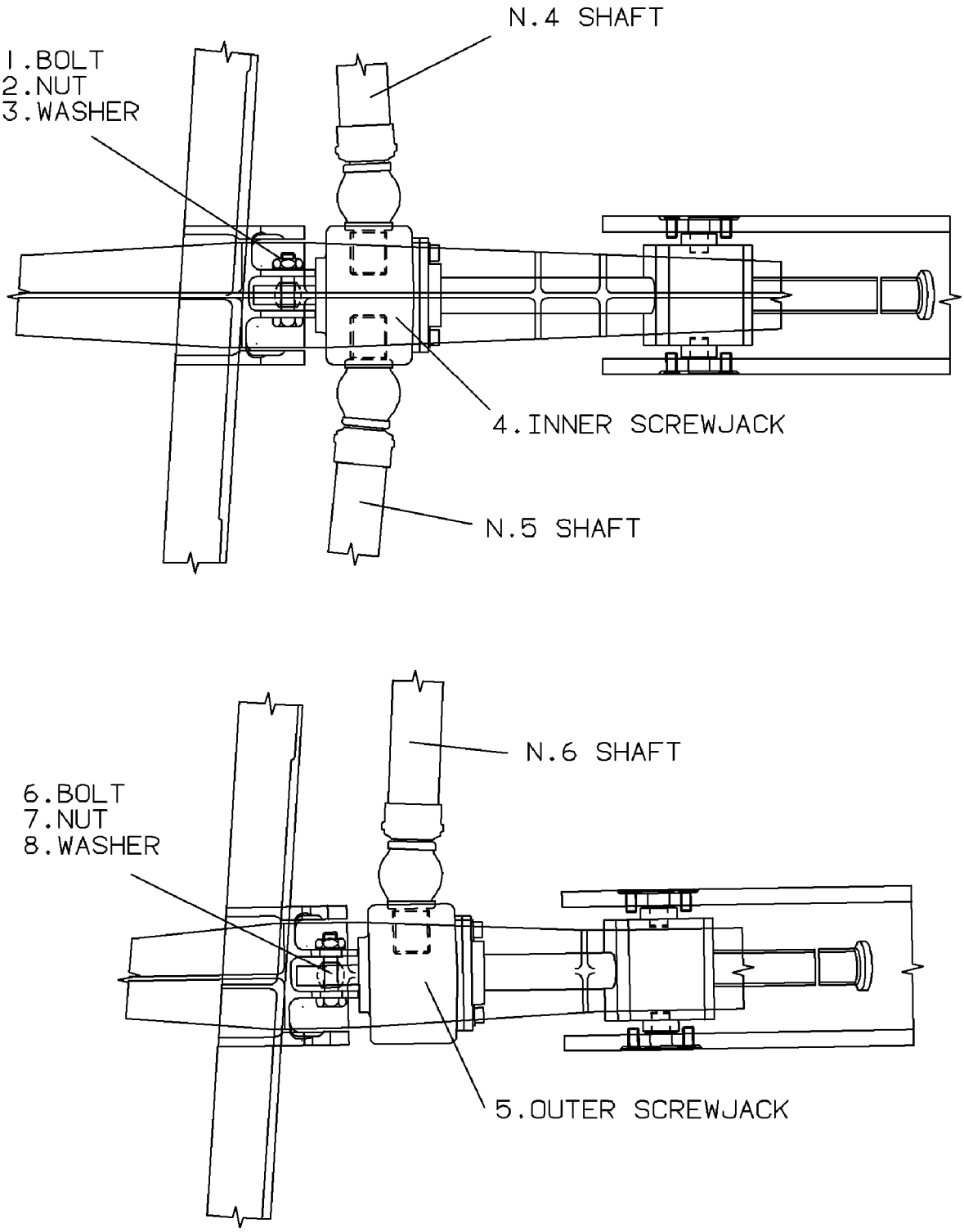

Fig. 205 - Outboard Flap Screwjack - Removal/Installation

11. MWIF Screwjack - Removal (Ref. to Fig. 206)

A. Referenced Information

Maintenance Manual Chapter 52-82-00

B. Procedure

(1) Remove the MWIF as detailed in Para. 4 of this section.
(2) Open the main landing gear rear door (Refer to 52-82-00).
(3) Remove wing inspection panels 522AT, 522BT and 522CT (622AT, 622BT and 622CT).
(4) Remove the bolts (1) which secure the MWIF screwjack (2) to the third spar.
(5) Remove the screwjack (2) from the airplane by moving it away (outboard) from No. 7 shaft.

12. MWIF Screwjack - Installation (Ref. to Fig. 206)

A. Referenced Information

Maintenance Manual Chapter 52-82-00

B. Procedure

WARNING: DO NOT LUBRICATE OR GREASE THE EXTERNAL SCREW OF THE SCREWJACK.

(1) Put the screwjack (2) in position at the third spar and at the same time engage the outboard end of the No. 7 shaft in the screwjack (2). Make sure that the inboard end of the shaft remains installed in the flap drive unit.
(2) Install the four bolts (1) to secure the screwjack (2) to the third spar.
(3) Install the MWIF as detailed in Para. 5 of this section.
(4) Install inspection panels 522AT, 522BT and 522CT (622AT, 622BT and 622CT) on top of the wing.
(5) Close the main landing gear rear door (Refer to 52-82-00).

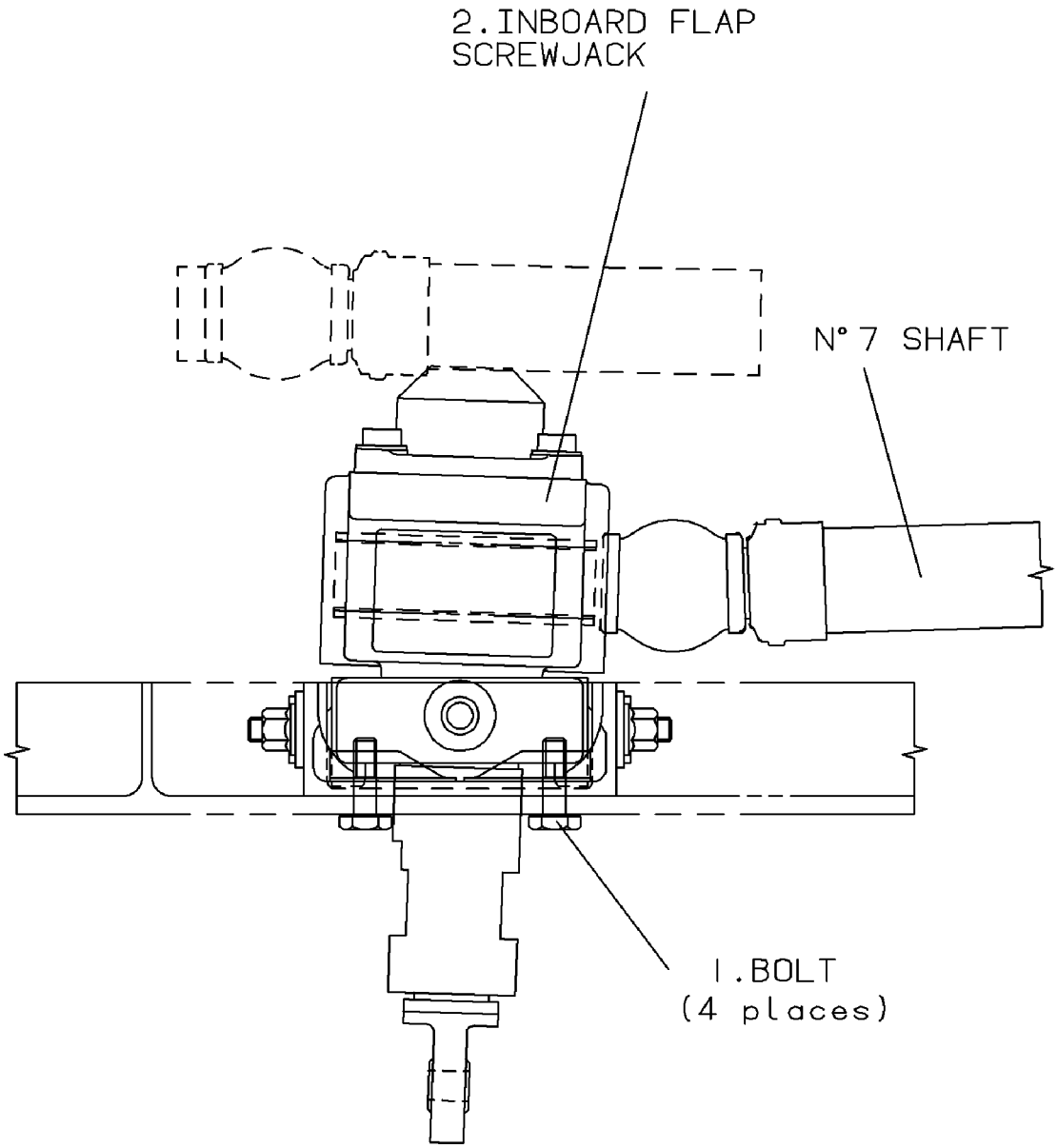

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Fig. 206 - Inboard Flap Screwjack - Removal/Installation

13. Main Wing Flaps Drive Unit - Removal (Ref. to Fig. 207 and 211)

A. Referenced Information

Maintenance Manual Chapter 07-10-00
Maintenance Manual Chapter 21-10-00
Maintenance Manual Chapter 24-00-00
Maintenance Manual Chapter 52-82-00

B. Procedure

(1) Raise the airplane on jacks (Refer to 07-10-00).
(2) Make sure that electrical power is available (Refer to 24-00-00).
(3) Remove the RH Main Wing Inboard Flap (MWIF) as described in this Section.
(4) Set the FLAPS control lever to the UP position.
(5) When all other flaps are in the fully up position, open, tag and safety this circuit breaker:

Copilot CB panel:

FLAPS PWR

(6) Open the main landing gear rear doors (Refer to 52-82-00).
(7) Remove inspection panels 522AT, 522BT, 522CT, 622AT, 622BT and 622CT, located on the top wing surfaces.
(8) Remove the right inner flap screwjack as detailed in Para. 10.

CAUTION: AVOID ROTATING THE FLAP SYSTEM SHAFTS. THE SYSTEM RIGGING COULD BE DISTURBED AND CAUSE DAMAGE IF THE SHAFTS ROTATE DURING THIS PROCEDURE.

NOTE: If necessary remove also the support of the bevel gearbox (arrow A on Fig. 211).

(9) Remove the two bevel gearboxes from the right wing (indicated by arrows A and B on Fig. 211) and withdraw the bevel gearboxes and the No. 2 shaft through the access holes.
(10) Withdraw the right side No. 1 and No. 7 shafts from the drive unit and lower the shafts to rest inside the wing.
(11) Attach identity tags and disconnect the four electrical connectors (3), (4), (6) and (7) from the drive unit; get access through the left wheel well.
(12) Remove the branched duct of the air conditioning system (located immediately in front of the drive unit); be careful to collect the two check valves and the four gaskets (Refer to 21-10-00).
(13) Remove the branched duct support.
(14) Remove the duct (29) (Refer to 21-10-00).
(15) Support the drive unit and remove the bolts (2) which secure the unit to the bulkhead (1).
(16) Move the drive unit (5) to the right to disconnect it from the No. 1 and No. 7 shafts of the left flap systems.
(17) Withdraw the unit through the right wheel well.

14. Main Wing Flaps Drive Unit - Installation (Ref. to Fig. 207 and 211)

A. Referenced Information

Maintenance Manual Chapter 07-10-00
Maintenance Manual Chapter 21-10-00
Maintenance Manual Chapter 24-00-00
Maintenance Manual Chapter 52-82-00

B. Procedure

(1) Put the drive unit (5) in position at the bulkhead (1) but do not make any mechanical connections at this time.

(2) Connect the four electrical connectors (3), (4), (6) and (7) in accordance with the identity tags attached but do not remove the identity tags at this time.

(3) Close the FLAPS circuit breaker and make sure that electrical power is available.

(4) Make sure that the flaps selector lever is in the UP position and wait at least one minute then open the FLAPS circuit breaker; this makes sure that the drive unit is in the up position.

(5) Disconnect the four electrical connectors (3), (4), (6) and (7).

(6) Put the drive unit into position and, at the same time, make sure that the No. 1 and No. 7 shafts of the left flap system engage correctly in the left side of the drive unit (5).

(7) Make sure that the No. 1 and No. 7 shafts of the left system are correctly located in the intermediate supports and the inboard flap screwjack respectively.

(8) Install the bolts (2) that secure the drive unit (5) to the bulkhead (1) and tighten the bolts.

(9) Install the No. 1 and No. 7 shafts (of the right flap system) in the drive unit, the intermediate support and the inboard flap screwjack.

CAUTION: THE SUPPORT OF THE BEVEL GEARBOX IS ASYMMETRIC. IF IT HAS BEEN REMOVED, DURING INSTALLATION IT MUST BE POSITIONED WITH THE PROTRUDING AREA UPWARD AS SHOWN IN FIGURE 211.

(10) Make sure that the No. 2 shaft is correctly installed between the two bevel gearboxes (indicated by arrows A and B on Fig. 211).

(11) Secure the bevel gearboxes and the inboard flap screwjack in their respective locations.

(12) Install the RH Main Wing Inboard Flap (MWIF) as described in this Section.

(13) Connect the four electrical connectors (3), (4), (6) and (7) to the drive unit (5) and remove the identity tags.

(14) Lower the airplane to the ground (Refer to 07-10-00).

(15) Set the flap control level to UP position and check it on the flap indicator.

(16) On the Test Switch Panel set the Selector Knob on the STALL position and push the System Test for few seconds.

(17) Check that the red light STALL located on the annunciator panel comes on and at the same time the aural warning tone start.

NOTE: from the action on the System Test pushbutton and the test starting

exist an wait time of 10 - 15 seconds about.

(18) Raise the airplane on jacks (Refer to 07-10-00).
(19) Do a functional test of the main wing flaps (Refer to Page Block 501 of this section).
(20) Install the duct (29) (Refer to 21-00-00).
(21) Install the branched duct support.
(22) Install the branched assembly of the air conditioning system (Refer to 21-00-00).
(23) Install inspection panels 522AT, 522BT, 522CT, 622AT, 622BT and 622CT.
(24) Close the main landing gear rear doors (Refer to 52-82-00).
(25) Lower the airplane to the ground (Refer to 07-10-00).

15. FDU (Flap Drive Unit) Electrical Motor - Removal(Ref. to Fig. 207)

A. Referenced Information

Maintenance Manual Chapter 07-10-00
Maintenance Manual Chapter 24-00-00

B. Procedure

(1) Lift the airplane on jacks (Refer to 07-00-00).
(2) Insert the GPU and provide the External Electrical Power (Refer to 24-00-00).
(3) Set to ON position the Battery Switch located on the switch panel.
(4) Check and ensure to OFF position the HYD Switch.
(5) Pull the Emergency Valve.
(6) Pull the Service Selector Valve.
(7) Position UP the Landing Gear Control Knob.
(8) Act on the Hand Pump until the main landing gear is unlocked from Down Position.
(9) Verify that MLG Down Locked green light comes OFF, the red light is ON and the MLG Doors are open.
(10) Check the mutual position of flap control lever and flap surfaces. If this correspondance is not verified, match the flap control lever as close as possible with the actual flap surface position.
(11) Open, tag and safety this circuit breaker:

Copilot CB panel:

FLAPS PWR

CAUTION: NO AIR BLOWERS CAN BE USED TO CLEAN/DRY BOTH MOTOR AND FDU RECEPTACLE. DAMAGE MAY OCCUR TO MOTOR BEARING/BRUSHES AND AFFECT ITS PROPER OPERATION.

(12) Localize the FDU and the electrical motor(s) to be removed.
(13) Disconnect the electrical plug.

(14) Refer to Microtecnica CMM and countermark the position of FDU mounting flange.

(15) Refer to Microtecnica CMM and remove the four screws that retain the electrical motor flange(s).

(16) Refer to Microtecnica CMM and remove the electrical motor(s).

16. FDU (Flap Drive Unit) Electrical Motor - Installation (Ref. to Fig. 207)

A. Referenced Information

(1) Maintenance Manual Chapter 07-10-00

CAUTION: Procedure
NO AIR BLOWERS CAN BE USED TO CLEAN/DRY BOTH MOTOR AND FDU RECEPTACLE. DAMAGE MAY OCCUR TO MOTOR BEARING/BRUSHES AND AFFECT ITS PROPER OPERATION.

(2) Refer to Microtecnica CMM and align the motor spline with the FDU.

(3) Refer to Microtecnica CMM and install the electrical motor(s).

(4) Refer to Microtecnica CMM and install the four screws that retain the electrical motor (tighten the screws as specified in Microtecnica CMM).

(5) Install the electrical plug.

(6) Reset the CB previously removed.

(7) Perform the Flap System Functional Test as described in this section.

(8) Reset all system in the original condition. Verify that when Nose & MLG are Locked Down, the green light comes ON before lowering the Airplane to ground.

(9) Record the replacement of motor(s) in the airplane logbook, if the motor(s) was/were been replaced.

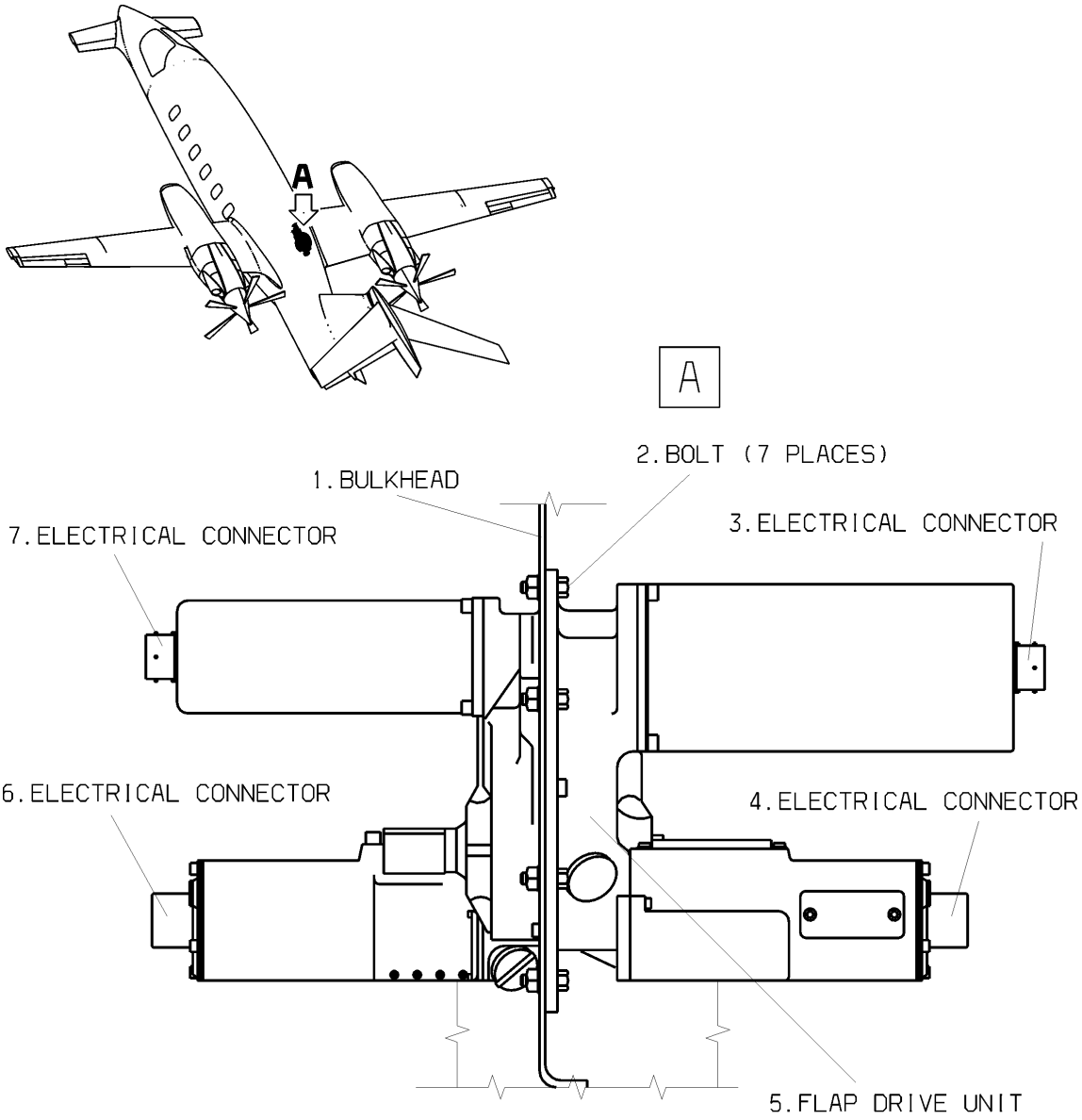

Fig. 207 - Main Wing Flaps Drive Unit - Removal/Installation

17. FWF Actuator - Removal (Ref. to Fig. 208)

A. Referenced Information

Maintenance Manual Chapter 24-00-00

B. Procedure

(1) Make sure that electrical power is available (Refer to 24-00-00).
(2) Set the FLAPS control lever to DN.
(3) When the forward wing flaps are fully extended, open, tag and safety this circuit breaker:

Copilot CB panel:

FLAPS PWR

(4) Remove the two protection covers of the actuator rods (7) and (10).
(5) Remove the bolts (4), nuts (5) and washers (6) which secure the actuator rods (7) and (10) to the connecting rods (8) and (9).
(6) Remove the forward wing tip access panel 561A (661A).
(7) Remove the electrical connector (1) from the actuator (3).
(8) Remove the screws (2) which secure the actuator (3) to forward wing.
(9) Remove the actuator (3) from the airplane through the access hole at the forward wing tip.

18. FWF Actuator - Installation (Ref. to Fig. 208)

A. Referenced Information

B. Procedure

(1) Make sure that the FLAPS circuit breaker is open, tagged and safetied.
(2) Put the FWF actuator (3) in position in the forward wing so that the two actuator rods (7) and (10) protrude from the trailing edge.
(3) Connect the electrical connector (1) to the actuator (3).
(4) Install the screws (2) to secure the actuator (3) to the forward wing.
(5) Install the bolts (4), nuts (5) and washers (6) to secure the actuator rods (7) and (10) to the connecting rods (8) and (9).
(6) Install the two protection covers of the actuator rods (7) and (10).
(7) Install the forward wing tip access panel 561A (661A).
(8) Remove the safety tag and close the FLAPS circuit breaker.
(9) Do a functional test of the FWF system (Refer to Page Block 501 of this section).

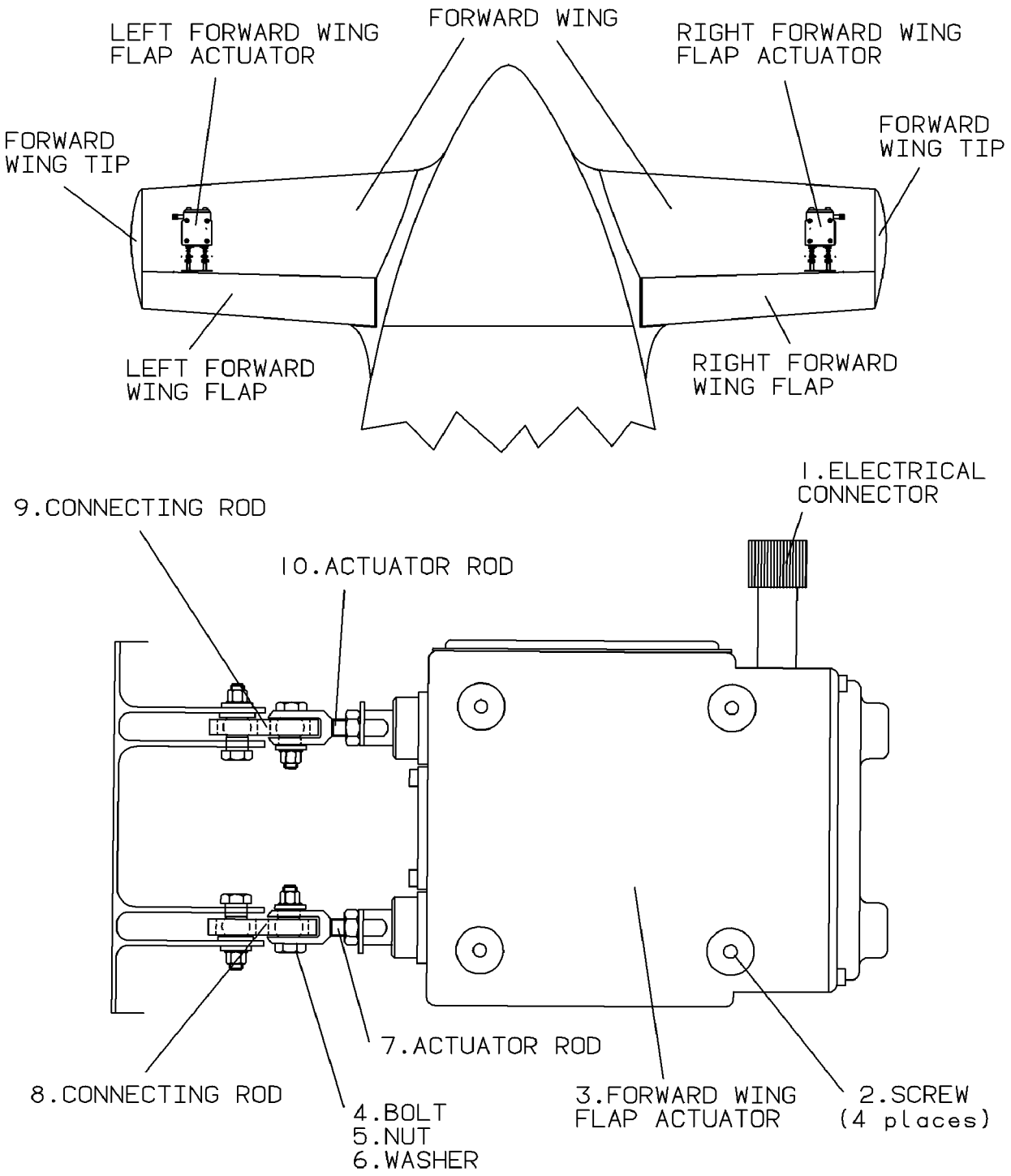

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Fig. 208 - Forward Wing Flap Actuator - Removal/Installation

19. Flap Electronic Control Unit (ECU) - Removal (Ref. to Fig. 209)

A. Procedure

(1) Open, tag and safety this circuit breaker:

Copilot CB panel:
FLAPS PWR

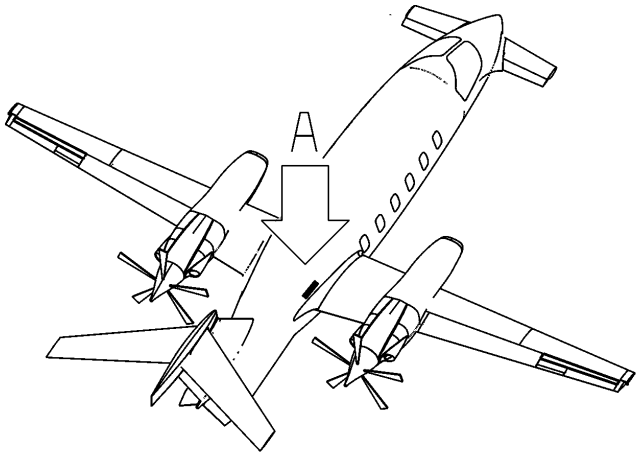
(2) Open the baggage compartment door.
(3) Remove the access panel of the electrical equipment rack.
(4) Attach identity tags and remove the four electrical connectors (2) from the ECU (1).
(5) Remove the screws (3) which secure the ECU (1) to the rack.
(6) Remove the ECU (1).

20. Flap Electronic Control Unit (ECU) - Installation (Ref. to Fig. 209)

NOTE: Make sure that Flap Electronic Control Unit is compliant to SB-80-247 - latest issue.

A. Procedure

(1) Make sure that the FLAPS circuit breaker is open, tagged and safetied.
(2) Put the ECU into position on the electrical equipment rack as shown in Fig. 208.
(3) Install the screws (3) to secure the ECU (1) to the rack.
(4) Install the four electrical connectors (2) in accordance with the identity tags. Remove the identity tags.
(5) Make sure that the circuit breakers on the ECU housing are pushed in.
(6) Remove the safety tags and close the FLAPS circuit breaker.
(7) Do a functional test of the flap system as detailed in Page Block 501 of this section.
(8) Install the access panel of the electrical equipment rack.
(9) Close the baggage compartment door.



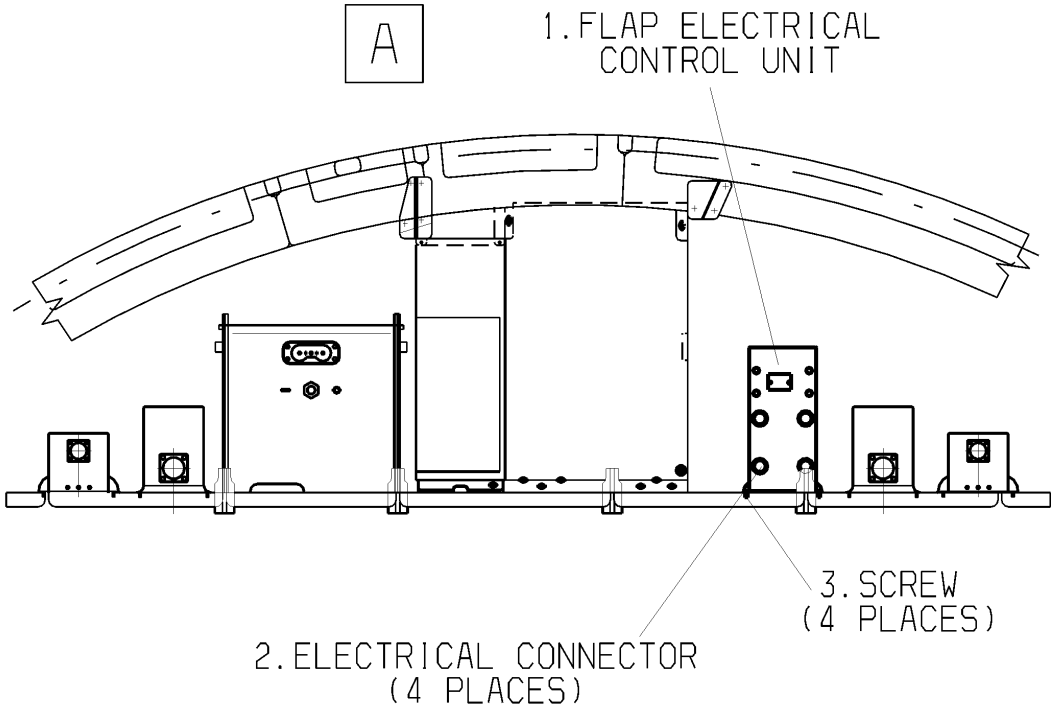


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Fig. 209 - Flaps Electronic Control Unit - Removal/Installation

21. Flaps Control Lever - Removal (Ref. to Fig. 210)

NOTE: The flaps control lever and its housing are a single assembly for removal purposes.

A. Procedure

(1) Open, tag and safety this circuit breaker:

Copilot CB panel:

FLAPS PWR

(2) Remove the screws (2) which secure the flaps control lever housing (3) to the control pedestal.

(3) Carefully remove the housing (3) from the pedestal until the electrical connector (4) can be removed from the housing (3).

(4) Remove the electrical connector (4) from the housing (3).

(5) Remove the flap control lever (1) and housing (3) as a complete assembly.

22. Flaps Control Lever - Installation (Ref. to Fig. 210)

A. Procedure

(1) Make sure that the FLAPS circuit breaker is open, tagged and safetied.

(2) Connect the electrical connector (4) to the housing (3).

(3) Put the lever and housing assembly into position in the control pedestal.

(4) Install the screws (2) to secure the housing (3) to the control pedestal.

(5) Remove the safety tag and close the FLAPS circuit breaker.

(6) Do a functional test of the flap system as detailed in Page Block 501 of this section.

(7) Do a "Landing Gear Warning Test" as detailed in Chapter 32-60-00 Page Block 501.

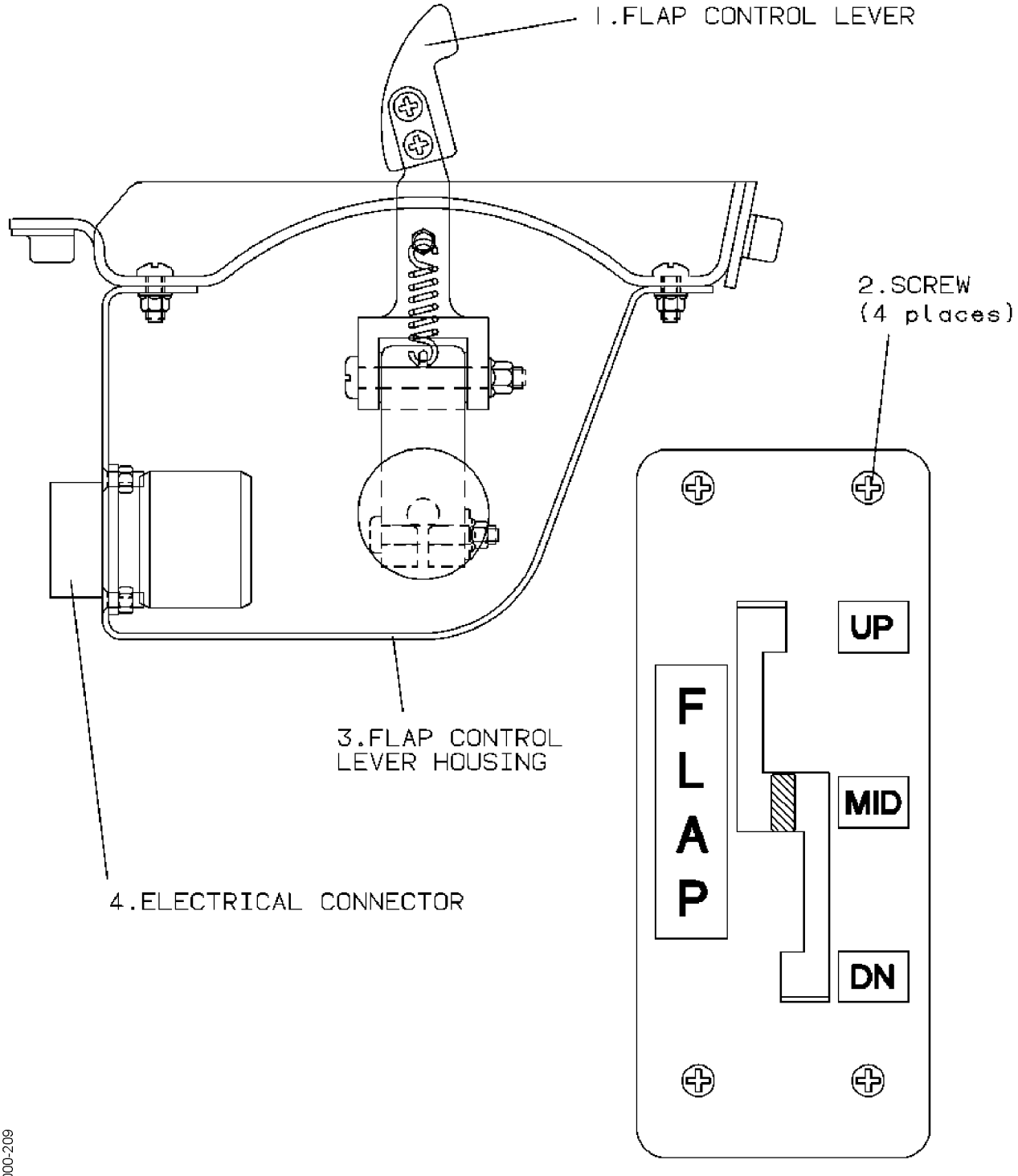

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Fig. 210 - Flaps Control Lever - Removal/Installation

23. Flap Shafts - Removal (Ref. to Fig. 211)

A. Referenced Information

Maintenance Manual Chapter 52-82-00
Maintenance Manual Chapter 57-50-00
Maintenance Manual Chapter 54-10-00

B. Procedure - General (All Shafts)

(1) Open, tag and safety this circuit breaker:

Copilot CB panel:

FLAPS PWR

(2) These procedures are for all of the flap shafts, use the procedure(s) applicable to the specific task.

CAUTION: DURING ALL OF THE SHAFT REMOVAL PROCEDURES, MAKE SURE THAT THE SHAFTS DO NOT ROTATE. BLOCK SHAFT ROTATION TO MAINTAIN SYSTEM RIGGING AND PREVENT DAMAGE.

(3) For ease of later installation it is recommended that the shafts are tagged with the numbers shown on Fig. 211.

C. Procedure - Removal of No. 1 Shaft

(1) Open the main landing gear rear door (Refer to 52-82-00).
(2) Remove wing inspection panels 522AT, 522BT and 522CT (622AT, 622BT and 622CT) from the top of the wing.
(3) Remove the outboard flap as detailed in Para. 2 of this section.
(4) Remove the wing trailing edge (Refer to 57-50-00).
(5) Remove the screws which secure bevel gearbox (1), bevel gearbox (2) and intermediate support (3) to their respective supports on the wing spars.
(6) Move the inner screwjack of the outboard flap towards the wing tip so that it is possible to move the other shafts outboard and disengage the outboard end of No. 1 shaft from the bevel gearbox (1).

NOTE: If it is difficult to disengage the No. 1 shaft from the bevel gearbox (1), remove the inner screwjack of the outboard flap as detailed in Para. 8 of this section. This will allow the necessary extra movement of the shafts and make disengagement easier.

(7) Pull out the No. 1 shaft from the drive unit and remove the shaft from the airplane through the wing ribs at WS 1510 and WS 1825.

D. Procedure - Removal of No. 2 Shaft

(1) Remove wing inspection panels 522AT, 522BT and 522CT (622AT, 622BT and 622CT) from the top of the wing.
(2) Open the main landing gear rear door (Refer to 52-82-00).
(3) Remove the outboard flap as detailed in Para. 2 of this section.
(4) Remove the wing trailing edge (Refer to 57-50-00).

(5) Remove nacelle panels 410AT and 410BT (420AT and 420BT). Refer to 54-10-00.
(6) Remove the screws which secure bevel gearbox (1), bevel gearbox (2) and intermediate support to their respective supports on the wing spar.

NOTE: If necessary remove also the support of the bevel gearbox (arrow A on Fig. 211).

(7) Move the inner screwjack of the outboard flap towards the wing tip so that it is possible to move the other shafts outboard and disengage the inboard end of the No. 2 shaft from the bevel gearbox (1).

NOTE: If it is difficult to disengage the No. 2 shaft from the bevel gearbox (1), remove the inner screwjack of the outboard flap as detailed in Para. 8 of this section. This will allow the necessary extra movement of the shafts and make disengagement easier.

(8) Pull out the No. 2 shaft from the airplane through the wing inspection access holes.

E. Procedure - Removal of No. 3 Shaft

(1) Remove inspection panels 522AT, 522BT and 522CT (622AT, 622BT and 622CT) from the top of the wing.
(2) Remove the outboard flap as detailed in Para. 2 of this section.
(3) Remove the wing trailing edge (Refer to 57-50-00).
(4) Remove nacelle panels 410AT and 410BT (420AT and 420BT). Refer to 54-10-00.
(5) Remove the screws which secure intermediate support (3) to the wing spar.
(6) Move the inner screwjack of the ouboard flap toward the wing tip so that it is possible to move the drive shaft and disengage the outboard end of the No. 3 shaft from the intermediate support (3).

NOTE: If it is difficult to disengage the No. 3 shaft from the intermediate support (3), remove the inner screwjack of the outboard flap as detailed in Para. 8 of this section. This will allow the necessary extra movement of the shafts and make disengagement easier.

(7) Pull out the No. 3 shaft from the airplane toward the wing tip.

F. Procedure - Removal of No. 4 Shaft

(1) Remove the nacelle panels 410AT and 410BT (420AT and 420BT). Refer to 54-10-00.
(2) Remove the outboard flap as detailed in Para. 2 of this section.
(3) Remove the wing trailing edge (Refer to 57-50-00).
(4) Remove the inner screwjack of the outboard flap as detailed in Para. 8 of this section.
(5) Remove the No. 4 shaft from the airplane, by pulling it out of intermediate support (3).

G. Procedure - Removal of No. 5 and No. 6 Shafts

(1) Remove the outboard flap as detailed in Para. 2 of this section.
(2) Remove the wing trailing edge (Refer to 57-50-00).
(3) Remove the bolts which secure the intermediate support (4) to the wing spar.
(4) Move the inner and outer screwjacks so that it is possible to disengage the No. 5 and No. 6 shafts from the intermediate support (4) and from the screwjacks.
(5) Remove the shafts.

H. Procedure - Removal of No. 7 Shaft

(1) Open the main landing gear rear door (Refer to 52-82-00).
(2) Remove wing inspection panels 522AT, 522BT and 522CT (622AT, 622BT and 622CT).
(3) Remove the inboard flap as detailed in Para. 4 of this section.
(4) Remove the inboard flap screwjack as detailed in Para. 10 of this section.
(5) Pull out the No. 7 shaft from the flaps drive unit.
(6) Remove the shaft from the airplane by pulling it outboard from the fuselage through the main landing gear wheel well.

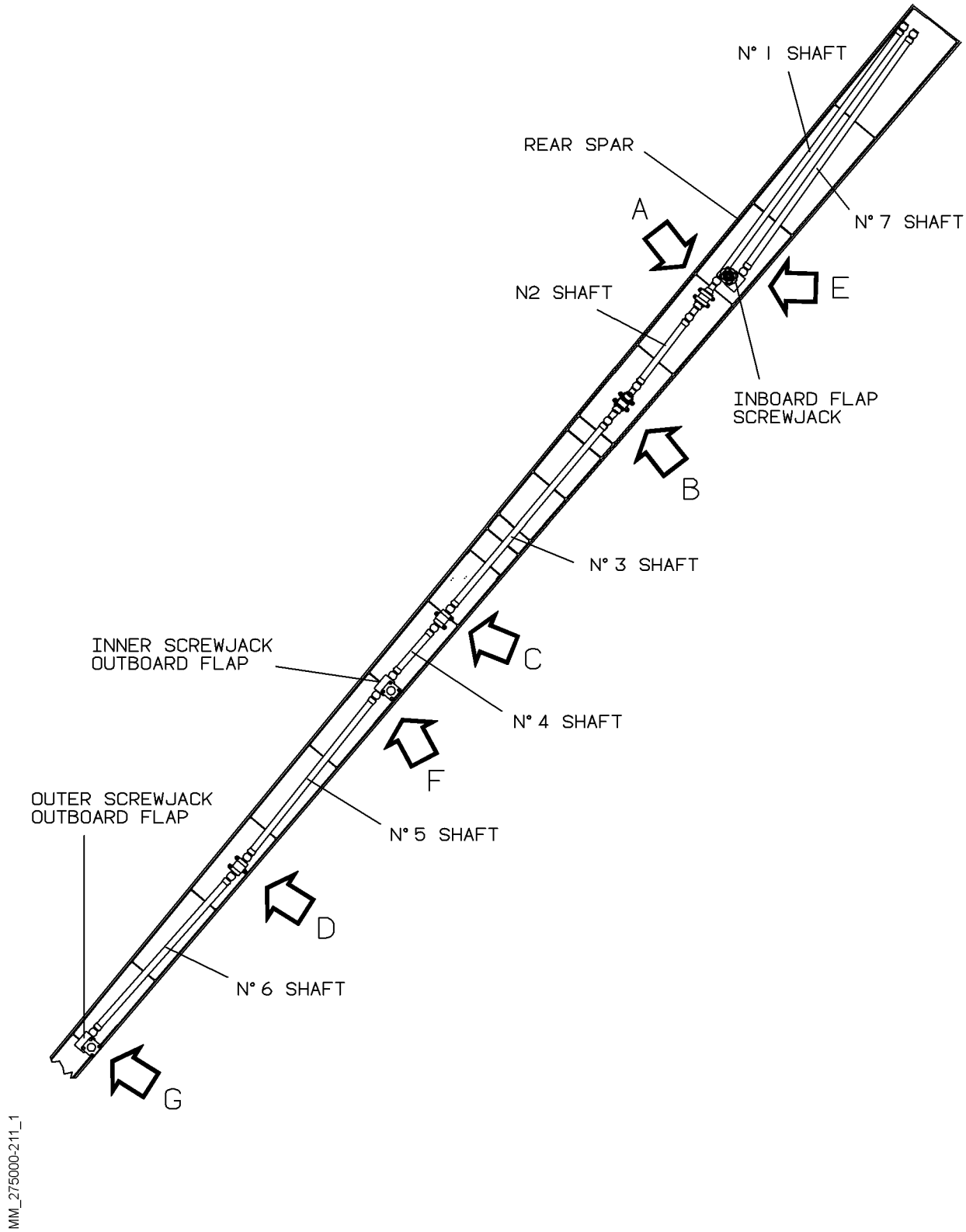

Fig. 211 - Flap Shafts - Removal/Installation (Sheet 1 of 3)

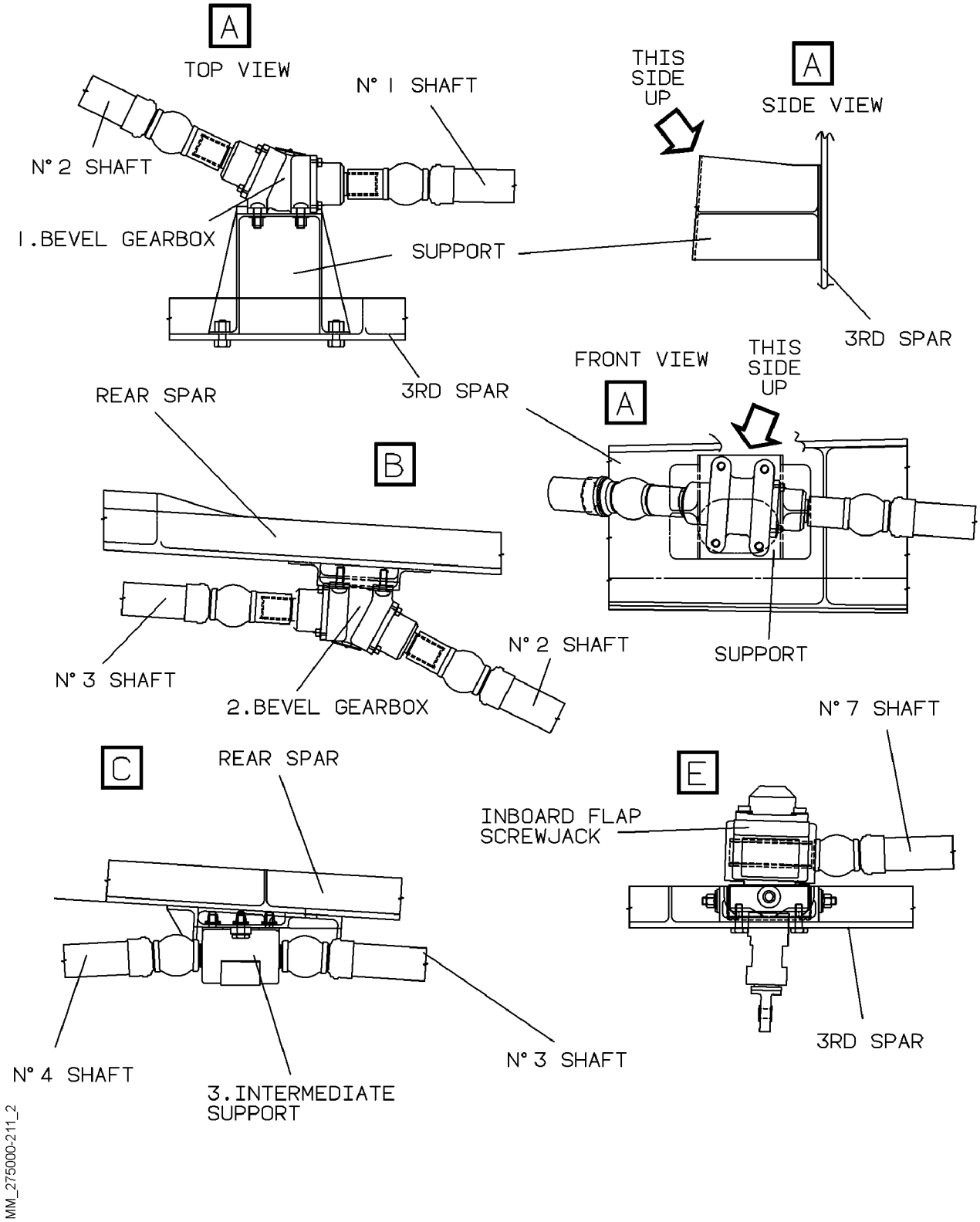

Fig. 211 - Flap Shafts - Removal/Installation (Sheet 2 of 3)

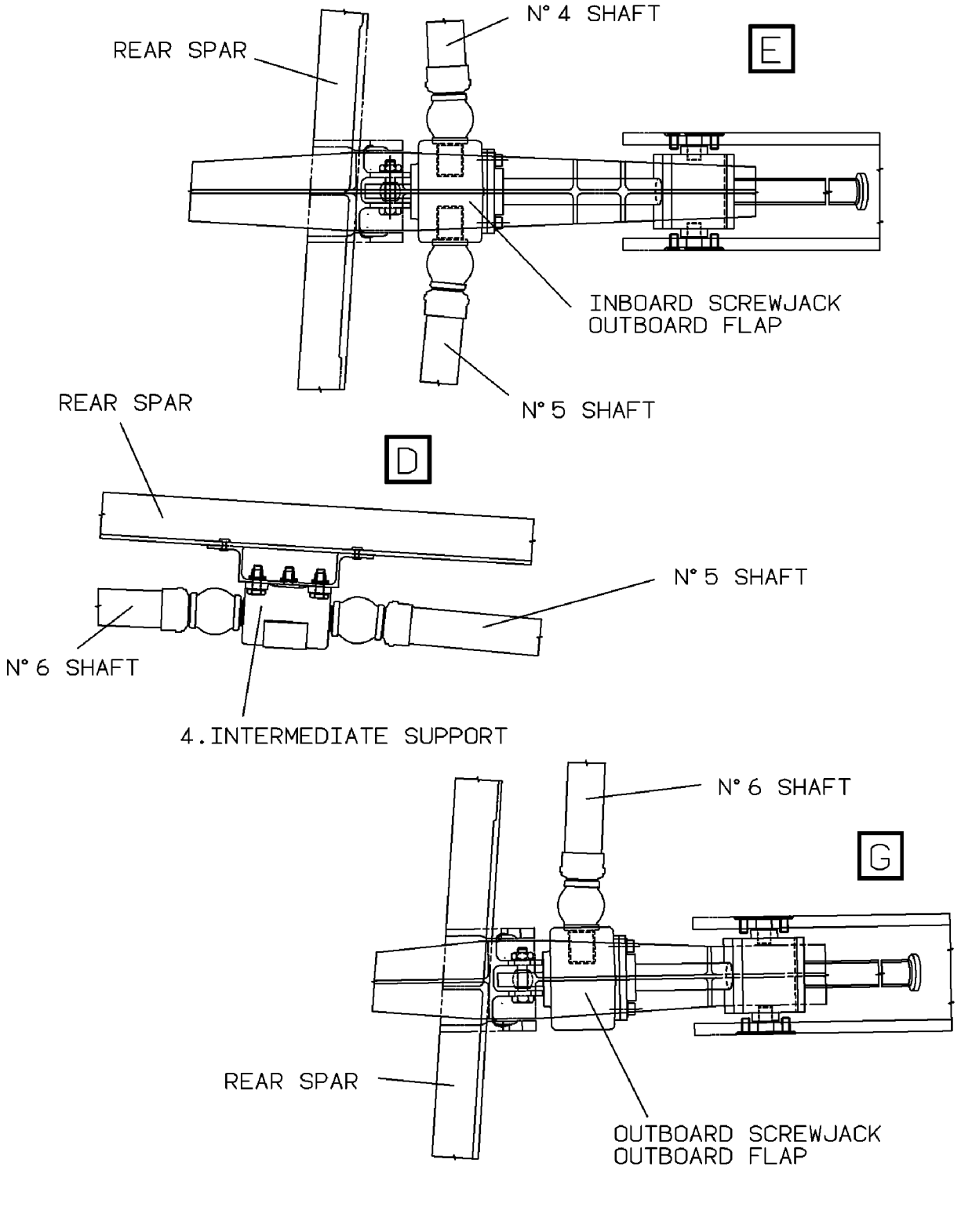

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Fig. 211 - Flap Shafts - Removal/Installation (Sheet 3 of 3)

24. Flap Shafts - Installation (Ref. to Fig. 211)

A. Referenced Information

Maintenance Manual Chapter 52-82-00
Maintenance Manual Chapter 57-50-00
Maintenance Manual Chapter 54-10-00

B. Procedure - General (All Shafts)

(1) Make sure that the FLAPS circuit breaker is open, tagged and safetied.

(2) These procedures are for all of the flap shafts, use the procedure(s) applicable to the specific task.

CAUTION: DURING ALL OF THE SHAFT INSTALLATION PROCEDURES, MAKE SURE THAT THE SHAFTS DO NOT ROTATE. MAKE SURE THAT SHAFT ROTATION IS BLOCKED TO MAINTAIN SYSTEM RIGGING AND PREVENT DAMAGE.

(3) After installation of the shaft(s) do a functional test of the flap system, as detailed in Page Block 501 of this section.

C. Procedure - Installation of No. 1 Shaft

(1) Put the No. 1 shaft into position by installing it through the wing ribs at WS 1510 and WS 1825.

(2) Install the inboard end of the No. 1 shaft in its location in the flaps drive unit.

(3) Install the outboard end of the No. 1 shaft in its location in the bevel gearbox (1).

(4) Install the screws to secure the bevel gearbox (1) to its support on the wing spar.

(5) Move the drive shafts, the bevel gearbox (2) and the intermediate support (3), toward the fuselage so that they are correctly positioned; this movement should result in correct positioning of the inner screwjack of the outboard flap.

(6) Install the screws to secure the bevel gearbox (2) and the intermediate support (3) to the wing spar.

NOTE: If it was necessary (during the removal procedure) to remove the inner screwjack, install it as detailed in Para. 9 of this section.

(7) Install the wing trailing edge (Refer to 57-50-00).

(8) Install the outboard flap as detailed in Para. 3 of this section.

(9) On completion of the flap system functional test, install wing inspection panels 522AT, 522BT and 522CT (622AT, 622BT and 622CT) and close the main landing gear rear door (Refer to 52-82-00).

D. Procedure - Installation of No. 2 Shaft

CAUTION: THE SUPPORT OF THE BEVEL GEARBOX IS ASYMMETRIC. IF IT HAS BEEN REMOVED, DURING INSTALLATION IT MUST BE POSITIONED WITH THE PROTRUDING AREA UPWARD AS SHOWN IN FIGURE 211 (SHEET 2).

(1) Put the No. 2 shaft into position by installing it through the inspection holes in the top of the wing.
(2) Install one end of the shaft in the bevel gearbox (1).
(3) Install the screws to secure the bevel gearbox (1) to its support on the wing spar.
(4) Move the drive shafts, the bevel gearbox (2) and the intermediate support (3) toward the fuselage so that they are correctly positioned; at the same time install the outboard end of the No. 2 shaft in the bevel gearbox (2).
(5) Install the screws to secure the bevel gearbox (2) and the intermediate support (3) to the wing spar.

NOTE: If it was necessary (during the removal procedure) to remove the inner screwjack, install it as detailed in Para. 9 of this section.

(6) Install the wing trailing edge (Refer to 57-50-00).
(7) Install the outboard flap as detailed in Para. 3 of this section.

CAUTION: CHECK THAT THE CLEARANCE BETWEEN THE N°2 SHAFT AND THE BLEED LINE DUCT IS NOT LESS THAN 6 MILLIMETERS.

(8) On completion of the flap system functional test, install wing inspection panel 522AT, 522BT and 522CT (622AT, 622BT and 622CT), and close the main landing gear rear door (Refer to 52-82-00).

E. Procedure - Installation of No. 3 Shaft

(1) Put the No. 3 shaft into position by installing one end of it in the bevel gearbox (2).
(2) Install the ouboard end of the No. 3 shaft in its location in the intermediate support (3).
(3) Install the screws to secure the intermediate support.

NOTE: If it was necessary (during the removal procedure) to remove the inner screwjack, install it as detailed in Para. 9 of this section.

(4) Make sure that the No. 4 shaft is correctly installed in the inner screwjack; move the inner screwjack as necessary.
(5) Install the wing trailing edge (Refer to 57-50-00).
(6) Install the outboard flap as detailed in Para. 4 of this section.
(7) On the completion of the flap system functional test, install wing inspection panels 522AT, 522BT and 522CT (622AT, 622BT and 622CT).
(8) Install nacelle panels 410AT and 410BT (420AT and 420BT). (Refer to 54-10-00).

F. Procedure - Installation of No. 4 Shaft

(1) Put the No. 4 shaft into position by installing one end of it in the intermediate support (3).
(2) Install the inner screwjack of the outboard flap as detailed in Para. 9 of this section.
(3) Install the wing trailing edge (Refer to 57-50-00).
(4) Install the outboard flap as detailed in Para. 3 of this section.
(5) On completion of the flap system functional test install nacelle panels 410AT and 410BT (420AT and 420BT). Refer to 54-10-00.

G. Procedure - Installation of No. 5 and No. 6 Shafts

(1) Install one end of the No. 5 and No. 6 shafts in the inner and outer screwjacks respectively.
(2) Install the other ends of the No. 5 and No. 6 shafts in the intermediate support (4).
(3) Install the bolts to secure the intermediate support (4) to the wing spar.
(4) Install the wing trailing edge (Refer to 57-50-00).
(5) Install the outboard flap as detailed in Para. 3 of this section.

H. Procedure - Installation of No. 7 Shaft

(1) Put the No. 7 shaft into position by installing it through the main landing gear rear well.
(2) Install one end of the shaft in its location in the flaps drive unit.
(3) Install the screwjack of the inboard flap as detailed in Para. 11 of this section.
(4) Install the inboard flap as detailed in Para. 5 of this section.
(5) On completion of the flaps system functional test, install wing inspection panels 522AT, 522BT and 522CT (622AT, 622BT and 622CT) and close the main landing gear rear door.

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FLAPS - ADJUSTMENT/TEST

1. General

A. Flap system functional testing consists of:

- checking the flap travel times from UP to MID, MID to DN, DN to MID and MID to UP
- checking the angular positions of the flaps at the fully down position, the mid position (when MID is selected from the DN position) and the fully up position
- checking that the MFD Flaps Position Indication corresponds to the actual flap positions.

B. Testing is done on the flaps on one side of the airplane (left or right) and repeated for the other side. The travel boards are designed for use on both sides of the airplane.

2. Flaps - Functional Test

A. Fixtures, Test and Support Equipment

Main Wing Outboard Flap (MWOF) Travel Board	80-909163-001
Main Wing Inboard Flap (MWIF) Travel Board	80-909162-801
Forward Wing Flap (FWF) Travel Board	80-909161-801
Stop Watch (Qty. 2)	Not Specified

B. Referenced Information

Maintenance Manual Chapter 24-00-00

C. Procedure

WARNING: DO NOT LUBRICATE OR GREASE THE EXTERNAL SCREW OF THE SCREWJACK.

(1) Install the MWOF travel board between the aileron and the outboard flap (at WS 5120) (Ref. to Fig. 501).
(2) Install the MWIF travel board at the center of wing inspection panel 522CT (left wing) or 622CT (right wing), located on top of the wing between the fuselage and the engine nacelle (Ref. to Fig. 502).
(3) Install the FWF travel board at the position in line with the two external screws which secure the FWF actuator to the forward wing (Ref. to Fig. 503).
(4) Make sure that electrical power is available (Refer to 24-00-00).
(5) Set the battery switch to BAT.
(6) Make sure that the areas around the flaps are clear.

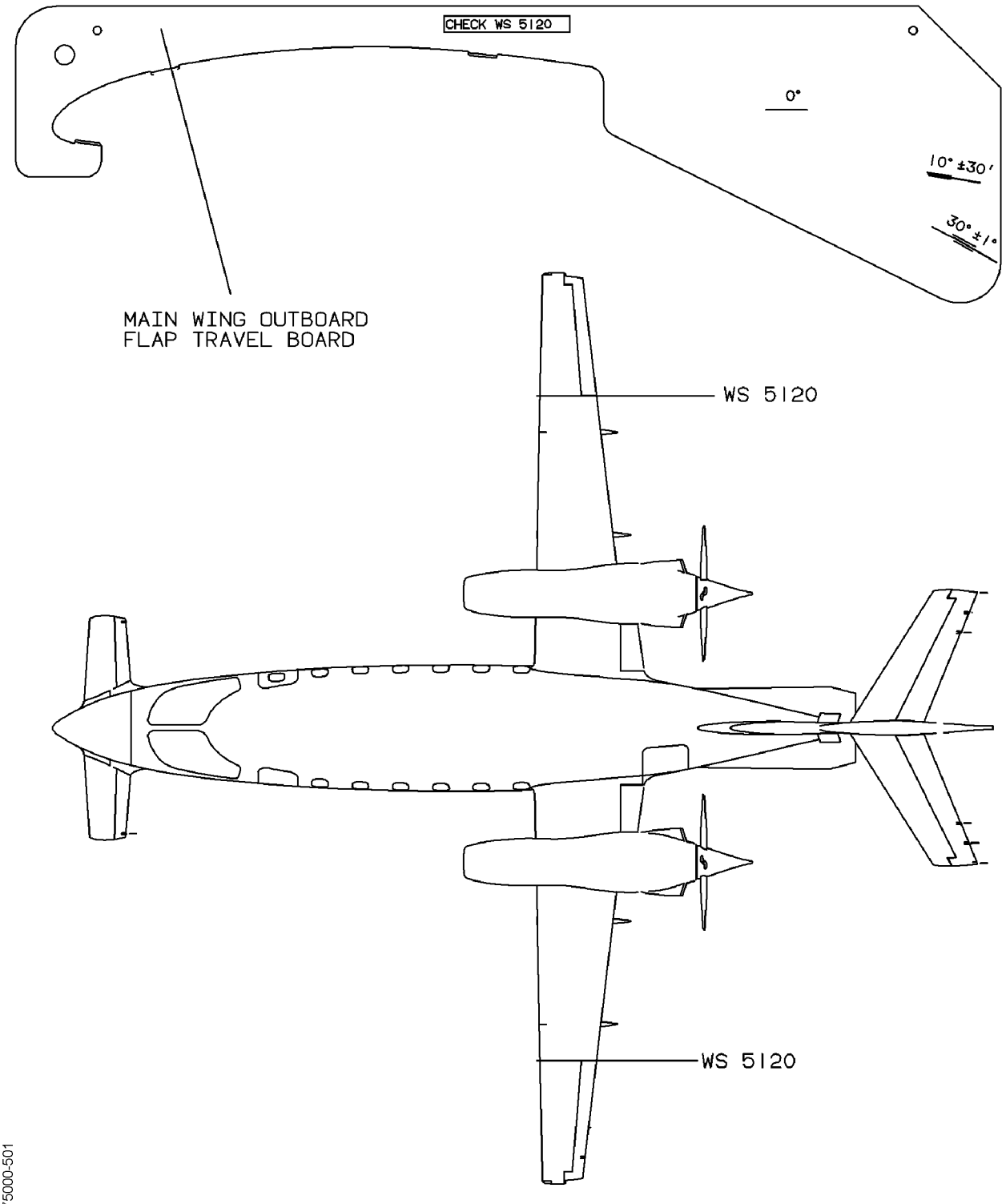

Fig. 501 - MWOF Travel Board Installation

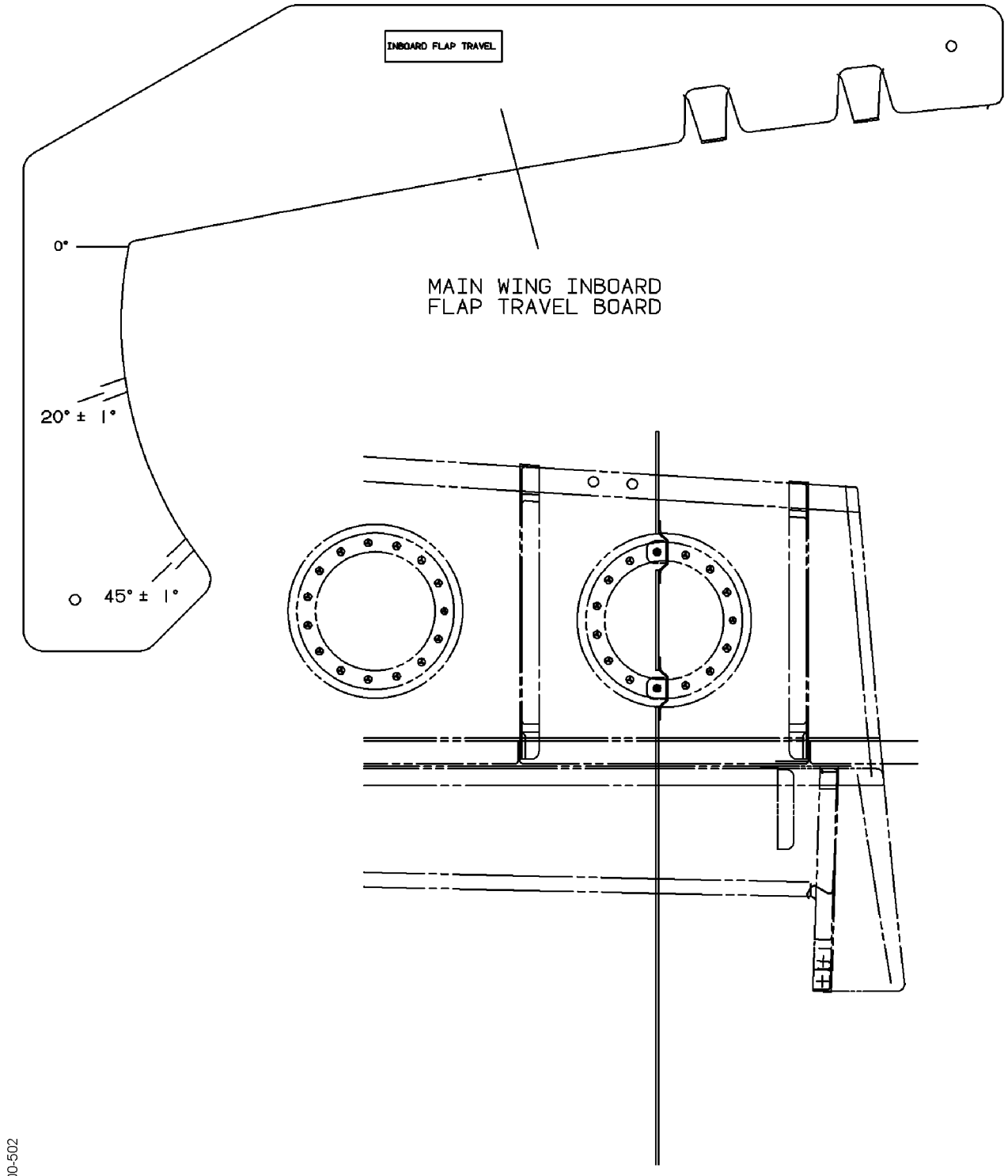

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Fig. 502 - MWIF Travel Board Installation

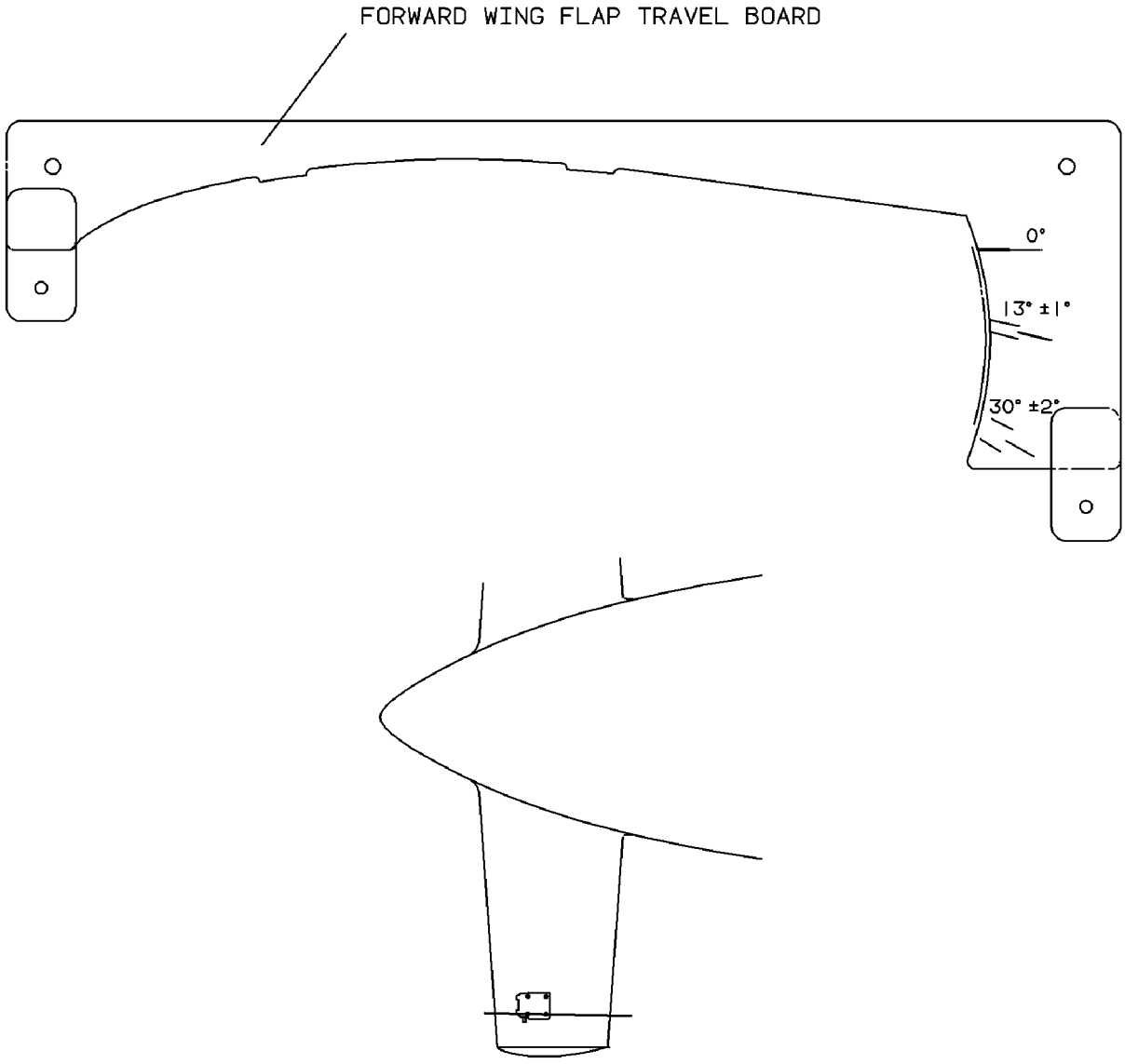

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Fig. 503 - FWF Travel Board Installation

NOTE: For these tests it will be necessary to have one person in the flight compartment to operate the flap control lever and check the MFD Flaps Position Indication, and one person at the applicable flap to check travel times and flap position.

(7) Do the test of the MWOF:

	Action	Result
(a)	Set the flap control lever (located on the control pedestal) to the MID position. At the same time, start the stop watch and be ready to stop the watch when the MWOF reaches the mid-position.	The MWOF moves to the mid-position.
(b)	Stop the watch at the instant that the MWOF stops at the mid-position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 14 and 18 seconds.
(c)	Set the flap control lever to the DN position. At the same time, start the stop watch and be ready to stop the watch when the MWOF reaches the fully down position.	The MWOF moves to the fully down position.
(d)	Stop the watch at the instant that the MWOF stops at the fully down position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 3 and 5 seconds.
(e)	Check the angular position of the MWOF at the travel board.	The MWOF must be within 1 degree of the 30° mark on the travel board.
(f)	Check that the position of the MWOF is correctly shown on the MFD Flaps Position Indication.	The OUTB arrowhead must be in line with the DN mark.

	Action	Result
(g)	Set the flap control lever to the MID position. At the same time, start the stop watch and be ready to stop the watch when the MWOF reaches the mid-position.	The MWOF moves to the mid-position.
(h)	Stop the watch at the instant that the MWOF stops at the mid-position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 3 and 5 seconds.
(i)	Check the angular position of the MWOF at the travel board.	The MWOF must be within 0.5 degree of the 10° mark on the travel board.
(j)	Check that the position of the MWOF is correctly shown on the MFD Flaps Position Indication.	The OUTB arrowhead must be in line with the MID mark.
(k)	Set the flap control lever to the UP position. At the same time, start the stop watch and be ready to stop the watch when the MWOF reaches the fully up position.	The MWOF moves to the fully up position.
(l)	Stop the watch at the instant that the MWOF stops at the fully up position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 14 and 18 seconds.
(m)	Check the angular position of the MWOF at the travel board.	The MWOF must be in line with the 0° mark on the travel board.
(n)	Check that the position of the MWOF is correctly shown on the MFD Flaps Position Indication.	The OUTB arrowhead must be in line with the UP mark.

(8) Do the test of the MWIF:

NOTE: For these tests, two stop watches are required. One is used to monitor MFIF travel time from lever MID selection to MWIF mid-position and is designated stop watch No. 1; the other is used to monitor when MWIF travel begins in relation to MWOF travel time and is designated stop watch No. 2.

	Action	Result
(a)	Set the flap control lever to the MID position. At the same time, start the two stop watches and be ready to stop watch No. 2 when the MWIF starts to move, and to stop watch No. 1 when the MWIF reaches the mid-position.	
(b)	Stop the No. 2 watch when the MWIF starts to move, and stop the No. 1 watch when the MWIF stops at the mid-position. Make a note of the two stop watch readings, then set both watches to zero.	The time recorded on the stop watch No. 2 must be between 12.5 and 14.5 seconds. The time recorded on stop watch No. 1 must be between 14 and 18 seconds.
(c)	Set the flap control lever to the DN position. At the same time, start one of the stop watches. Be ready to stop the watch when the MWIF reaches the fully down position.	The MWIF moves to the fully down position.
(d)	Stop the watch at the instant that the MWIF stops at the fully down position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 2.5 and 4.5 seconds.
(e)	Check the angular position of the MWIF at the travel board.	The MWIF must be within 1 degree of the 45° mark on the travel board.
(f)	Check that the position of the MWIF is correctly shown on the MFD Flaps Position Indication.	The INB arrowhead must be in line with the DN mark.

	Action	Result
(g)	Set the flap control lever to the MID position. At the same time, start one of the stop watches and be ready to stop the watch when the MWIF reaches the mid-position.	The MWIF moves to the mid-position.
(h)	Stop the watch at the instant that the MWIF stops at the mid-position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 2.5 and 4.5 seconds.
(i)	Check the angular position of the MWIF at the travel board.	The MWIF must be within 1 degree of the 20° mark on the travel board.
(j)	Check that the position of the MWIF is correctly shown on the MFD Flaps Position Indication.	The INB arrowhead must be in line with the MID mark.
(k)	Set the flap control lever to the UP position. At the same time, start one of the stop watches and be ready to stop the watch when the MWIF reaches the fully up position.	The MWIF moves to the fully up position.
(l)	Stop the watch at the instant that the MWIF stops at the fully up position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 2 and 4 seconds.
(m)	Check the angular position of the MWIF at the travel board.	The MWIF must be in line with the 0° mark on the travel board.
(n)	Check that the position of the MWIF is correctly shown on the MFD Flaps Position Indication.	The INB arrowhead must be in line with the UP mark.

(9) Do the test of the FWF:

NOTE: For the first part of this test, two stop watches are required.

	Action	Result
(a)	Set the flap control lever to the MID position. At the same time, start both stop watches and be ready to stop the watch when the FWF starts to move and the other when the FWF stops (this first interruption of movement occurs approx. 1 second after initial movement).	–
(b)	Stop one watch when the FWF starts to move, and stop the other watch when the FWF stops. Make a note of the two stop watch readings and set both watches to zero. **NOTE:** After a further 3.5 seconds (approx.) the FWF will continue to move to the mid-position. This movement will be monitored during the next steps.	The time recorded on the watch stopped first must be between 8 and 10seconds. The time recorded on the other watch must be between 9 and 11 seconds.
(c)	Wait until the FWF reaches the mid-position, then set the flap control lever to the UP position.	
(d)	Wait until the FWF reaches the UP position, then set the flap control lever to the MID position. At the same time start both stop watches and be ready to stop one watch when the FWF starts to move after the initial 1 second of movement recorded previously, and stop the other watch when the FWF reaches the mid-position.	

	Action	Result
(e)	Stop one watch when the FWF starts to move for the second time and stop the other watch at the instant that the FWF stops at the mid-position. Make a note of the stop watch readings and set both watches to zero.	The time recorded on the watch stopped first must be between 12.5 and14.5 seconds. The time recorded on the other watch must be between 14 and 18 seconds.
(f)	Set the flap control lever to the DN position. At the same time start one of the stop watches. Be ready to stop the watch when the FWF reaches the fully down position.	The FWF moves to the fully down position.
(g)	Stop the watch at the instant that the FWF stops at the fully down position. Make a note of the time recorded on the stop watch and set the watch to zero.	The time recorded must be between 3.5 and 5.5 seconds.
(h)	Check the angular position of the FWF at the travel board.	The FWF must be within 1 degree of the 30° mark on the travel board.
(i)	Check that the position of the FWF is correctly shown on the MFD Flaps Position Indication.	The pointers at the upper part of the indication must be in line with the DN mark.
(j)	Set the flap control lever to the MID position. At the same time, start one of the stop watches and be ready to stop the watch when the FWF reaches the mid-position.	The FWF moves to the mid-position.
(k)	Stop the watch at the instant that the FWF stops at the mid-position. Make a note of the time recorded on the stop watch and set the watch to zero.	The time recorded must be between 3.5 and 5.5 seconds.

	Action	Result
(l)	Check the angular position of the FWF at the travel board.	The FWF must be within 1 degree of the 13° mark on the travel board.
(m)	Check that the position of the FWF is correctly shown on the MFD flaps position indication.	The pointers must be in line with the MID mark.
(n)	Set the flap control lever to the UP position. At the same time, start one of the stop watches and be ready to stop the watch when the FWF reaches the up position.	The FWF moves to the fully up position.
(o)	Stop the watch at the instant that the FWF stops at the fully up position. Make a note of the time recorded on the stop watch and set the watch to zero.	The time recorded must be between 2.5 and 4.5 seconds.
(p)	Check the angular position of the FWF at the travel board.	The FWF must be in line with the 0° mark on the travel board.
(q)	Check that the position of the FWF is correctly shown on the MFD flaps position indication.	The pointers must be in line with the UP mark.

(10) Do the tests, steps (7), (8) and (9), on the flaps on the other side of the airplane.
(11) Remove the three travel boards.
(12) Set the battery switch to OFF.
(13) Remove electrical power (Refer to 24-00-00).

3. MWOF - Adjustment (Ref. to Fig. 504)

A. Procedure

(1) Make sure that electrical power is available, and that the FLAPS circuit breaker is closed.

(2) Set the FLAP control lever to the UP position.

(3) When the flaps are fully retracted, check that the gap between the leading edge of the MWOF and the structure of the wing trailing edge is between 1.5 and 2 mm (0.059 and 0.079 inch).

(4) When the flaps are fully retracted, check that the trailing edge of the MWOF is aligned and flush with the rear edge of the wing trailing edge structure.

(5) If the requirements of steps (3) and (4) are met, adjustment is not required.

(6) If the requirements of steps (3) and (4) are not met, there are three possible conditions which must be corrected:

- the outer end only is out of line
- the inner end only is out of line
- the complete MWOF is out of line.

(7) If the outer end only is out of line, proceed as follows:

(a) Measure and make a note of the gap at the outer end of the MWOF leading edge.

(b) Mark a line across the roller support and the flap track at the outer location as shown in Fig. 504.

(c) Remove the wing trailing edge. Refer to 57-50-00.

(d) Set the flaps to the UP position (the flaps were selected to the DN position for removal of the wing trailing edge).

(e) Remove the intermediate support (shown as item (4) on Fig. 211 of this section).

(f) Turn the No. 6 shaft as required to move the outer part of the flap the required amount so that when the trailing edge is installed the gap between the leading edge of the flap and the trailing edge will be between 1.5 and 2 mm (0.059 and 0.079 inch).

For example:
If the gap measured in step (a) was 4 mm. (0.157 inch) the No. 6 shaft must be turned so that the mark on the roller support moves forward 2 to 2.5 mm. (0.079 to 0.098 inch) in relation to the mark on the flap track.

(g) Install the intermediate support as detailed in Page Block 201, Para. 23, Procedure G; make sure that the No. 6 shaft is moved the minimum amount necessary to engage it in the intermediate support and still maintain the adjustment made in step (f).

(h) Install the wing trailing edge (Refer to 57-50-00).

(i) Do steps (1) thru (4) again to make sure that the system is adjusted correctly; do any further adjustments, as necessary (as detailed in this procedure) until satisfactory.

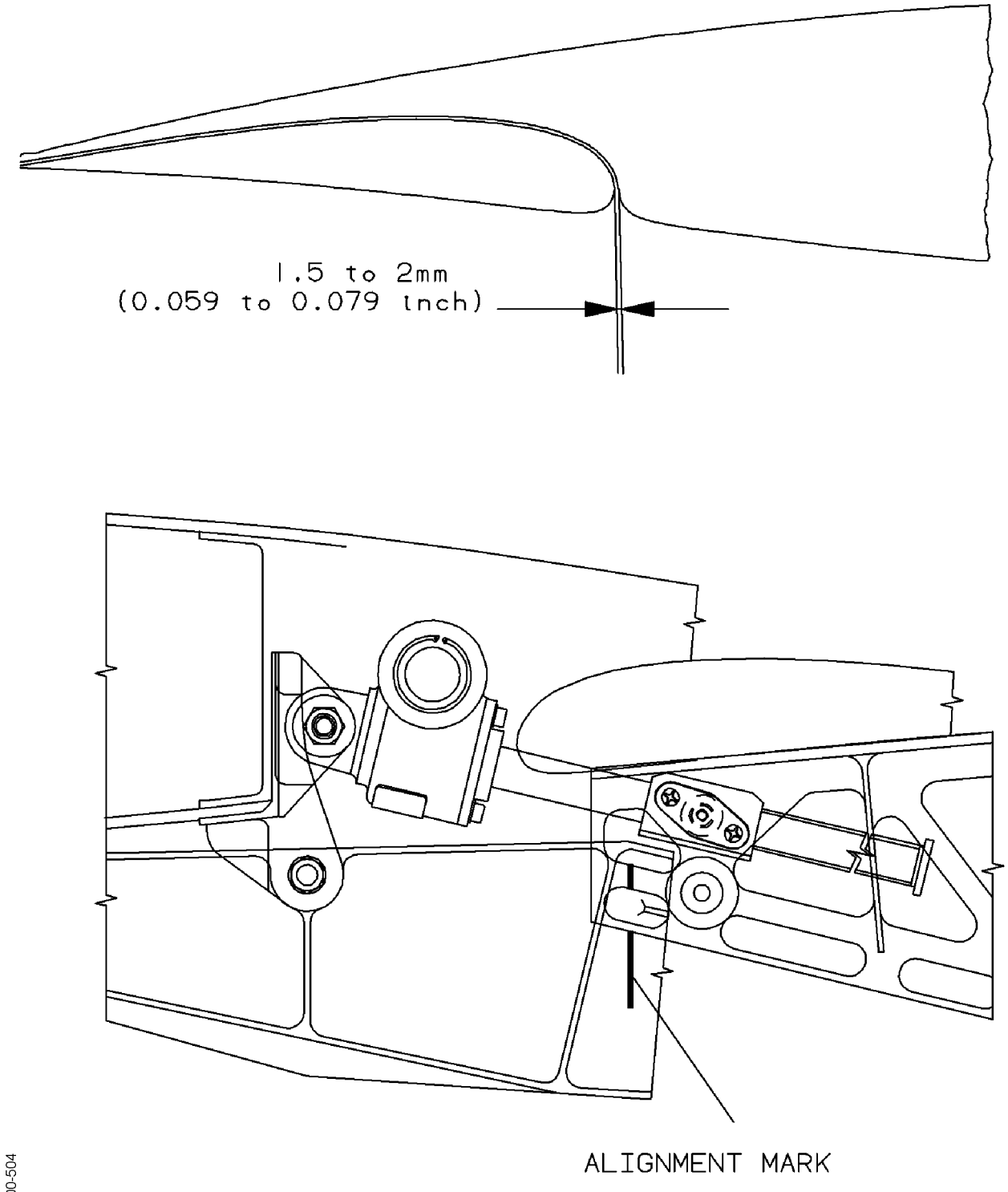

Fig. 504 - Main Wing Outboard Flap - Adjustment Details

(8) If the inner end only is out of line, proceed as follows:
  (a) Measure and make a note of the gap at the inner end of the MWOF leading edge.
  (b) Mark a line across the roller support and the flap track at the inner location as shown in Fig. 504.
  (c) Remove the wing trailing edge. Refer to 57-50-00.
  (d) Set the flaps to the UP position (the flaps were selected to the DN position for removal of the wing trailing edge).
  (e) Remove the intermediate support (shown as item (4) on Fig. 211 of this section).
  (f) Remove the No. 5 and No. 6 shafts (shown on Fig. 211).
  (g) Remove the bolts which secure the intermediate support (shown as item (3) on Fig. 211) to the wing rear spar, but do not remove the intermediate support.
  (h) Move the intermediate support and the No. 4 shaft (as much as possible) toward the fuselage and move the inner screwjack toward the wing tip (as much as possible) to disengage the No. 4 shaft from the inner screwjack.
  (i) When the No. 4 shaft and the inner screwjack are disengaged, insert the No. 5 shaft in the screwjack and turn the No. 5 shaft as required to move the inner part of the flap the required amount so that, when the trailing edge is installed, the gap between the leading edge of the flap and the trailing edge will be between 1.5 and 2 mm. (0.059 and 0.079 inch).

    For example:
    If the gap measured in step (a) was 4 mm (0.157 inch) the No. 6 shaft must be turned so that the mark on the roller support moves forward 2 to 2.5 mm (0.079 to 0.098 inch) in relation to the mark on the flap track.
  (j) Remove the No. 5 shaft from the inner screwjack.
  (k) Move the No. 4 shaft and the inner screwjack as required to engage the No. 4 shaft in the inner screwjack.
  (l) Install the bolts to secure the intermediate support (item (3) on Fig. 211) to the wing rear spar.
  (m) Install the intermediate support (item 4 on Fig. 211) and the No. 5 and No. 6 shafts; make sure that the outer screwjack does not turn during the installation procedure.
  (n) Install the wing trailing edge (Refer to 57-50-00.
  (o) Do steps (1) thru (4) again to make sure that the system is adjusted correctly; do any further adjustments, as necessary (as detailed in this procedure) until satisfactory.
(9) If the complete MWOF is out of line, use the appropriate parts of the procedures given in steps (7) and (8) as required to set the MWOF in its correct position.

4. MWIF - Adjustment (Ref. to Fig. 505)

A. Procedure

(1) Make sure that electrical power is available, and that the FLAPS circuit breaker is closed.
(2) Set the FLAP control lever to the UP position.

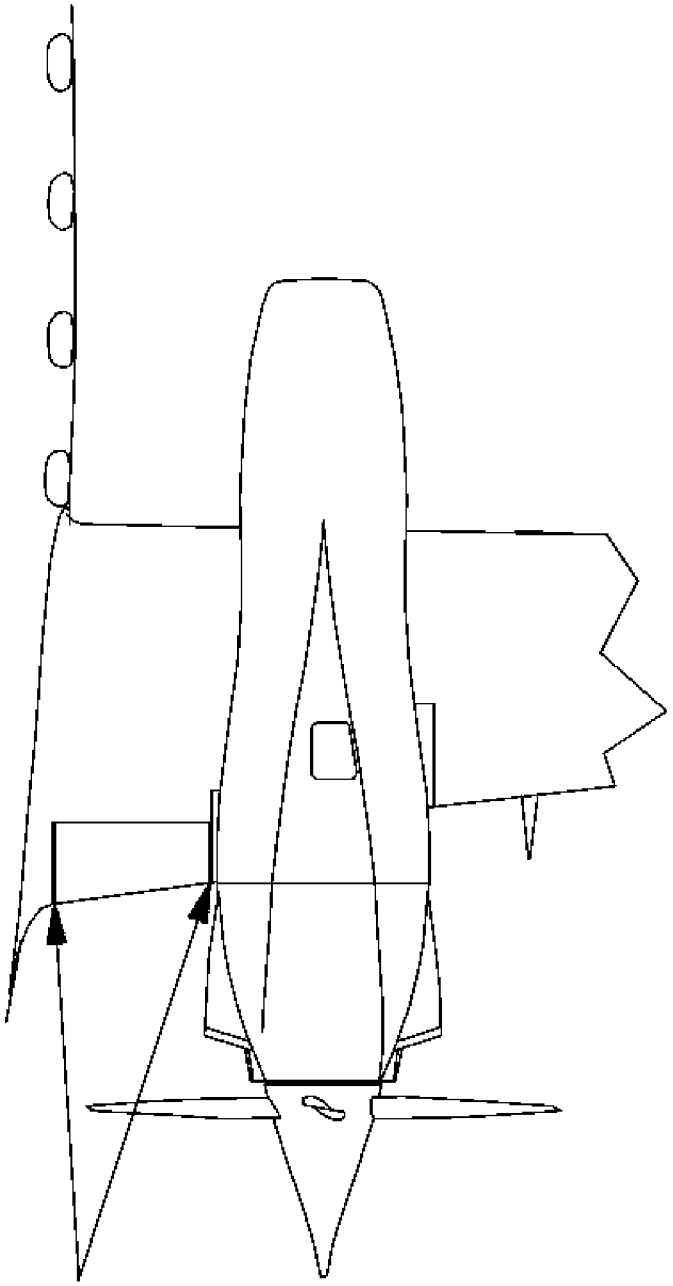

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Fig. 505 - Main Wing Inboard Flap - Adjustment Details

(3) When the flaps are fully retracted, check that the trailing edge of the MWIF is in line with the fillet on the rear fuselage/wing fairing and the fillet on the lower nacelle panel as shown in Fig. 505.
(4) If the requirements of step (3) are met, adjustment is not required.
(5) If the requirements of step (3) are not met, there are three possible conditions which must be corrected:
- the outer end only is out of line
- the inner end only is out of line
- the complete MWIF is out of line.

(6) If one or both ends of the MWIF is out of line, proceed as follows:
(a) Remove the MWIF as detailed in Para. 4 of Page Block 201.
(b) Adjust as required at one or more of these locations:
- the eccentric on the front roller each side of the MWIF
- the eye-end of the screwjack which is attached to the flap.

(c) Install the MWIF and do this Procedure again to verify that the adjustments result in alignment of the MWIF when retracted.

5. FWF - Adjustment

NOTE: Adjustment of the FWF is required if, as a result of the functional test detailed in this Page Block, the FWF does not align with the marks on the travel board.

A. Procedure

(1) Remove the two protection covers of the actuator rods.
(2) Adjust the ends of the actuator rods as required.
(3) Install the two protection covers.

6. MID Interlock Circuit - Operational Test

(1) Set the system to UP position.
(2) Disconnect the L FWD WG ACT fuse.
(3) Set the system to MID position.
(4) Check that all surfaces have reached the MID position except the L FWD WG ACT (LH Canard). Check that the "Flap Sync" advisory light comes on after 5÷6 seconds.
(5) Set the system to DOWN position.
(6) Check that the inboard flap (MWIF) have reached the DOWN position. The other surfaces should remain to MID (LH Canard to UP). Check that the "Flap Sync" advisory light comes on.
(7) Set the system to MID position.
(8) Check that the position of all surfaces do not change (same condition as step 6).
(9) Set the system to UP position.
(10) Check that all surfaces move to UP position (except the LH canard already to UP position as to step 6). Check that the "Flap Sync" advisory light goes off as soon as all surfaces reach the UP position.

(11) Repeat steps 1 ÷ 10 disconnecting the R FWD WG ACT fuse and connecting the L FWD WG ACT. Check steps 4 - 6 - 8 - 10 making sure that the flap canard inhibited in this phase is the RH one.

(12) Connect the R FWD WG ACT fuse.

(13) Set the system to DOWN position.

(14) Disconnect the L FWD WG ACT fuse.

(15) Set the system to MID position.

(16) Check that all surfaces have reached the MID position except the L FWD WG ACT (LH Canard). Check that the "Flap Sync" advisory light comes on after 5 ÷ 6 seconds.

(17) Set the system to UP position.

(18) Check that the inboard flap (MWIF) have reached the UP position. The other surfaces should remain to MID (RH Canard to UP). Check that the "Flap Sync." advisory light comes on.

(19) Set the system to MID position.

(20) Check that the position of all surfaces do not change (same condition as step 19).

(21) Set the system to DOWN position.

(22) Check that all surfaces move to DOWN position. Check that the "Flap Sync" advisory light goes off as soon as all surfaces reach the DOWN position.

(23) Repeat steps 14 ÷ 23 disconnecting the R FWD WG ACT fuse and connecting the L FWD WG ACT. Check steps 17 - 19 - 21 - 23 making sure that the flap canard inhibited in this phase is the RH one.

(24) Connect the R FWD WG ACT fuse.

7. Flaps - Operational Test

A. Referenced Information

Maintenance Manual Chapter 24-00-00

B. Procedure

(1) Make sure that electrical power is available (Refer to 24-00-00).

(2) Set the battery switch to BAT.

NOTE: Make sure that the areas around the flaps are clear.For these tests it will be necessary to have one person in the flight compartment to operate the flap control lever and check the MFD Flaps Position Indication, and one person at the applicable flap to check travel times and flap position.

CAUTION: CHECK THAT THE FLAP OPERATIONS ARE SMOOTH, CONTINUOUS AND NOISELESS.

(3) Do the test of the MWOF:

	Action	Result
(a)	Set the flap control lever (located on the control pedestal) to the MID position. At the same time, start the stop watch and be ready to stop the watch when the MWOF reaches the mid-position.	The MWOF moves to the mid-position.
(b)	Stop the watch at the instant that the MWOF stops at the mid-position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 14 and 18 seconds.
(c)	Check the Flap MID Position correct indication on the MFD.	
(d)	Set the flap control lever to the DN position. At the same time, start the stop watch and be ready to stop the watch when the MWOF reaches the fully down position.	The MWOF moves to the fully down position.
(e)	Stop the watch at the instant that the MWOF stops at the fully down position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 3 and 5 seconds.
(f)	Check the Flap DOWN Position correct indication on the MFD.	
(g)	Set the flap control lever to the MID position. At the same time, start the stop watch and be ready to stop the watch when the MWOF reaches the mid-position.	The MWOF moves to the mid-position.

	Action	Result
(h)	Stop the watch at the instant that the MWOF stops at the mid-position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 3 and 5 seconds.
(i)	Check the Flap MID Position correct indication on the MFD.	
(j)	Set the flap control lever to the UP position. At the same time, start the stop watch and be ready to stop the watch when the MWOF reaches the fully up position.	The MWOF moves to the fully up position.
(k)	Stop the watch at the instant that the MWOF stops at the fully up position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 14 and 18 seconds.
(l)	Check the Flap UP Position correct indication on the MFD.	

(4) Do the test of the MWIF:

NOTE: For these tests, two stop watches are required. One is used to monitor MWIF travel time from lever MID selection to MWIF mid-position and is designated stop watch No. 1; the other is used to monitor when MWIF travel begins in relation to MWOF travel time and is designated stop watch No. 2.

	Action	Result
(a)	Set the flap control lever to the MID position. At the same time, start the two stop watches and be ready to stop watch No. 2 when the MWIF starts to move, and to stop watch No. 1 when the MWIF reaches the mid-position.	
(b)	Stop the No. 2 watch when the MWIF starts to move, and stop the No. 1 watch when the MWIF stops at the mid-position. Make a note of the two stop watch readings, then set both watches to zero.	The time recorded on the stop watch No. 2 must be between 12.5 and 14.5 seconds. The time recorded on stop watch No. 1 must be between 14 and 18 seconds.
(c)	Check the Flap MID Position correct indication on the MFD.	
(d)	Set the flap control lever to the DN position. At the same time, start one of the stop watches. Be ready to stop the watch when the MWIF reaches the fully down position.	The MWIF moves to the fully down position.
(e)	Stop the watch at the instant that the MWIF stops at the fully down position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 2.5 and 4.5 seconds.
(f)	Check the Flap DOWN Position correct indication on the MFD.	

	Action	Result
(g)	Set the flap control lever to the MID position. At the same time, start one of the stop watches and be ready to stop the watch when the MWIF reaches the mid-position.	The MWIF moves to the mid-position.
(h)	Stop the watch at the instant that the MWIF stops at the mid-position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 2.5 and 4.5 seconds.
(i)	Check the Flap MID Position correct indication on the MFD.	
(j)	Set the flap control lever to the UP position. At the same time, start one of the stop watches and be ready to stop the watch when the MWIF reaches the fully up position.	The MWIF moves to the fully up position.
(k)	Stop the watch at the instant that the MWIF stops at the fully up position. Make a note of the time recorded on the stop watch. Set the stop watch to zero.	The time recorded must be between 2 and 4 seconds.
(l)	Check the Flap UP Position correct indication on the MFD.	

(5) Do the test of the FWF:

NOTE: For the first part of this test, two stop watches are required.

Action	Result
(a) Set the flap control lever to the MID position. At the same time, start both stop watches and be ready to stop the watch when the FWF starts to move and the other when the FWF stops (this first interruption of movement occurs approx. 1 second after initial movement).	
(b) Stop one watch when the FWF starts to move, and stop the other watch when the FWF stops. Make a note of the two stop watch readings and set both watches to zero. **NOTE:** After a further 3.5 seconds (approx.) the FWF will continue to move to the mid-position. This movement will be monitored during the next steps.	The time recorded on the watch stopped first must be between 8 and 10seconds. The time recorded on the other watch must be between 9 and 11 seconds.
(c) Wait until the FWF reaches the mid-position, then set the flap control lever to the UP position.	
(d) Wait until the FWF reaches the UP position, then set the flap control lever to the MID position. At the same time start both stop watches and be ready to stop one watch when the FWF starts to move after the initial 1 second of movement recorded previously, and stop the other watch when the FWF reaches the mid-position.	

	Action	Result
(e)	Stop one watch when the FWF starts to move for the second time and stop the other watch at the instant that the FWF stops at the mid-position. Make a note of the stop watch readings and set both watches to zero.	The time recorded on the watch stopped first must be between 12.5 and14.5 seconds. The time recorded on the other watch must be between 14 and 18 seconds.
(f)	Set the flap control lever to the DN position. At the same time start one of the stop watches. Be ready to stop the watch when the FWF reaches the fully down position.	The FWF moves to the fully down position.
(g)	Stop the watch at the instant that the FWF stops at the fully down position. Make a note of the time recorded on the stop watch and set the watch to zero.	The time recorded must be between 3.5 and 5.5 seconds.
(h)	Check the Flap DOWN Position correct indication on the MFD.	
(i)	Set the flap control lever to the MID position. At the same time, start one of the stop watches and be ready to stop the watch when the FWF reaches the mid-position.	The FWF moves to the mid-position.
(j)	Stop the watch at the instant that the FWF stops at the mid-position. Make a note of the time recorded on the stop watch and set the watch to zero.	The time recorded must be between 3.5 and 5.5 seconds.
(k)	Check the Flap MID Position correct indication on the MFD.	

	Action	Result
(l)	Set the flap control lever to the UP position. At the same time, start one of the stop watches and be ready to stop the watch when the FWF reaches the up position.	The FWF moves to the fully up position.
(m)	Stop the watch at the instant that the FWF stops at the fully up position. Make a note of the time recorded on the stop watch and set the watch to zero.	The time recorded must be between 2.5 and 4.5 seconds.
(n)	Check the Flap UP Position correct indication on the MFD.	
(o)	Set the flap control lever to the DN position.	The MWIF moves to the fully down position.
(p)	When all flaps reach fully down position, check the Flap DOWN Position correct indication on the MFD.	
(q)	Set the flap control lever to the UP position.	The FWF moves to the fully up position.
(r)	When all flaps reach fully up position, check the Flap UP Position correct indication on the MFD.	

(6) Set the battery switch to OFF.

GUST LOCK - DESCRIPTION AND OPERATION

1. General (Ref. to Fig. 1)

   A. The gust lock consists of a set of three pins, which lock the primary controls in a set position, and a plate which is installed between the power and condition levers on the control pedestal.

   B. The locking pins for the rudder and the elevators are connected to each other by a metal bar; the locking pin for the ailerons is attached to the metal bar by a flexible wire and the plate is attached to the aileron locking pin by a flexible wire. Also, a warning flag, labelled "REMOVE BEFORE FLIGHT" is attached to the aileron locking pin.

   C. The rudder locking pin is installed through the pilot's rudder pedal levers to lock the rudder in its neutral (streamlined) position. The elevator locking pin is installed in a bracket, which extends forward from the pilot's control column, to hold the column in a forward position and thereby lock the elevators in their down position. The aileron locking pin is installed in the front of the pilot's control wheel to lock the control wheel in its central position and thereby lock the ailerons in their neutral (streamlined) position.
   The plate which is installed between the power and condition levers serves to warn the pilot that the gust locks are installed and that they must be removed before starting the engines. The flag is further warning to the pilot that the gust locks must be removed before flight.

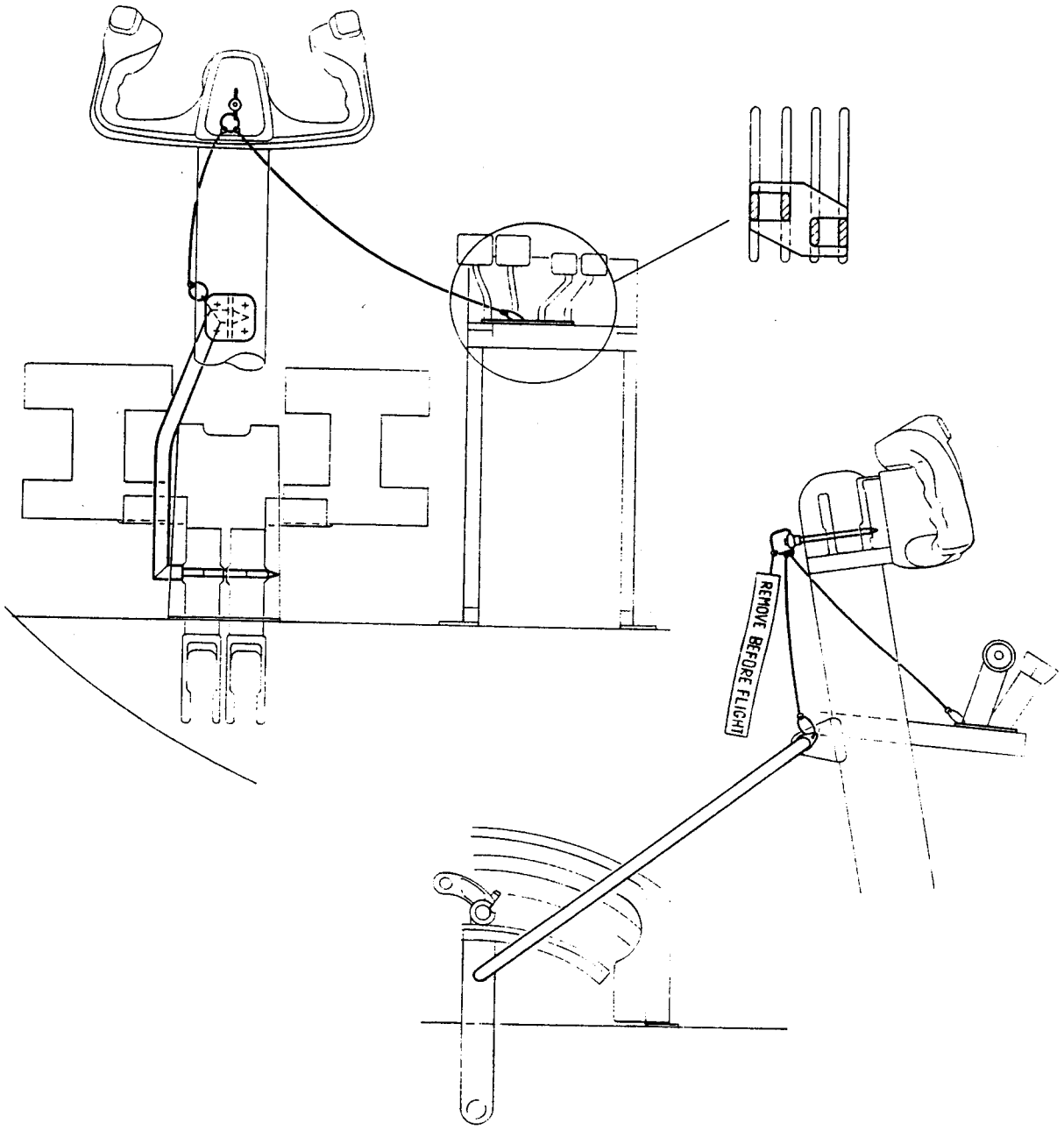

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Fig. 1 - Gust Lock Installation