

## FLAP RIGGING GUIDE - ADJUSTMENT/TEST

### 1. General

A. This Rigging Guide consists of the following steps:

- (1) FLAP COMPONENT INSPECTION
  - (a) Determines if any parts need repair or replacing prior to rigging.
- (2) OPERATIONAL CHECK
  - (a) Determines if flaps need rigging and provides criteria for system acceptance.
- (3) FLAP RIGGING
  - (a) Detailed procedure to adjust flaps to meet OPERATIONAL CHECK requirements.

**WARNING:** Follow appropriate safety precautions when operating and/ or adjusting flap system components.

**NOTE:** Two people are required to properly and efficiently perform these procedures.

**NOTE:** The rigging procedures in this guide are for flap systems with adjustable interconnect rods on both sides. (Refer to Figure 502 for location of interconnect rods). 20800001 Thru 20800126 and 208B0001 Thru 208B0042 that have not complied with CAB88-13 have a non-adjustable interconnect rod between the right inboard forward and aft bellcranks. Compliance with CAB88-13 or installation of 2660020-4 interconnect rod assembly is required to perform the following rigging procedures.

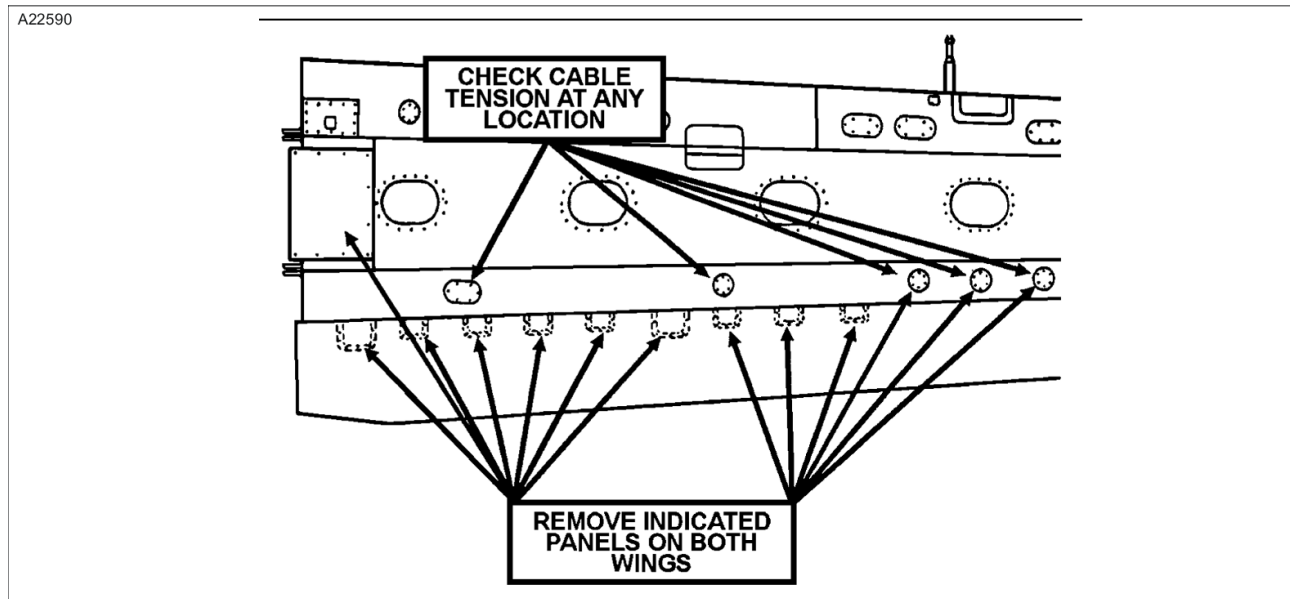
### 2. Flap Component Inspection

**NOTE:** This inspection is necessary to find parts that are unserviceable before you start the flap rigging.

**CAUTION:** Repair or replace damaged parts before proceeding to operational check.

A. Exterior Inspection

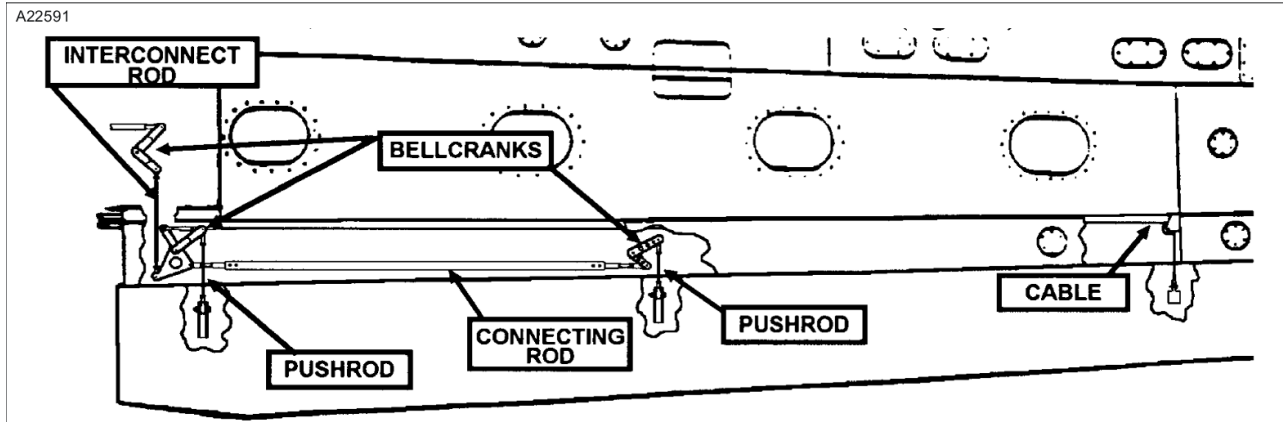
- (1) Remove panels and covers to gain access to flap components in both wings. (Refer to Figure 501)



*WING ACCESS PANELS (LEFT SHOWN)*

*Figure 501*

- (2) Inspect bell cranks and pulleys (Refer to Figure 502) for worn bearings or deformation. Check bellcrank mounting bolts for proper torque of 35 inch pounds.

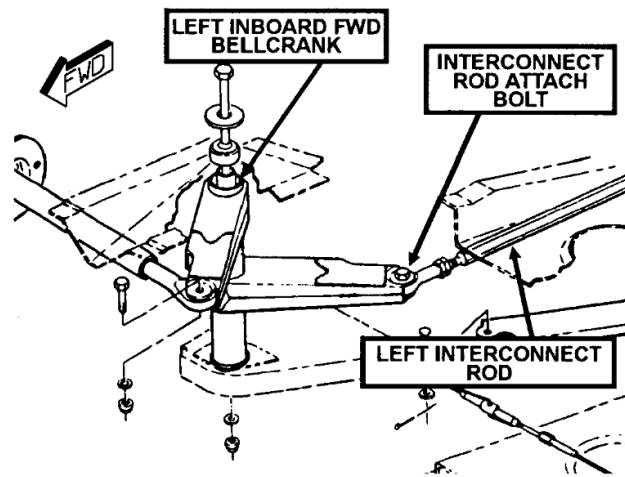


**LEFT WING AND FLAP COMPONENTS**

*Figure 502*

- (3) Inspect pushrods, interconnect rods, connecting rods, and rod ends for binding, wear, deformation, and other indications of distress or malfunction. (Refer to Figure 502)
- (4) Inspect flap cables for fraying, frozen pulleys, corrosion, and interference with structure.
- (5) Inspect wire bundle tie-wraps located below the flap cable. The tie-wrap "tails" should be in the 12 o'clock position - rotate tie wraps as required.
- (6) Inspect flap tracks and rollers for corrosion, frozen bearings, flat spots, wear, deformation, or other indications of distress or malfunction.
- (7) Hold flap to prevent it from falling to the end of its track. Remove bolts that attach the left and right interconnect rods to their respective forward inboard bellcranks (Refer to Figure 503). Manually move one flap at a time through its full range of travel to verify free movement.

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**LEFT INBOARD FORWARD BELLCRANK AND INTERCONNECT ROD**

*Figure 503*

(8) Reconnect interconnect rods to left and right forward inboard bellcranks.

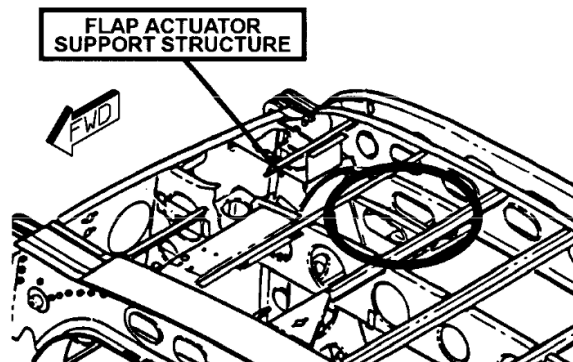
B. Interior Inspection

- (1) Unzip or remove headliner as required to gain access to flap actuator and wing-to-wing interconnect rod.

**WARNING: If cracks are found in support structure, reinforce or replace structure as required. Stop drilling cracks alone is insufficient; additional reinforcement is required.**

- (2) Inspect flap actuator support structure for cracks, deformation, or other signs of distress. (Refer to Figure 504)

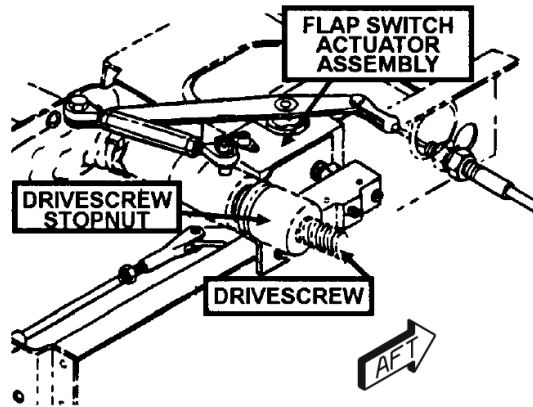
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**FLAP ACTUATOR SUPPORT STRUCTURE***Figure 504*

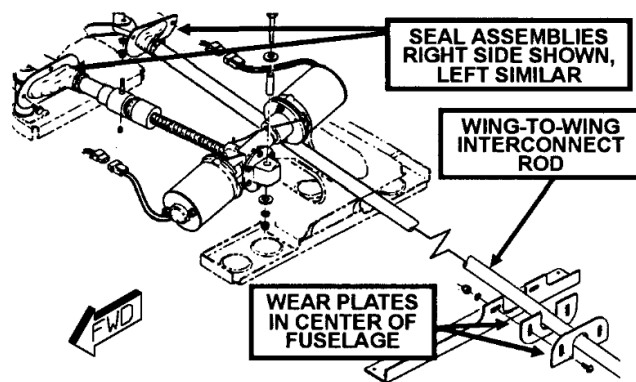
- (3) Check flap actuator drivescrew threads for cleanliness and lubrication. If required, clean and lubricate with #10 weight non-detergent oil. (Refer to Figure 505)

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**FLAP SWITCH ACTUATOR***Figure 505*

- (4) Inspect flap switch actuator assembly, and associated linkage for indications of binding, wear, interference, or other signs of distress. (Refer to Figure 505)
- (5) Inspect the wing-to-wing interconnect rod and wear plates for binding or deformation. (Refer to Figure 506)

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**WING-TO-WING INTERCONNECT ROD**

*Figure 506*

(6) Inspect the left and right fuselage pushrod seal assemblies for condition and security. (Refer to Figure 506)

**3. Operational Check**

**NOTE:** Perform the following **OPERATIONAL CHECK** completely and note discrepancies. If criteria in any of the **OPERATIONAL CHECK** steps are not met, perform the complete **FLAP RIGGING** procedure.

**WARNING:** Before you move the flaps, make sure that the area around the flaps is clear. This will prevent injuries to personnel and damage to the equipment and the flaps.

A. Position flap lever to UP

- (1) Check and note cable tension of both flaps. With flaps UP the tension must be 35 pounds +5 or -5 pounds. (Refer to Figure 501 for tensiometer access locations).
- (2) Lower flaps in small increments to 10 degrees while monitoring cable tension. Minimum cable tension is 10 pounds between UP and 10 degrees.

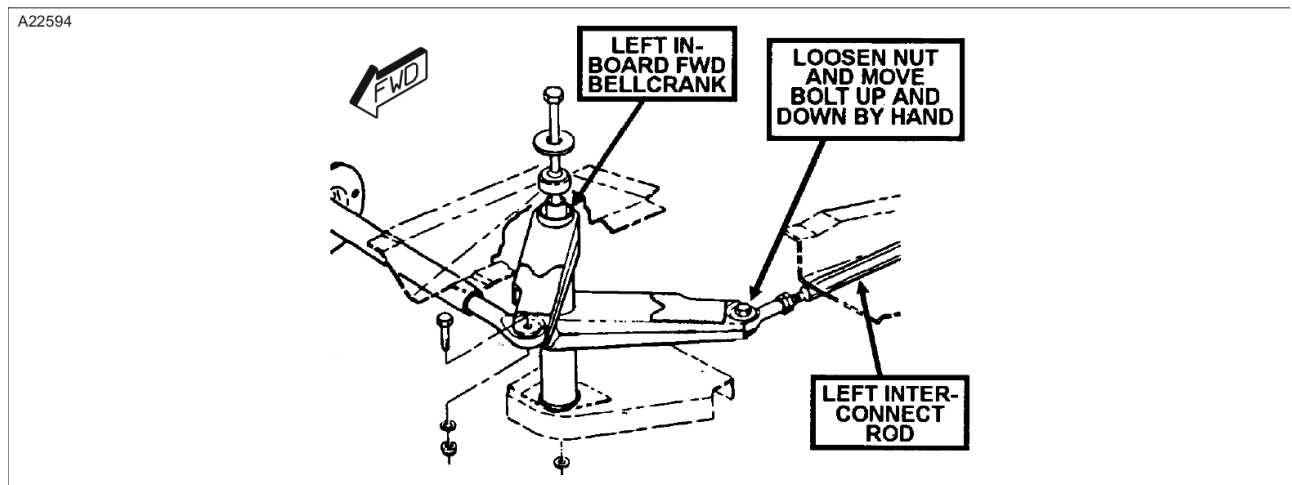
B. Return flaps to UP position.

- (1) Check both flaps at each flap track position (inboard, center, outboard) for fore/aft movement by grasping flap with one hand while holding flap track with other hand. Push flap forward. Free play in mechanical linkage will allow slight forward movement if flap rollers are not contacting the end of each track. Movement must be negligible, indicating each flap roller is contacting the end of its track.

**NOTE:** Slight up/down movement is acceptable due to roller/flap track clearance.

- (2) Loosen nuts on the interconnect rod attach bolts at the inboard forward bellcranks. (Refer to Figure 507 shows left, right typical). Bolts must move up and down by hand, indicating no preload. Retorque after check.

**CAUTION:** Improper preload may result in a slackened cable and interference with the airframe.

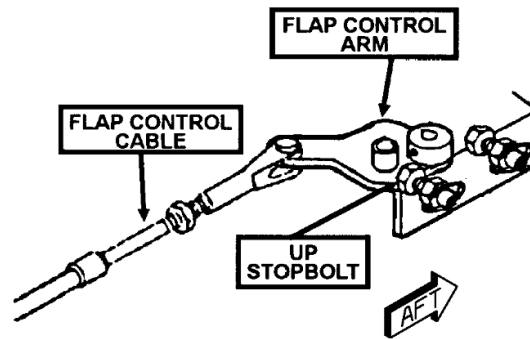


**LEFT INBOARD FORWARD BELLCRANK AND INTERCONNECT**

*Figure 507*

- (3) Lower flaps to 10 degrees, then raise to UP, while observing flap actuator support structure for deflection caused by preload. Also, listen and watch for indications of the drivescrew stopnut bottoming out at the end of the drivescrew, indicated by an abrupt stop. Transmission support structure must not deflect, and drivescrew stopnut must not bottom out at the end of the drivescrew in the UP position. (Refer to Figure 504 and Figure 505).
- (4) With the flap control lever in the UP position, the flap control arm must contact the Up Stopbolt (Refer to Figure 508) and the flap pointer must point to the UP indication on the pedestal cover.

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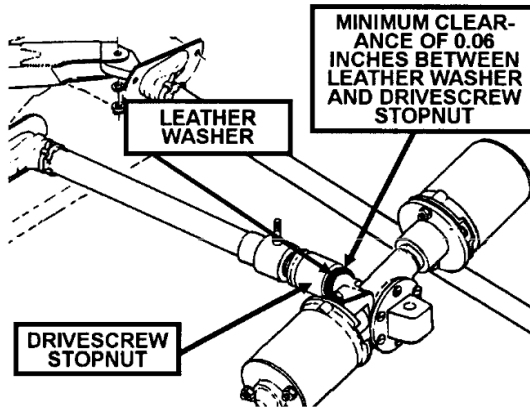
***FLAP CONTROL ARM AGAINST STOPBOLT***

***Figure 508***

- (5) Extend the flaps to FULL DOWN and check clearance between the leather washer against the flap actuator transmission and the drivescrew stop nut. Clearance must be a minimum of 0.06 inches. (Refer to Figure 509)



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***FLAP ACTUATOR SHOWN IN FULL DOWN POSITION***

***Figure 509***

- (6) Operate flaps through full range of travel and observe for erratic motion, binding, and interference.
- C. Flap Travel Check (Airplanes 20800001 and On and Airplanes 208B0001 Thru 208B4999)

- (1) Return flaps to the UP position.
- (2) Attach an inclinometer to each flap on the trailing edge rib, W.S. 68.00, located approximately thirty-four inches from the inboard edge of the flap. Set inclinometers to 0 degrees.
  - (a) Record inclinometer reading for each flap at the following positions on Table 501.
    - 1 Lower flap control lever to 10 degrees.
    - 2 Lower flap control lever to 20 degrees.
    - 3 Lower flap control lever to FULL DOWN.
    - 4 Raise flap control lever to 20 degrees.
    - 5 Raise flap control lever to 10 degrees.
    - 6 Raise flap control lever to UP.

**Table 501. Flap Extension and Retraction Tolerances (Airplanes 2080001 and On and Airplanes 208B0001 Thru 208B4999)**

| Flap Handle Position | Required Flap Position | Inclinometer Reading |       |
|----------------------|------------------------|----------------------|-------|
|                      |                        | Left                 | Right |
| 0°                   | 0°                     |                      |       |
| 10° extending        | 10° +1 or -2°          |                      |       |
| 20° extending        | 20° +2 or -2°          |                      |       |
| 30° extending        | 30° +1 or -2°          |                      |       |
| 20° retracting       | 20° +2 or -2°          |                      |       |
| 10° retracting       | 10° +1 or -2°          |                      |       |
| 0° retracting        | 0°                     |                      |       |

Flap positions must be within tolerances, symmetrical within 1/2 degree in all positions and within one degree at corresponding extending and retraction positions.

D. Flap Travel Check (Airplanes 208B5000 and On)

- (1) Return flaps to the UP position.
- (2) Attach an inclinometer to each flap on the trailing edge rib, W.S. 68.00, located approximately thirty-four inches from the inboard edge of the flap. Set inclinometers to 0 degrees.
  - (a) Record inclinometer reading for each flap at the following positions on Table 502.
    - 1 Lower flap control lever to 15 degrees.
    - 2 Lower flap control lever to FULL DOWN.
    - 3 Raise flap control lever to 15 degrees.
    - 4 Raise flap control lever to UP.

**Table 502. Flap Extension and Retraction Tolerances (Airplanes 208B5000 and On)**

| Flap Handle Position | Setting (Degrees) | Required Flap Position | Inclinometer Reading |       |
|----------------------|-------------------|------------------------|----------------------|-------|
|                      |                   |                        | Left                 | Right |
| UP                   | 0°                | 0° +1 or -1°           |                      |       |
| TO/APR               | 15° extending     | 15° +1 or -2°          |                      |       |
| LAND                 | 30° extending     | 30° +1 or -2°          |                      |       |
| TO/APR               | 15° retracting    | 15° +1 or -2°          |                      |       |
| UP                   | 0° retracting     | 0° +1 or -1°           |                      |       |

Flap positions must be within tolerances, symmetrical within 1/2 degree in all positions and within one degree at corresponding extending and retraction positions.

- (b) Check travel times.
  - 1 UP to LAND: Must not exceed 10 seconds.

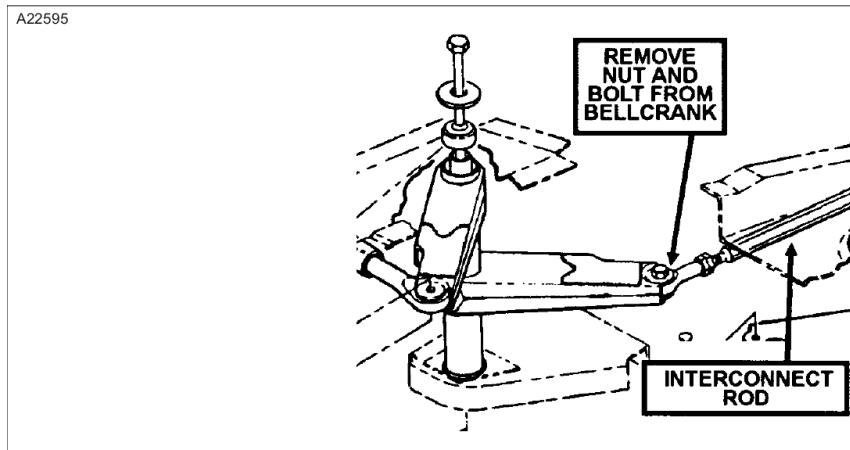
2 LAND to UP: Must not exceed 10 seconds.

- E. If the criteria in any of the previous steps was not met proceed with FLAP RIGGING. If all criteria were met, secure the flap system as follows:
- (1) Verify all rod end inspection holes are covered. Check that rod ends are clocked so maximum rotational freedom is available to each rod (so rod end housings are perpendicular to attaching bolts).
  - (2) Remove inclinometers from the left and right flaps.
  - (3) Verify flap system components are secure, torqued, and safety wired as required.
  - (4) Install panels, covers and close headliner.
  - (5) Operate flaps through their full travel range. Check for adequate clearances to panels and covers. Verify smooth operation with no interference.

#### 4. Flap Rigging

**NOTE:** If any of the following steps cannot be achieved without exposing rod end inspection holes, or exceeding bellcrank throw limits, set all rods to the nominal lengths specified in Flap System - Maintenance Practices, Install Pushrods, then repeat the procedure.

- A. Flap switch actuator re-rigging
- (1) If flap travel failed Operational Check, Flap extension and retraction tolerances, remove, rig, and reinstall the flap switch actuator assembly in accordance with the instructions in Flap system - Maintenance Practices, Flap Switch Actuator Disassembly/Assembly.
- B. Interconnect rod bolt removal
- (1) Lower flaps to 10 degrees.
  - (2) Perform this step for both flaps.
    - (a) Hold flap to prevent it from falling to the end of its track.
    - (b) Remove interconnect rod attach bolt from the inboard forward bellcrank. (Refer to Figure 510).
    - (c) Position interconnect rod to allow movement of flap and forward bellcrank without interference.

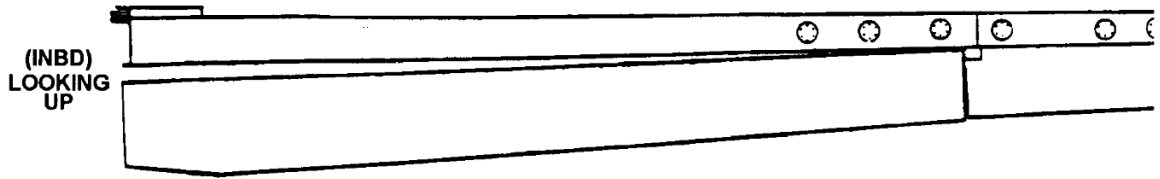


*LEFT INTERCONNECT ROD (RIGHT TYPICAL)*

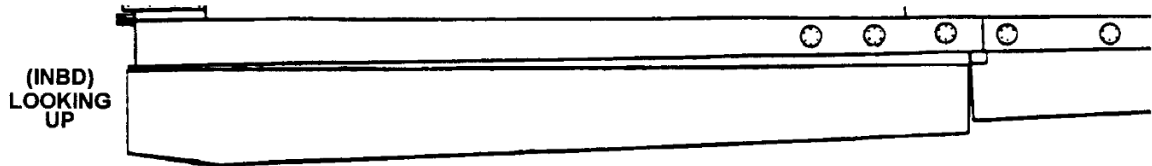
*Figure 510*

- C. Adjustment of pushrods, and/or connecting rods to ensure full roller travel in all flap tracks.

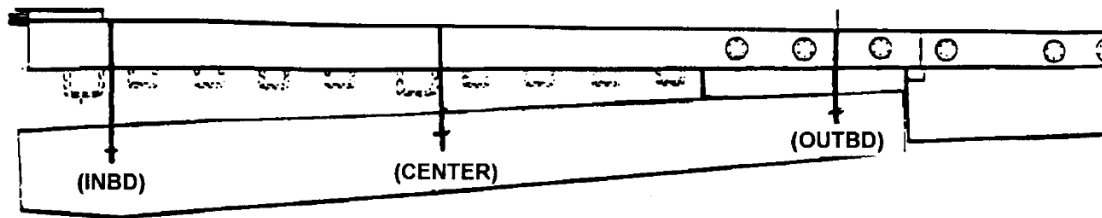
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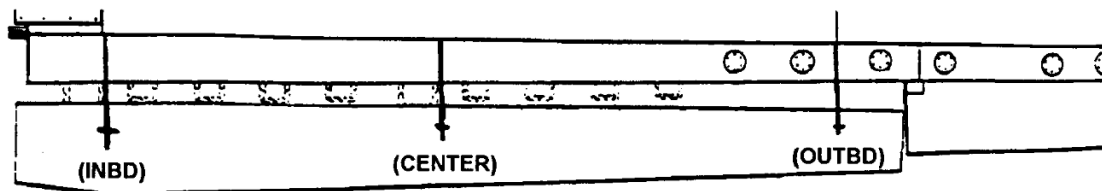
Condition "A" -Outboard roller contacts in UP position first



Condition "B" -Inboard roller contacts in UP position first



Condition "C" -Inboard roller contacts in down position first



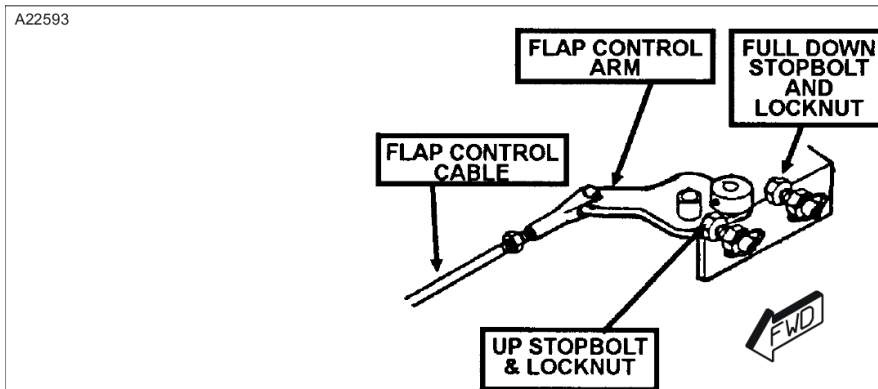
Condition "D" -Center or outboard roller contacts in down position first

**ROLLER TRAVEL CHECKS**  
*Figure 511*

- (1) Perform the following procedure for both flaps.
- (2) Adjust cable tension to obtain 35 pounds, + or - 5 pounds in the UP position.
  - (a) Check flap at each track position (inboard, center, outboard) for fore/aft movement by grasping flap with one hand while holding flap track with other hand. Push flap forward. Free play in mechanical linkage will allow slight forward movement if flap rollers are not contacting the end of each track. Movement must be negligible, indicating each flap roller is contacting the end of its track.
    - 1 If inboard, and center or outboard flap rollers contact the forward ends of the track go on to checks at full down position and check for CONDITION "C" or "D".
    - 2 If Condition "A" or "B" exists, adjust as follows:
      - a CONDITION "A" - Release cable tension, and shorten inboard pushrod and/or lengthen outboard pushrod until inboard, and center or outboard flap rollers contact the forward ends of the track.
      - b CONDITION "B" - Release cable tension, and lengthen inboard pushrod and/or shorten outboard pushrod until inboard, and center or outboard flap rollers contact the forward ends of the track.
  - (b) Move flap to FULL DOWN position.
    - 1 If both inboard, and center rollers contact the end of their tracks at the same time, go on to Flap actuator adjustment for maximum travel.
    - 2 If CONDITION "C" or "D" exists with flap in FULL DOWN position, adjust connecting rod (Refer to Figure 502) as follows:
      - a CONDITION "C" - Release cable tension, and lengthen connecting rod as required to reclock the outboard bellcrank which increases outboard pushrod travel. Repeat checks and adjustments at UP and full down until both inboard, and center rollers contact the end of their tracks at the same time.
      - b CONDITION "D" - Release cable tension, and shorten connecting rod as required to reclock the outboard bellcrank which decreases outboard pushrod travel. Repeat checks and adjustments at UP and full down until both inboard, and center rollers contact the end of their tracks at the same time.

D. Flap actuator adjustment for maximum travel.

- (1) Disconnect flap control cable from flap control arm. (Refer to Figure 512)



*FLAP CONTROL ARM AGAINST UP STOPBOLT*

*Figure 512*

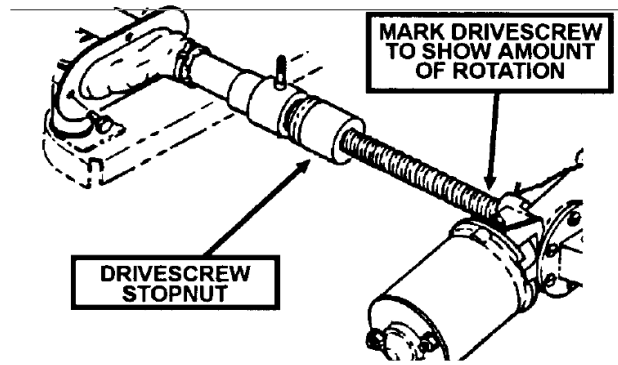
**NOTE:** Locknuts on Up and Full Down stopbolts must be tightened after each adjustment. (Refer to Figure 511)

- (2) Move flap control arm to the UP position. Flap control arm must be contacting Up stopbolt. (Refer to Figure 512)

**NOTE:** The flap control arm must be moved off, then back in contact with the Up stopbolt after each adjustment.

- (3) Loosen locknut, then turn in Up stopbolt (Refer to Figure 512) in small increments until drivescrew stopnut contacts the end of the drivescrew (Refer to Figure 513). A distinctive "thump" will be heard when the stopnut contacts the end of the drivescrew. (Refer to Figure 513).

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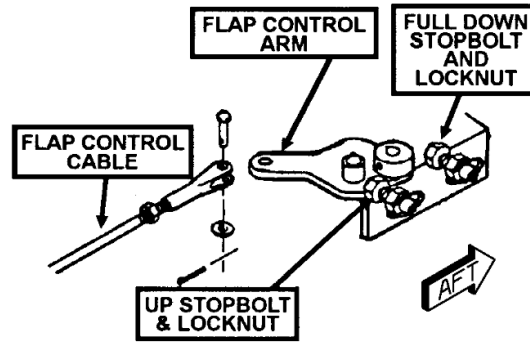
*FLAP ACTUATOR SHOWN IN UP POSITION*

*Figure 513*

- (4) Mark the drivescrew near the transmission to indicate rotation of drivescrew. (Refer to Figure 513)
- (5) Back out Up stopbolt (Refer to Figure 514) in small increments until the drivescrew stopnut is 1 turn from the end of the drivescrew.

**NOTE:** Each full turn of the Up stopbolt is approximately 1 drivescrew turn.

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***FLAP CONTROL ARM AGAINST UP STOPBOLT***

***Figure 514***

- (6) Tighten UP stopbolt locknut then recheck.
- E. Adjustment and re-connection of interconnect rods to ensure flaps are fully up in tracks without preload.

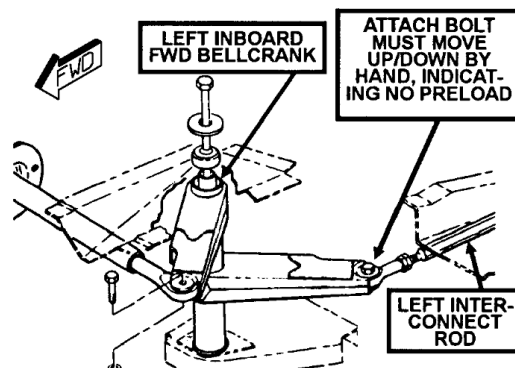
**NOTE:** When installing interconnect rod attach bolts at bellcrank, do not tighten nuts at this time.

- (1) Verify drivescrew stopnut is positioned in UP position previously set (full up; one turn from end).
- (2) Repeat this step for both flaps.
  - (a) Place and hold flap in the UP position.
  - (b) Adjust and reconnect interconnect rod so the following conditions are met.
    - 1 Flaps are UP in tracks by procedure in OPERATIONAL CHECK.
    - 2 With interconnect rod reconnected to forward bellcrank, attach bolt must move up/down by hand, indicating no preload. (Refer to Figure 515)

**NOTE:** If adjustment limits of the left interconnect rod are reached, the left forward bellcrank can be relocked by adjusting the wing-to-wing interconnect rod barrel located on left side of cabin overhead.



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***LEFT INBOARD FORWARD BELLCRANK (RIGHT TYPICAL)***

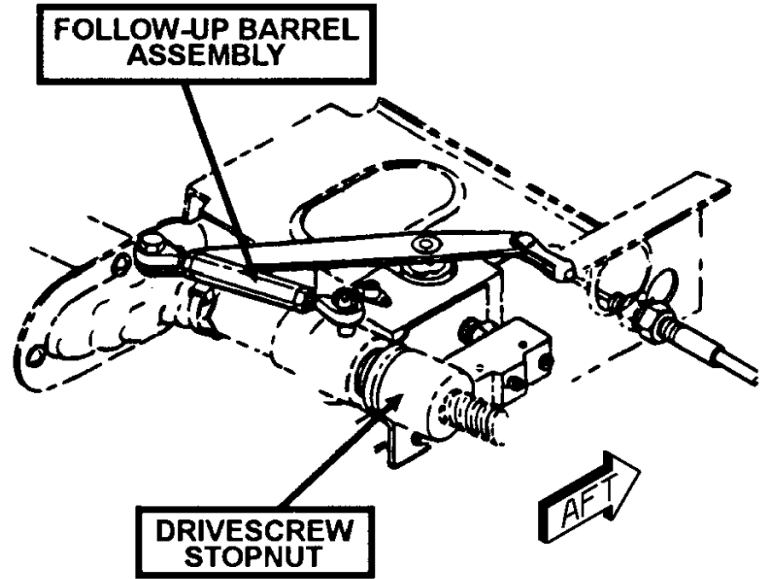
***Figure 515***

- 3 Move flap control arm to 10 degree detent, then back to UP. Recheck flaps and readjust interconnect rods if necessary.

F. Adjustment of 10 degree position using the follow-up barrel assembly.

**NOTE:** Anytime the follow-up barrel assembly (Refer to Figure 516) is adjusted, both the UP and Full Down stopbolts must be readjusted.

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***FLAP ACTUATOR SHOWN IN UP POSITION***  
***Figure 516***

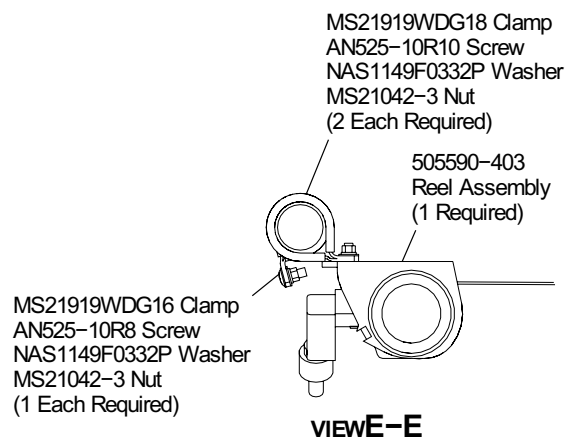
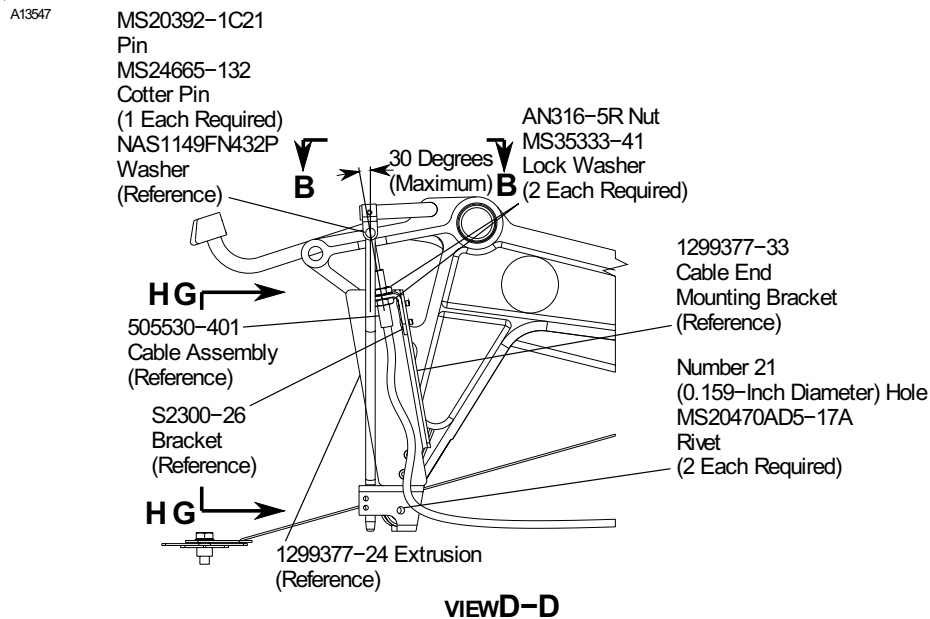
- (1) Verify flaps are in the UP position, then adjust inclinometers to 0 degrees.
- (2) Move flap control arm to the 10 degree detent. Lengthen or shorten follow-up barrel assembly (Refer to Figure 516) as required to obtain 10 degree position.

**NOTE:** If 10 degree position cannot be obtained with follow-up barrel assembly adjustment, remove and rig flap switch actuator assembly in accordance with the instructions in Flap system - Maintenance Practices, Flap Switch Actuator Disassembly/Assembly. Repeat this procedure before proceeding to the final adjustment of UP and down stopbolts.

- (3) Move flap control arm to the 20 degree detent (second detent aft of the UP detent).
- (4) Tighten locknuts and recheck for 10 degrees.

G. Final adjustment of the Up and the Full Down stopbolts.

**NOTE:** If follow-up barrel assembly was shortened in the previous step, back out the UP stopbolt (Refer to Figure 517) until the end of the bolt is flush with the nutplate.



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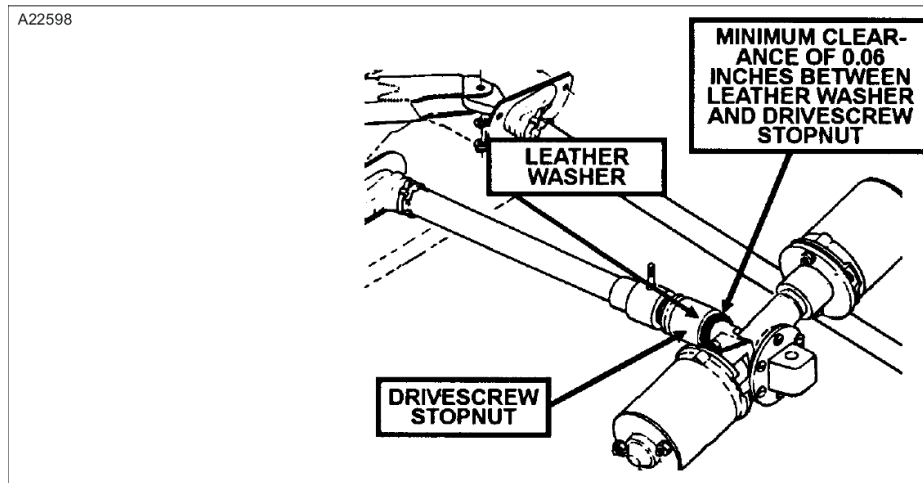
**FLAP CONTROL ARM AGAINST UP STOPBOLT**

*Figure 517*

- (1) Move flap control arm to UP position.
- (2) Adjust Up stopbolt in small increments until flaps are full up in tracks and interconnect rod attach bolts move up/down by hand.

**NOTE:** The flap control arm must be moved off, then back in contact with the Up stopbolt after each adjustment.

- (3) Back out the Full Down stopbolt until the end of the bolt is flush with the nutplate. Move flap control arm to contact Full Down stopbolt. (Refer to Figure 517)
- (4) Adjust Full Down stopbolt in small increments to obtain a clearance of at least 0.06 inch between the leather washer next to the flap actuator transmission and the drivescrew stopnut. (Refer to Figure 518)



*FLAP ACTUATOR SHOWN FULL DOWN*

*Figure 518*

**NOTE:** If the upper rollers contact the end of their tracks, or if flap position exceeds 31 degrees, back out Full Down stopbolt to turn off flap motor before either condition occurs.

H. Adjustment to obtain symmetrical flaps.

- (1) Move flap control arm to UP and verify inclinometers are set to 0 degrees.
- (2) Move flap control arm to FULL DOWN position and note inclinometer readings on both flaps. If the difference is 1/2 degree or less, proceed to Adjustment of Flap Pointer. If the difference is greater than 1/2 degree, accomplish the following procedures.

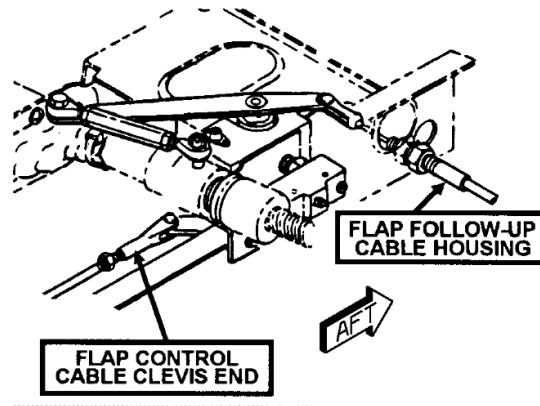
**NOTE:** Decision to lengthen, or shorten pushrods depends on available adjustment and difference from nominal lengths listed in in Flap System - Maintenance Practices, Install Pushrods. Only one side should have to be adjusted.

- (3) Remove interconnect rod attach bolt at the inboard forward bellcrank (Refer to Figure 514) on chosen side; release cable tension, and lengthen the pushrods on a flap that is short of travel; or, shorten the pushrods on a flap that has excess travel.
- (4) Re-rig flaps omitting Flap Actuator Adjustment for Maximum Travel.

I. Adjustment of flap pointer.

- (1) Move flap control arm to 10 degree detent and note position of pointer.
- (2) Move flap control arm to 20 degree detent and note position of pointer.
- (3) Adjust flap follow-up cable housing at the flap switch actuator support assembly (Refer to Figure 519) as required to position flap pointer as close as possible to 10 and 20 degree marks on the pedestal cover.

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***FLAP SWITCH ACTUATOR SUPPORT ASSEMBLY***

***Figure 519***

- J. Adjustment and re-connection of flap control cable.
  - (1) Move flap control arm to the UP position. The flap control arm must be contacting the UP stopbolt.

- (2) Place flap control lever (located at center pedestal) in the UP position.
- (3) Adjust the flap control cable clevis end (Refer to Figure 519) to obtain a slight spring-back of the flap control lever in the UP position with the cable reconnected to the flap control arm. If adjustment limits of the clevis end are reached, the flap control cable housing at the pedestal can also be adjusted.

**NOTE:** If spring-back is excessive, flaps may move up past the point set in (7) b. when flap control lever is moved to the forward end of the slot. Move flap control lever to the forward end of slot to verify this condition does not exist.

K. Perform previous OPERATIONAL CHECK.