CHAPTER

22

AUTO FLIGHT

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Insert latest revised pages; destroy superseded or deleted pages.

* Asterisk indicates pages revised, added, or deleted by the current revision. The portion of the text affected by the current revision is indicated by a vertical line in the outer margin of the page.

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RECORD OF TEMPORARY REVISIONS

TEMP REV NO	DESCRIPTION	ISSUE DATE	ATP REV DATE	INSERT BY	DATE REMOVED	REV INCOR	REMOVE BY
22-1/-23	REMOVED						
22-24	22-21-00:205	10/16/94	11-17-94	ATP/VM	4/27/00	68	ATP/JB

Record of Temporary Revisions

Revision Number	Status	Date	Location	Insertion Date	Inserter's Initials	Removal Date	Removers Initials
22-1	Inactive	Apr 8/75	22-10-02 Page 202	Apr 8/75	LJ	Jun 30/75 Rev 3	LJ
22-2	Inactive	Apr 8/75	22-10-00 Page 507	Apr 8/75	LJ	Jun 30/75 Rev 3	LJ
22-3	Inactive	Apr 8/75	22-10-00 Page 510	Apr 8/75	LJ	Jun 30/75 Rev 3	LJ
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AUTOFLIGHT - DESCRIPTION AND OPERATION

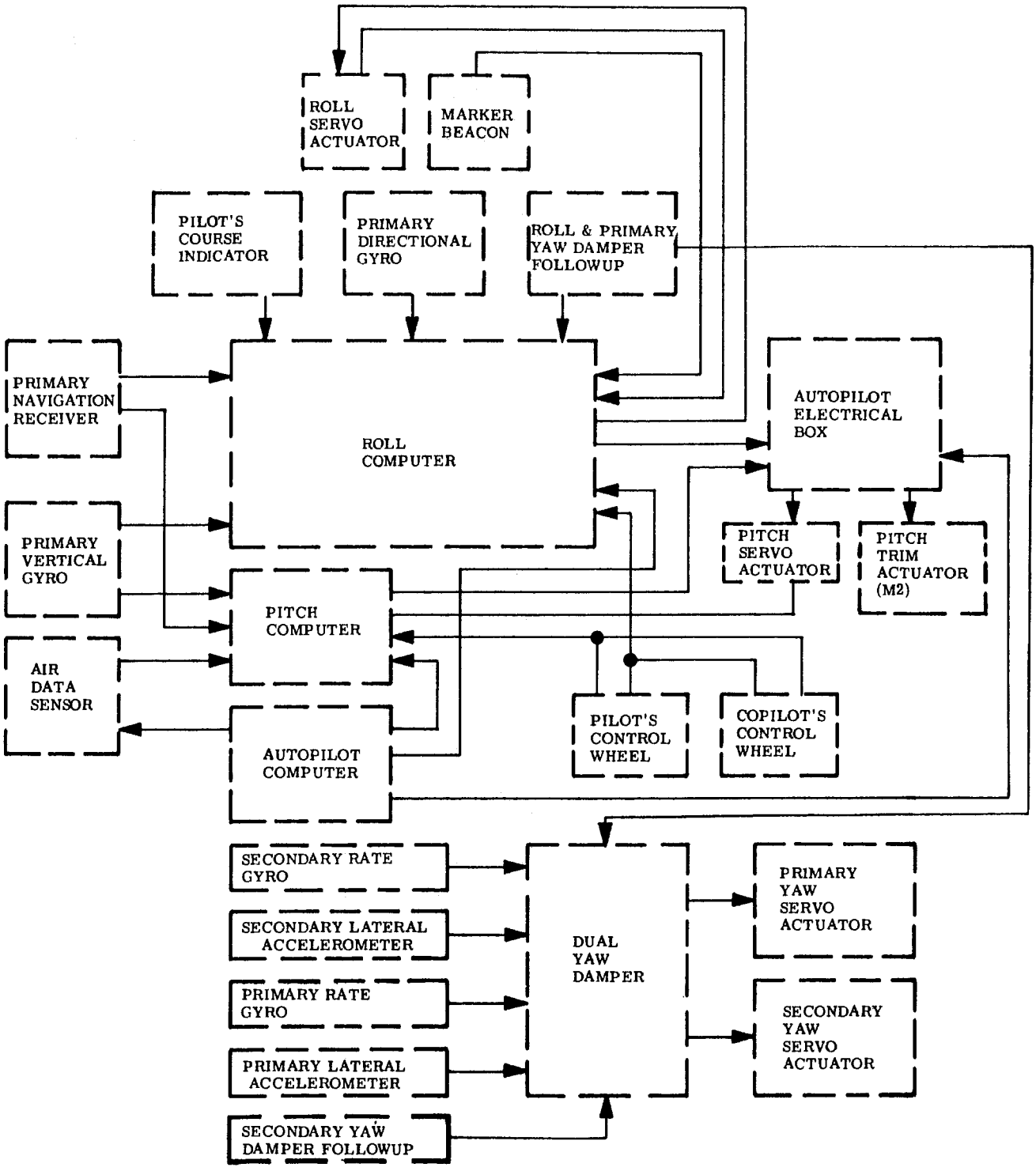
1. DESCRIPTION

A. Autoflight systems provide the means for automatically stabilizing and controlling the flight of the aircraft.

B. The autopilot, a function of the flight guidance system, is integrated with the flight director to automatically control and direct the flight of the aircraft.

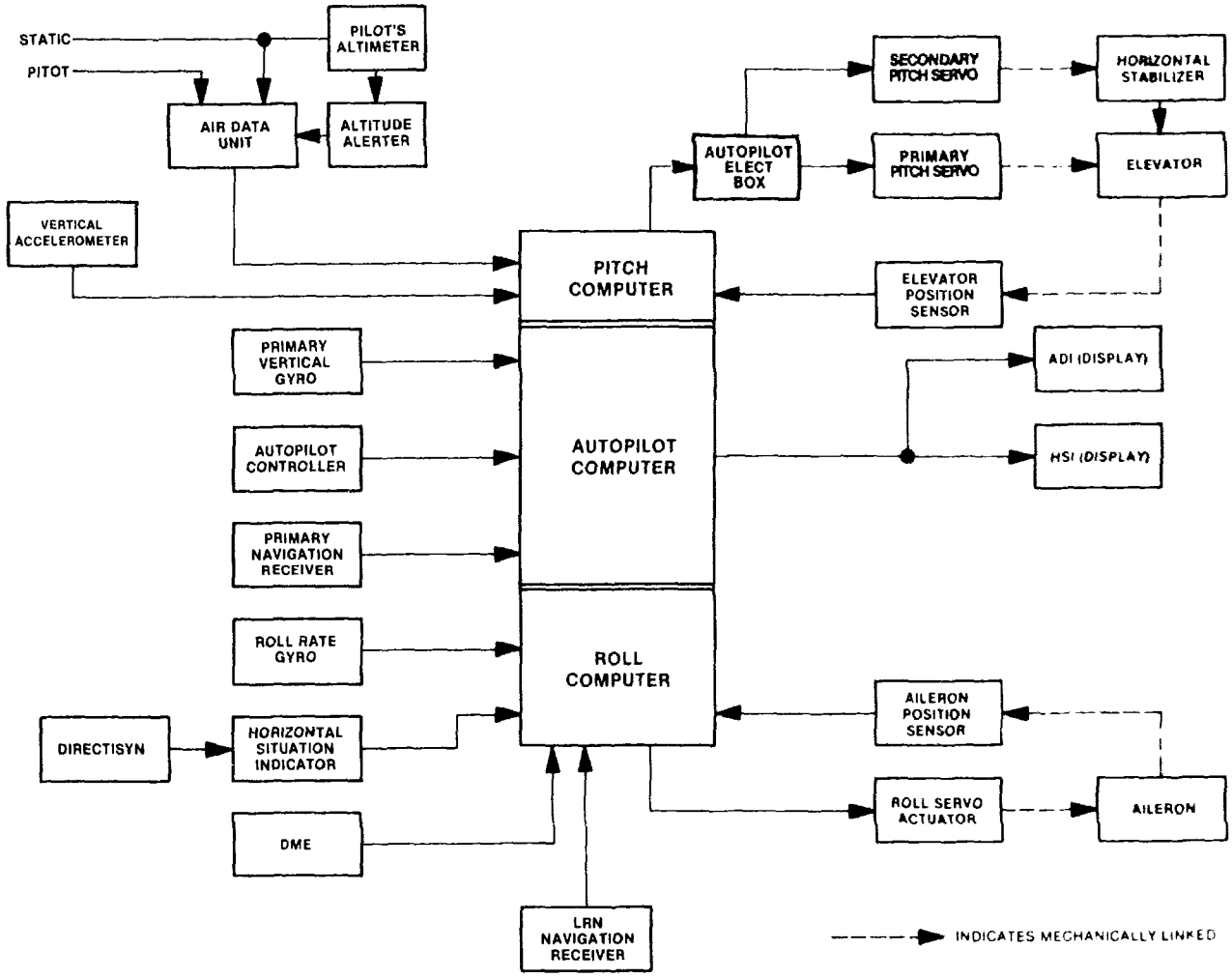
C. The mach trim system is installed to provide automatic speed and attitude control if the autopilot is disengaged or becomes inoperative.

D. The autopilot receives inputs from primary vertical gyro, primary navigation receiver, pilot's course indicator, primary directional gyro, and the marker beacon. (See Figure 1.)



Autopilot Block Diagram
Figure 1 (Sheet 1 of 2)

EFFECTIVITY: 35-002 THRU 35-505 EXCEPT 35-408, AND 36-002 THRU 36-053 NOT MODIFIED PER AAK 83-2, "Installation of FC-530 Autopilot"



Autopilot Block Diagram
Figure 1 (Sheet 2 of 2)

AUTOPILOT - DESCRIPTION AND OPERATION

1. DESCRIPTION

A. The flight guidance system consists of the autopilot and the flight director systems. The autopilot controls aircraft movement about all three axes. The dual yaw damper is capable of operating independently of the autopilot system.

B. The dual yaw damper system consists of two independently operated systems. On *Aircraft 35-002 thru 35-066 and 36-002 thru 36-017*, the primary system will automatically engage when the autopilot is engaged. On *Aircraft 35-067 and Subsequent and 36-018 and Subsequent*, the primary yaw damper is engaged by the PRI ENG pushbutton on the yaw damper controller. The primary yaw damper is connected directly to the rudder sector by a servo cable and acts to dampen yaw oscillations and coordinate turns. The secondary yaw damper functions identically to the primary yaw damper.

2. OPERATION

A. Autopilot

(1) The autopilot controls movement about the pitch and roll axes. The mode of operation provides the capability to automatically maintain the desired altitude, pitch attitude or heading, and to automatically capture and track localizer, glideslope, and omni-range facilities. The mode selections for autopilot are as follows:

(a) Heading - The heading mode (HDG) pushbutton commands the aircraft to maintain the heading selected by the HSI (horizontal situation indicator). An annunciator above the HDG pushbutton will illuminate when HDG is engaged.

(b) Navigation - The navigation mode (NAV) pushbutton commands the autopilot to capture and track VOR and LOC. For NAV mode function, the aircraft navigation receiver must be tuned to the frequency of the navigation aid and the course pointer on the HSI must be set to the magnetic heading of the selected radio beam. The initial angle of intercept of the radio beam must be established in the HDG mode. Activation of the NAV mode will start automatic procedures and the NAV-ARM annunciator will illuminate. When the autopilot turns the aircraft onto the desired track, the NAV-ARM annunciator will extinguish and the NAV-CAPT annunciator will illuminate. An engaged heading hold or level mode will automatically disengage as NAV-CAPT engages.

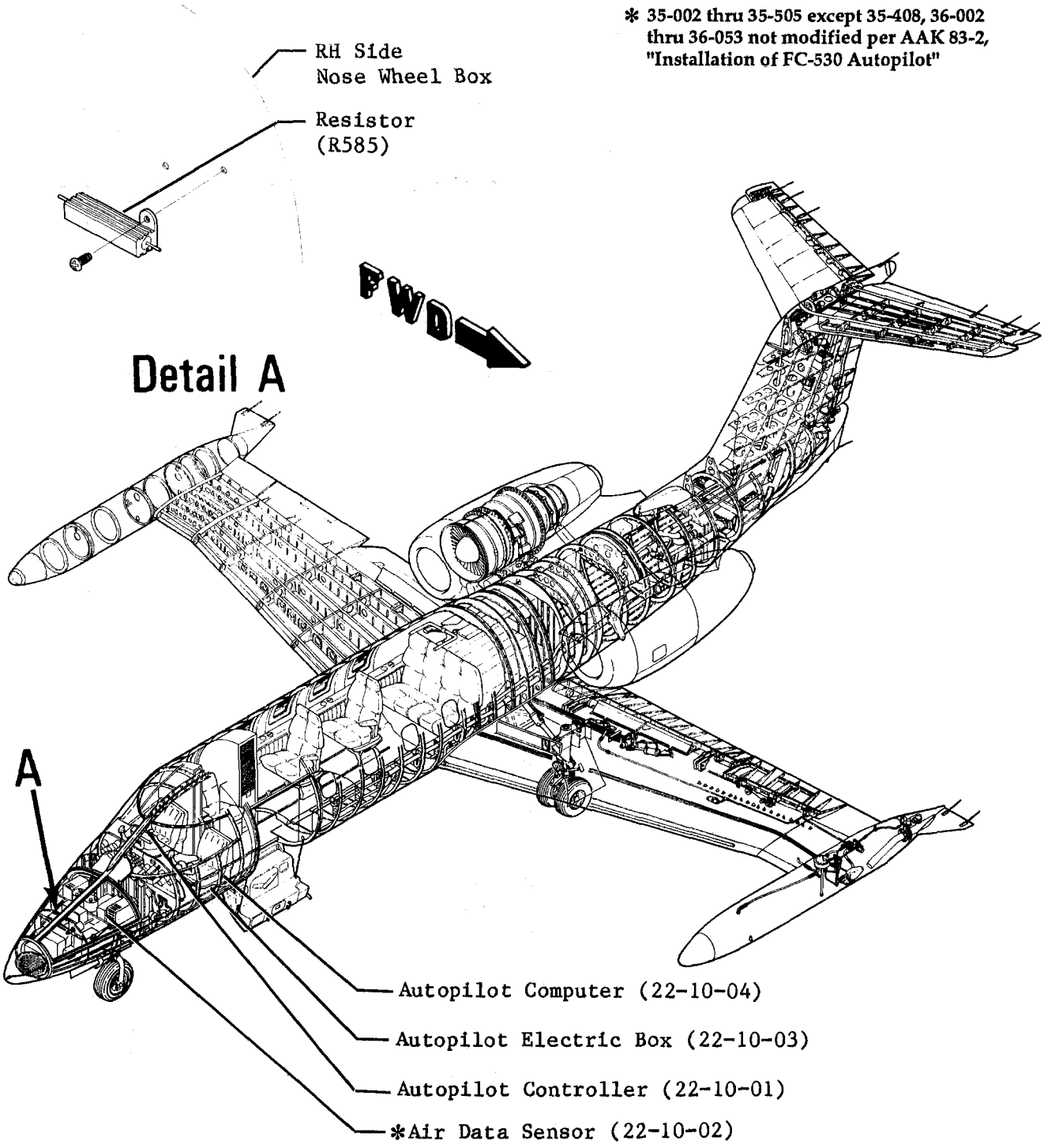
(c) Reverse Course - The reverse course mode (REV) pushbutton engages the backcourse function of the NAV mode. This function should be used for backcourse ILS only. REV is inoperative on VOR frequencies and also locks out glideslope signals. Disengaging the NAV also disengages REV.

(d) Level - The level mode (LVL) pushbutton levels the aircraft in roll mode only or will maintain the existing heading when the level mode of the aircraft is not banking more than 5°. The level mode may be used to level the roll axis or to cancel any other engaged roll mode. The LVL annunciator illuminates when this mode is engaged.

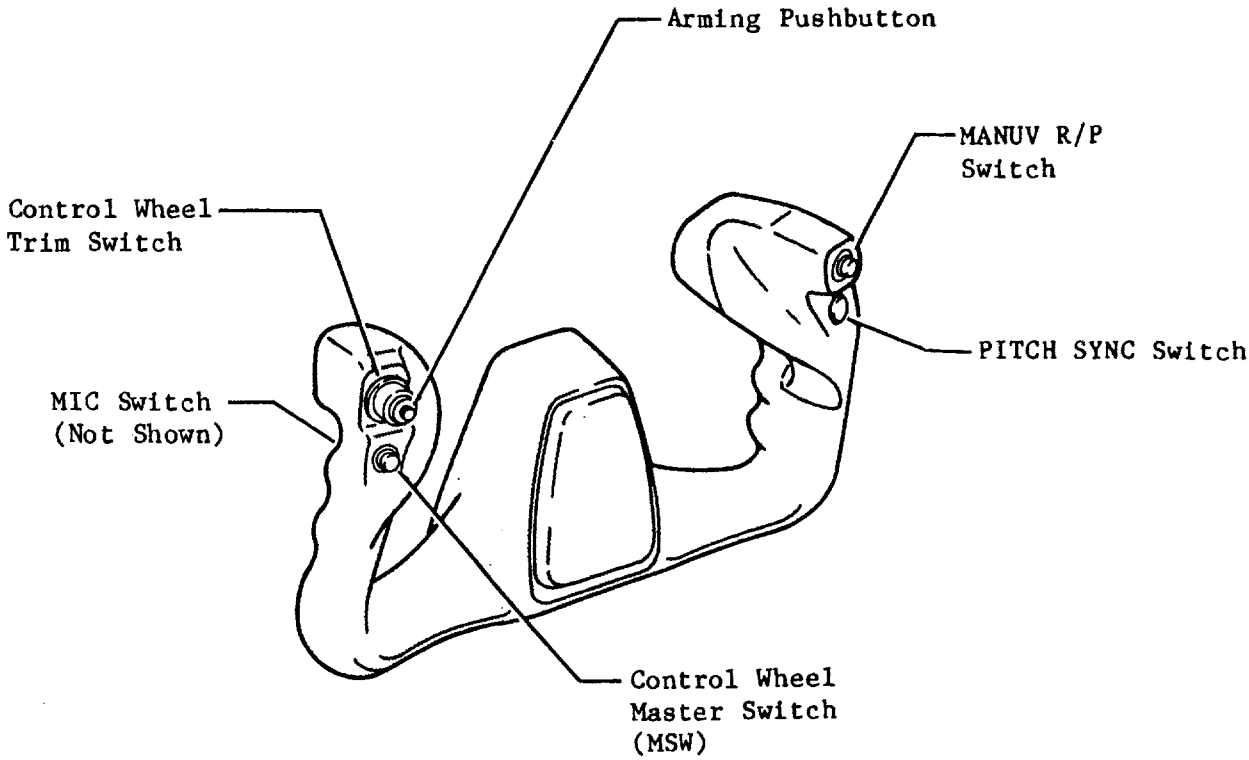
(e) Soft - The soft mode (SOFT) pushbutton reduces the gain of the autopilot to provide a softer response in the pitch and roll axis when flying through turbulence. The SOFT annunciator illuminates when soft mode is selected. The soft mode is not functional after LOC frequency is selected.

(f) Speed - The speed mode (SPD) pushbutton couples the autopilot pitch axis to an air data sensor output to maintain speed existing at the time of engagement. At altitudes up to 29,000 feet, the IAS annunciator will illuminate; above 29,000 feet, the MACH annunciator will illuminate. Speed is maintained by autopilot changes in pitch attitude as necessary.

(g) Vertical Speed - The vertical speed mode (V/S) pushbutton engages an autopilot function, within autopilot limits, an established rate-of-climb, or rate of descent. Before engaging this mode, maintain the desired rate of speed long enough for the rate sensor lag to diminish. The V/S annunciator illuminates when V/S is selected.



Autopilot Component Locator
Figure 1 (Sheet 1 of 2)



PILOT'S CONTROL WHEEL (TYPICAL)

Autopilot Component Locator
Figure 1 (Sheet 2 of 2)

(h) Glideslope - The glideslope mode (G/S) pushbutton allows the autopilot to capture and track the glideslope. If the aircraft is not on glideslope when G/S is depressed, the amber G/S-ARM annunciator will illuminate and the engaged ALT or V/S mode will be maintained. The autopilot will capture and track the glideslope when the beam center is intercepted and the ALT or V/S annunciators will extinguish and the G/S-CAPT annunciator will illuminate. If G/S is depressed when the aircraft is on the glideslope, G/S-CAPT is immediate.

(i) Altitude Hold - The altitude hold mode (ALT) pushbutton allows the aircraft to maintain flight at existing altitude when engaged. The ALT annunciator illuminates when ALT is selected.

(j) Approach Light - The approach (APPR) light will illuminate when the flaps are lowered to 13° or more. This increases the autopilot gains to compensate for lower airspeeds.

(k) Final Light - The final (FNL) light will illuminate during an ILS approach if the flaps are down (lighting APPR) and the outer marker is passed. It signals an automatic change in autopilot gains to compensate for increased sensitivity of the ILS signals.

(l) Track - The track (TRK) light indicates that the autopilot has acquired the center of the VOR or LOC beam.

(m) Power - This annunciator (PWR) illuminates when power is available to at least the pitch and roll axes of the autopilot. It is an indication that at least the associated AC and DC circuit breakers have been set and that the Autopilot Switch has been set to ON. Autopilot synchronizing circuits are active.

(n) Test - The test (TEST) push button provides automatic test of all autopilot systems in the pitch and roll axes. With power on, PWR annunciator illuminated, pressing the TEST pushbutton will illuminate all annunciators on the autopilot controller. Failure of any annunciator to illuminate during test indicates a malfunction in the autopilot or an annunciator light is burned out. Test may be used before takeoff or any time while airborne. If TEST is depressed with autopilot engaged, it will not provide any indication on the trim meters.

(o) Engage - The engage (ENG) pushbutton engages the autopilot. If only one green roll or pitch annunciator illuminates (but both respond to TEST), it is an indication of a problem in the unilluminated axis.

(2) Autopilot Control Switches

(a) Autopilot Disengage Switch - Pilot or copilot autopilot disengage switches are located on the control wheel just below the trim switch.

(b) Wheel Trim Switch - The wheel trim switches are used to manually control the autopilot. The trim switch will roll the aircraft at a constant rate until 30° of bank is reached. To level the aircraft, hold trim switch in opposite direction or depress LVL pushbutton. The trim switch will change pitch attitude approximately 1° per second. Upon release, the existing pitch attitude will remain.

NOTE: Pushing top of trim switch and commanding trim will temporarily disengage the autopilot.

B. The aircraft is equipped with an autopilot servo actuator in each of the three control surface axes. On a signal from the autopilot, the servo actuator provides automatic roll and pitch control when the autopilot system is engaged. Output torque developed is transferred directly to the capstan.

C. The autopilot controller is installed in the aft portion of the glareshield beneath the warning lights.

D. The control head for the yaw damper is located in the aft portion of pedestal.

E. The air data sensor (AE127) is installed in the nose compartment. It receives a static input from the heated shoulder static ports and a pitot input from the RH pitot system. The sensor provides air data information to the autopilot computer (pitch axis) and to the mach trim system. For further information on the mach trim system, refer to 22-00-00.

F. On *Aircraft 35-003 and Subsequent and 36-003 and Subsequent*, the autopilot electrical box (AE88) is installed beneath the pilot's seat.
H. The autopilot computer (AE84) is installed beneath the pilot's seat.
I. The flight director interface box is located beneath the pilot's seat adjacent to the autopilot computer.

3. **DESCRIPTION (See Figure 1.)**
A. The autopilot system includes an autopilot controller, an air data unit, an autopilot electric box, and an autopilot computer. Other components of the autopilot system are the Pitch System (22-12-00), Roll System (22-13-00), and the three axis disconnect box (22-11-00).
B. Component Description
(1) Autopilot Controller (AE128) - Mounted in the center of the glareshield, is accessible to both pilot and copilot. The autopilot controller contains switches necessary to engage the various autopilot modes. All annunciators appear as either amber or green on a black background (for easy daylight readability) above each mode switch and at each end of the autopilot controller. The designation appearing on each switch illuminates for night readability. The switch illumination and annunciators are dimmable.
(2) Air Data Unit (E251) - Installed in the nose avionics compartment aft of frame 3 at WL9, LBL6. The air data unit receives pitot and static pressures from the pitot and static systems. This information is then supplied by the air data unit to the autopilot computer and mach trim computer. (Refer to 22-20-00 for Mach Trim System coverage.)
(3) Autopilot Electric Box (AE88) - Installed under the pilot's seat. The autopilot electric box serves as a common junction box for the autopilot system. All autopilot components are tied together through this box.
(4) Autopilot Computer (AE84) - Installed under the pilot's seat adjacent to the autopilot electric box.

4. **OPERATION**
A. Primary power is applied to the autopilot system by setting the Autopilot Master Switch to AUTOPILOT. With power applied to the autopilot system, the PWR (power) annunciator on the autopilot controller shall illuminate. The autopilot may be engaged by depressing the ENG pushbutton on the autopilot controller. Axis engagement is indicated by the illumination of the Pitch and Roll (green) annunciators located in the upper inboard corners of the two large windows on the autopilot controller. If a monitor discrepancy exists (MON annunciator illuminated), neither axis will engage unless the DC circuit breaker for the failed axis is pulled.
B. Autopilot and flight director modes are engaged by depressing the applicable mode selector pushbutton on the autopilot controller. Flight director only mode selection is accomplished by depressing the applicable mode selector without the autopilot engaged.
C. Engaged autopilot and flight director modes may be disengaged by depressing the selector pushbutton a second time (except for SPD mode) or selecting an incompatible mode. Lateral modes (HDG, NAV CAPT, LVL, and roll command [autopilot only]) will cancel each other. NAV ARM is not affected by mode switching. Pitch modes (IAS, MACH, V/S, G/S CAPT, ALT SEL CAPT, ALT HLD, pitch command [autopilot only], and pitch sync [flight director only]) will cancel each other. G/S ARM and ALT SEL ARM are not affected by mode switching.
(1) Control Wheel Trim Switch (Pilot's and Copilot's) - The Trim Switch commands the autopilot to change attitude of the aircraft when moved in any of four directions without depressing the Trim Arming Switch pushbutton. When an attitude change is made and the Trim Arming Switch has not been depressed, the autopilot will change the attitude of the aircraft and reset the modes selected in the affected axis only. If a pitch attitude change is made, the pitch modes are reset (cancelled) and the roll modes remain unchanged. If a roll attitude change is made, engaged roll modes are reset (cancelled) and pitch modes remain unchanged. Depressing the Trim Arming Switch pushbutton and manipulating the Trim Switch in any of its four directions without depressing the MANUV R/P Switch, disengages the autopilot pitch and roll axes. A Trim Switch and Trim Arming Switch pushbutton are provided on both the pilot's and copilot's control wheel.

(2) Control Wheel Master Switch (MSW) - Depressing the control wheel Master Switch (MSW), disengages the autopilot pitch and roll axes. A control wheel Master Switch is provided on both the pilot's and copilot's control wheel. When used, this switch will also disengage the yaw damper system.

(3) Control Wheel Maneuver Switch (MANUV R/P) - Depressing either the pilot's or copilot's control wheel MANUV R/P Switch will temporarily inhibit the autopilot pitch and roll axes and extinguish the PITCH and ROLL annunciators. Manual pitch or roll trim commands can be made while the switch is depressed. Selected roll and pitch modes will not disengage when the switch is depressed. When the switch is released, the autopilot will resynchronize to and hold the existing (new) values in SPD (IAS or MACH), V/S, or ALT HLD modes.

NOTE:
- If the maximum pitch or roll attitude limits (10° down, 20° nose up, and 30° left or right) are exceeded and the MANUV R/P Switch is released, the autopilot will pitch or roll the aircraft to the maximum attitude limit and maintain the aircraft attitude at that limit. The roll and pitch axes will not disengage. If the MANUV R/P Switch is depressed and a roll or pitch monitor is tripped when commanding an attitude change, both the roll and pitch axes will be automatically disengaged upon release of the MANUV R/P Switch.

- The MANUV R/P Switches will remove any selected mode(s) during flight director operation and stow the flight director "V" bars.

(4) Pilot's Control Wheel Pitch Sync Switch (PITCH SYNC) - During flight director only operation, depressing the pilot's PITCH SYNC Switch will disengage any engaged pitch modes except G/S ARM and ALT SEL ARM. If a lateral mode is engaged, flight director pitch attitude hold reference values may be changed by depressing the pilot's PITCH SYNC Switch. The pilot's flight director command bars will generate commands necessary to maintain the pitch attitude existing when the PITCH SYNC Switch is released. The pilot's PITCH SYNC Switch has no effect on autopilot operation.

B. Operation of Mode Selection

(1) MON - This annunciator illuminates when a failure has occurred in either the pitch or roll axis during autopilot monitor check. The MON annunciator (amber) will remain illuminated, as a reminder to the pilot, until power to the autopilot has been recycled or the autopilot monitor check has been passed. The MON annunciator is located in the lower LH corner of the controller.

(2) PWR - This annunciator illuminates when power is available to the pitch or roll axis of the autopilot. It is an indication that the associated AC and DC circuit breakers have been depressed and the Autopilot Switch has been set to AUTOPILOT. Autopilot synchronizing circuits are active.

(3) TST - With power on (the PWR annunciator illuminated), depressing the TST pushbutton will illuminate all annunciators on the autopilot controller. Failure of any annunciator to illuminate during TST indicates a lamp is burned out. TST may be used before takeoff or any time while airborne. Momentarily depressing TST and ENG, simultaneously, provides an automatic self-test of the autopilot roll and pitch monitors. The self-test, referred to as an Autopilot Monitor Check, is a preflight test and should be performed on the ground.

(4) AUTOPILOT ATTITUDE HOLD - Either the pilot's or copilot's control wheel Trim Switch (arming pushbutton not depressed) may be used to command autopilot roll and pitch attitude changes. When a pitch attitude change is commanded, previously engaged pitch modes (except G/S ARM and ALT SEL ARM) will disengage. When a roll attitude change is commanded, previously selected roll modes (except NAV ARM) will disengage. When the autopilot is in the attitude hold mode, attitude commands are accepted by the autopilot and the autopilot will hold the attitude that exists when the command is released. The typical roll rate of attitude command is approximately 5 degrees per second and the typical pitch rate is approximately 1 degree per second.

Attitude command has no effect on flight director only operation. The autopilot is in pitch attitude hold when the PITCH annunciator is illuminated and all other pitch axis annunciators (except G/S ARM and ALT SEL ARM) are extinguished. The autopilot is in roll attitude hold when the ROLL annunciator is illuminated and all other roll axis annunciators (except NAV ARM) are extinguished. Attitude hold authority is limited to 10° nose down and 20° nose up in the pitch axis and 30° left or right bank in the roll axis.

(5) HDG (Heading) - When HDG is selected, autopilot or flight director commands are generated to maneuver the airplane as necessary to fly a heading selected by position of the heading "bug" on the pilot's horizontal situation indicator (HSI). The typical maximum bank angle is 25°. The ON annunciator above the HDG pushbutton will illuminate when heading mode is engaged.

NOTE: To make a turn of more than 135°, it is recommended that the heading "bug" be set to not more than 135° in the direction of the turn. When the heading "bug" is within approximately 25° of the lubber line, reselect up to 135 additional degrees until the desired heading is obtained.

(6) 1/2 BNK (Half Bank) - The 1/2 BNK mode is a subfunction of the HDG and NAV (VOR) modes and is only functional with HDG or NAV (VOR) engaged. When 1/2 BNK is engaged, the typical maximum bank angle is 13°. The ON annunciator above the 1/2 BNK pushbutton will illuminate when 1/2 BNK is engaged.

(7) NAV (Navigation) - The NAV mode, when selected, activates the autopilot or flight director function which captures and tracks VOR and LOC. For NAV mode to function, the aircraft NAV receiver must be tuned to the frequency of the navigation aid, the NAV flag must be valid, and the HSI course selector must be set to the desired course. Any mode may be used to intercept the course. Activation of the NAV mode will start automatic procedures and the NAV ARM annunciator will illuminate. When the aircraft turns to the desired track, the NAV ARM annunciator will extinguish and the NAV CAPT annunciator will illuminate. Refer to VOR OPERATION, ILS APPROACH, or BACK COURSE LOCALIZER APPROACH.

(8) LRN (Long Range Navigation) - The LRN mode is a sub-function of the NAV mode. The LRN mode, when selected, activates the autopilot or flight director function which follows steering commands generated by the installed LRN device. For LRN mode to function, a valid NAV course must be programmed on the LRN device Control Display Unit and the LRN device must be selected for display on the HSI. When properly initialized, LRN is selected by depressing the NAV pushbutton. When LRN is selected, automatic autopilot course interception and tracking procedures will begin and the LRN annunciator will illuminate. If the aircraft is not on course when LRN is selected, the autopilot or flight director will generate commands to maneuver the aircraft as required to intercept the desired course. Loss of LRN validity while flying the LRN mode will cause the LRN annunciator to flash and the autopilot will maintain existing roll attitude.

(9) SFT (Soft) - When SFT is selected, the autopilot provides softer responses in the pitch and roll axes for flying through turbulence. The SFT mode is locked out when in NAV localizer CAPT, NAV VOR APPR, or ALT SEL CAPT. The SOFT annunciator illuminates when the SFT mode is engaged. The autopilot will not maintain reference values as tightly with the SOFT mode engaged. SOFT mode is not available during flight director only operation.

(10) TRK (Track) - In the NAV CAPT mode, the TRK annunciator illuminates to indicate that the aircraft is approaching the center of the VOR or LOC beam. Crosswind compensation begins when the TRK annunciator is illuminated.

(11) BC (Back Course) - For BC mode operation, the NAV mode must be engaged and the primary NAV receiver must be tuned to a localizer frequency. When the BC pushbutton is depressed, the BC ON annunciator illuminates, the course information in the autopilot or to the flight director is reversed, and the glideslope signal is locked out. Disengaging the NAV mode also disengages BC.

(12) LVL (Level) - When the LVL mode is engaged, commands are generated which will roll the aircraft to and maintain a wings level attitude as defined by the attitude indicator. The LVL ON annunciator will illuminate when LVL mode is engaged.

NOTE: If a pitch mode is selected with no lateral mode selected during flight director only operation, the LVL mode will automatically engage, the LVL ON annunciator will illuminate, and the flight director command bars will provide a wings level command.

(13) SPD (Speed) - When SPD is selected, the autopilot or flight director pitch axis is coupled to an air data unit output to maintain speed existing at the time of engagement. When the SPD pushbutton is first depressed, the IAS annunciator will illuminate and the aircraft will hold the existing airspeed. Depressing the SPD pushbutton a second time will disengage IAS, the MACH annunciator will illuminate, and the aircraft will hold the existing MACH number. The switch will toggle between IAS and MACH, always starting with IAS upon initial engagement. Speed is maintained by the autopilot by changing pitch attitude as necessary. Power must be set by the pilot.

(14) V/S (Vertical Speed) - When V/S is selected, the autopilot or flight director will hold an established rate of climb or descent. Before engaging this mode, maintain the desired rate long enough (approximately 15 seconds) for the vertical speed indicator lag to diminish. The V/S ON annunciator illuminates when V/S is selected.

(15) G/S (Glideslope) - The G/S mode, when selected, activates the autopilot or flight director function which captures and tracks glideslope. For G/S to function, the primary NAV receiver must be tuned to a localizer frequency, an active glideslope signal must be present, the G/S flag must be valid, and BC mode must not be engaged. If the aircraft is not on the glideslope when G/S is selected, the G/S ARM annunciator will illuminate and the engaged pitch mode will be maintained. As the aircraft nears the center of the glideslope, the G/S ARM annunciator will extinguish, the engaged pitch mode will disengage, the G/S CAPT annunciator will illuminate, and the autopilot or flight director will command an intercept maneuver and track the glideslope. If G/S is selected while the aircraft is on the glideslope, G/S CAPT will be immediate.

(16) FNL (Final) - The FNL annunciator will illuminate during an ILS or back-course localizer approach whenever the beam signal is being desensitized.

(17) ALT HLD (Altitude Hold) - When ALT HLD is selected, the autopilot or flight director will generate commands to maintain the aircraft at the existing pressure altitude. The ALT ON annunciator illuminates when ALT HLD is selected. For smoothest leveling off, the rates of climb or descent should be less than 1,000 feet per minute. ALT HLD is automatically engaged after ALT SEL CAPT.

(18) ALT SEL (Altitude Select) - The desired altitude is set using the altitude alerter on the instrument panel. When the ALT SEL pushbutton is depressed, the mode is armed and the ALT SEL ARM annunciator will illuminate. While in ARM, any pitch mode may be used to climb or descend to the selected altitude. Upon nearing the selected altitude, the pitch mode in use disengages, ALT SEL ARM mode switch to ALT SEL CAPT mode and the autopilot or flight director commands an intercept maneuver, leveling off at the altitude selected on the altitude alerter. The point at which the intercept maneuver begins depends upon the aircraft's vertical speed. When the aircraft is within approximately 20 feet of the selected altitude and the aircraft's vertical speed is within limits, the ALT HLD mode will automatically engage, the ALT HLD ON annunciator will illuminate, and the ALT SEL CAPT annunciator will extinguish.

NOTE:

- Selecting a new altitude on the altitude alerter when in ALT SEL CAP will cancel ALT SEL, the ALT SEL CAPT annunciator will extinguish, and the autopilot will revert to pitch attitude hold. Selecting a new altitude or changing vertical modes when in ALT SEL ARM will have no effect on ALT SEL.

- ALT SEL cannot be armed when the aircraft is past the capture point.

- ALT SEL cannot be armed if altitude alert light is illuminated. After leveling off at the selected altitude, ALT SEL cannot be armed again if the aircraft deviates more than 300 feet from the selected altitude (altitude alert light will be illuminated). If it is desired to use LAT SEL after departure from the selected altitude (altitude alert light illuminated), the desired altitude must be reset on the altitude alerter even if the desired altitude has not changed.

(19) G/A (Go-Around) - Go-Around is a flight director only mode. Depressing the GO-AROUND pushbutton on the left engine throttle handle disengages the autopilot (if engaged), illuminates the G/A and LVL annunciators, and commands pilot's flight director to 9° pitch up, and wings level attitude. If the autopilot is engaged while in the flight director G/A mode, the G/A annunciator will extinguish and the autopilot roll and pitch axes will engage and maintain the roll and pitch attitudes existing at engagement.

AUTOPILOT SYSTEM - MAINTENANCE PRACTICES

1. Adjustment/Test

A. Functional Test of the Automatic Flight Control System - FC-200 *(Aircraft 35-002 thru 35-407, 35-409 thru 35-505, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-350 Autopilot")* (See Figure 201.) *(1108L)*

(1) Get the necessary tools and equipment.

NOTE: You can use equivalent alternatives for these items:

The autopilot and yaw damper follow-up alignments must be completed prior to this test. (Refer to 28-20-00.)

NAME	PART NUMBER	MANUFACTURER	USE
Tilt Table	TN026410	Learjet Inc. Wichita, KS	Mounting for the vertical gyro.
Turntable	TN026409	Learjet Inc. Wichita, KS	Mounting for the directional gyro.
Vertical Gyro Extension Cable		Manufacture Locally	Connect vertical gyro.
Directional Gyro Extension Cable		Manufacture Locally	Connect directional gyro.
Pitot-Static Tester	1811G	Barfield Co. Miami, FL	Apply vacuum and pressure.

(2) Remove the nose compartment access doors.
(3) Remove the primary vertical gyro from the aircraft and install it on the tilt table. (Refer to 34-23-01.)
(4) Remove the primary directional gyro from the aircraft and install it on the turntable. (Refer to 34-23-01.)
(5) Connect the primary vertical and directional gyros to the aircraft wiring with the extension cables.
(6) Connect the pitot-static tester directly to the air data sensor pitot and static lines.
(7) Connect an external electrical power source to the aircraft.
(8) Check the autopilot engagement and disengagement as follows:
  (a) Set the Battery and Primary and Secondary Inverter Switches ON. Make sure that the PRI VERT GY, PRI DIR GY, and all AFCS circuit breakers are pushed in.
  (b) Set the Pitch Trim PRI-OFF-SEC Switch, located on trim switch panel, to PRI, and using NOSE UP-OFF-NOSE DN Switch, trim the aircraft for a full nose-down attitude.
  (c) Set the Autopilot Switch, located on pilot's switch panel, ON and the Pitch Trim PRI-OFF-SEC Switch to OFF.

(d) Push the Autopilot ENG pushbutton. Note that ROLL and PITCH ENG and LVL lights are on and the primary yaw damper is engaged.

NOTE: *On Aircraft 35-067 thru 35-407, 35-409 thru 35-505 and 36-018 thru 36-053*, the primary yaw damper will not engage when autopilot ENG pushbutton is pushed.

(e) Tilt the primary vertical gyro sufficient to simulate a nose-down attitude. The autopilot must disengage and the warning horn must sound. Return the gyro to level.
(f) Set the Pitch Trim PRI-OFF-SEC Switch to PRI and push the Autopilot ENG pushbutton.
(g) Using the pilot's Trim and Trim Arm Switch, without pushing ARM pushbutton, trim the aircraft for a nose-up or nose-down attitude. The autopilot must remain engaged.
(h) Push the ARM pushbutton on the pilot's Trim and Trim Arm Switch. Do not position the switch for trim. The autopilot must remain engaged.
(i) Push the ARM pushbutton and position the pilot's Trim and Trim Arm Switch for a nose-up or nose-down attitude. The autopilot must disengage and the warning horn must sound.
(j) Repeat steps (f) thru (i) using the copilot's Trim and Trim Arm Switch.
(k) *On Aircraft 35-002 thru 35-066 and 36-002 thru 36-017 not equipped with Reduced Approach Speed System*, engage the autopilot and note that the primary yaw damper engages with the autopilot. Push the pilot's Control Wheel Master Switch (MSW). The autopilot and primary yaw damper must disengage.
(l) Repeat step (k) for the autopilot and secondary yaw damper.

NOTE: To engage the secondary yaw damper push SEC ENG pushbutton on the yaw damper controller.

(m) Repeat steps (k) and (l) using the copilot's MSW.
(n) *On Aircraft 35-067 thru 35-407, 35-409 thru 35-505, 36-018 thru 36-053 and prior aircraft equipped with Reduced Approach Speed System*, engage the autopilot and primary yaw damper. Push the pilot's MSW. The autopilot and primary yaw damper must disengage.
(o) Repeat step (n) for the autopilot and secondary yaw damper.

NOTE: To engage the secondary yaw damper push SEC ENG pushbutton on the yaw damper controller.

(p) Repeat steps (n) and (o) using the copilot's MSW.

(9) Check the yaw damper engagement and disengagement as follows:
(a) Push and release the PRI PWR/TEST pushbutton on the yaw damper controller. The PRI PWR/TEST light must come on. Push and release the PRI PWR/TEST OFF pushbutton. The PRI PWR/TEST light must go out.
(b) Repeat step (a) using the SEC PWR/TEST pushbutton.
(c) Push and release the PRI PWR/TEST and PRI ENG pushbuttons. Both lights must come on.
(d) Check that the yaw damper is engaged by pushing the rudder pedals off center. Note the resistance.
(e) Push and release the PRI PWR/TEST OFF pushbutton. Both lights must go out.
(f) Repeat steps (c) thru (e) using the SEC PWR/TEST and SEC ENG pushbuttons.

(g) Make sure that the primary and secondary ENG OFF pushbuttons disengage from their respective yaw damper systems.

(h) Check that the engaging primary yaw damper disengages the secondary yaw damper operation, and that the engaging secondary yaw damper disengages the primary yaw damper operation.

(10) Check the primary and secondary yaw damper isolation diodes as follows:

NOTE: This test will also make sure of the battery relays integrity.

(a) Pull the PITCH TRIM, AFCS ROLL, and AFCS PITCH circuit breakers.

(b) Push and release both the PRI and SEC PWR/TEST Switches on the Yaw Damper control head. The annunciator lights must come on.

(c) Engage the Secondary Yaw Damper by pushing and releasing the SEC ENG Switch. The annunciator must come on.

(d) Pull the AFCS YAW circuit breaker. The PRI PWR/TEST annunciator must go out.

(e) Push and release the PRI PWR/TEST and PRI ENG Switches and make sure that the primary yaw damper does not engage. (The annunciator lights will come on if the primary is engaged.)

(f) If the PRI PWR/TEST and PRI ENG annunciators are on, the primary yaw damper isolation diode (CR 10) is shorted and must be replaced.

NOTE: The primary yaw damper isolation diode (A2CR 10) is located inside the primary module of the YD-202 yaw damper computer. (Refer to JET Maintenance Manual TP-244.)

(g) Reset the AFCS YAW circuit breaker and push the PRI PWR/TEST Switch.

(h) Engage the Primary Yaw Damper by pushing and releasing the PRI ENG Switch. The annunciator must come on.

(i) Pull the SEC AFCS circuit breaker. The SEC PWR/TEST annunciator must go out.

(j) Push and release the SEC PWR/TEST and SEC ENG Switches and make sure that the secondary yaw damper does not engage. (The annunciator lights will come on if the secondary is engaged.)

(k) If the SEC PWR/TEST and SEC ENG annunciators are on, the secondary yaw damper isolation diode (CR 10) is shorted and must be replaced.

NOTE: The secondary yaw damper isolation diode (A2CR 10) is located inside the secondary module of the YD-202 yaw damper computer. (Refer to JET Maintenance Manual TP-244.)

(l) Reset the AFCS circuit breaker.

(m) Reset the PITCH, AFCS ROLL, and AFCS PITCH circuit breakers.

(n) Using the pilot's Pitch Trim Switch, push and position for either nose up or nose down. Make sure of horizontal stabilizer movement using the position indicator.

(o) Pull the PITCH circuit breaker. Push and position the pilot's Pitch Trim System for either nose up or nose down. Make sure that the stabilizer does not move.

NOTE: If the stabilizer does move, CR 11 of PCB 131 within the autopilot electrical box is shorted and must be replaced.

(p) Push the PITCH circuit breaker.

(11) Check the autopilot isolation diodes as follows:

(a) Set the Autopilot Switch to AUTOPILOT PWR. The annunciator on the autopilot controller must come on.

(b) Engage the autopilot by pushing and releasing the ENG Switch. The annunciators must come on.

(c) Push the SEC PWR/TEST Switch. The annunciator must come on.

(d) Push the SEC ENG Switch. The annunciator must come on.

(e) Pull the AFCS YAW circuit breaker. The annunciators in steps (d) and (e) must remain on. Reset the AFCS YAW circuit breaker.

(f) Pull the AFCS ROLL circuit breaker. The roll axis must disengage and the annunciator (adjacent to indicator) must go out. Push the ENG Switch and make sure that the roll axis does not engage. Reset the AFCS ROLL circuit breaker.

NOTE: If the roll axis remains engaged or engages after the AFCS ROLL circuit breaker has been pulled, CR 148 on the roll module is shorted and must be replaced. Refer to the FC-200 Autopilot Instructions Manual TP-241 for location of Roll and Pitch isolation diodes.

(g) Pull the AFCS PITCH circuit breaker. The pitch axis must disengage and the annunciator (adjacent to indicator) must go out. Push the ENG Switch and make sure that the pitch axis does not engage. Reset the AFCS PITCH circuit breaker.

NOTE: If the pitch axis remains engaged or engages after the AFCS PITCH circuit breaker has been pulled, CR 5 on the pitch module is shorted and must be replaced. (Refer to the FC-200 Maintenance Instructions Manual TP-241.)

(12) Check the autopilot AC interlock as follows:

(a) Engage the autopilot and primary yaw damper.

(b) Pull the primary AFCS AC circuit breaker. The autopilot and primary yaw damper must disengage. Push the circuit breaker.

(c) Engage the secondary yaw damper.

(d) Pull the SEC YAW DAMP circuit breaker. The secondary yaw damper must disengage. Push the circuit breaker.

(13) Check the autopilot DC interlock as follows:

(a) Engage the autopilot.

1) Pull the PRI AFCS circuit breaker. The autopilot must disengage. Push the circuit breaker and engage the autopilot.

2) Pull the AFCS PITCH circuit breaker. The autopilot must disengage. Push the circuit breaker and engage the autopilot.
3) Pull the AFCS ROLL circuit breaker. The autopilot must disengage (Roll axis only). Push the circuit breaker.

(b) Apply power to both the primary and secondary yaw dampers.
(c) Engage the secondary yaw damper.
(d) Pull the PRI YAW DAMP circuit breaker. The primary yaw damper power light must go out.
(e) Push the PRI PWR/TEST and PRI ENG pushbuttons (in an attempt to engage primary yaw damper). The primary yaw damper lights must remain out.
(f) Push the PRI YAW DAMP circuit breaker.
(g) Push the PRI PWR/TEST and PRI ENG pushbuttons.
(h) Repeat steps (d) thru (g) for the secondary yaw damper system.

(14) Engage the autopilot. Set the Autopilot Switch, located on the pilot's switch panel, OFF. The autopilot must disengage and the warning horn must sound.
(15) Set the Pitch Trim PRI-OFF-SEC Switch, located on the trim switch panel, to SEC. Set the Autopilot Switch, located on pilot's switch panel, ON. Engage the autopilot. The autopilot must disengage when the pilot's and copilot's Trim and Trim Arm Switch is held to NOSE UP and NOSE DOWN.
(16) *On Aircraft equipped with an Elevator Servo Switch*, set the ELEV SERVO Switch, located on pilot's switch panel, OFF. The autopilot pitch and roll axes must disengage. Make sure that the pitch axis cannot be engaged while the ELEV SERVO Switch is OFF. Set the ELEV SERVO Switch ON.
(17) Check the autopilot lighting as follows:
(a) Disengage the autopilot. Push the Autopilot TEST pushbutton. Make sure that all the lights come on.
(b) Turn the pilot's light dimmer, located on the pilot's side panel, off. Using a flashlight, check for light dimming at each glareshield photocell. The flashlight beam on any one of the photocells must cause the lights to brighten.
(c) Check all the primary and secondary yaw damper lights using the PWR/TEST pushbuttons.

NOTE: Make sure that no lights except PWR remain on after the PWR/TEST pushbutton is released.

(18) Check the autopilot roll engagement as follows:
(a) Push the Autopilot ENG pushbutton.
(b) Push and hold the Autopilot TEST pushbutton. Without pushing the ARM pushbutton, move the pilot's Trim and Trim Arm Switch left. The roll axis must disengage within 5 seconds and the warning horn must sound.
(c) Engage the autopilot and repeat step (b) moving the pilot's Trim and Trim Arm Switch right.
(d) Release the Autopilot TEST Switch.
(19) Check the autopilot pitch engagement as follows:
(a) Push and hold the Autopilot TEST pushbutton. Without pushing the ARM pushbutton, using the pilot's Trim and Trim Arm Switch, trim the aircraft for a nose-down attitude. The pitch axis must disengage within 5 seconds. The roll axis may also disengage (this is not a requirement).
(b) Deleted.
(20) Check the yaw damper engagement as follows:

(a) Push the PRI PWR/TEST and SEC PWR/ TEST pushbuttons on the yaw damper controller. The yaw force effort indicator must center.
(b) Push the primary and secondary yaw damper PWR/TEST OFF pushbuttons.
(c) Push and hold the PRI PWR/TEST pushbutton. The yaw force indicator must deflect left, then slowly wash out right of center in 30 seconds. Release the PRI PWR/TEST pushbutton.
(d) Push and hold the SEC PWR/TEST pushbutton. The yaw force indicator must deflect right, then slowly wash out to left of center in 30 seconds. Release the SEC PWR/TEST pushbutton.

NOTE: As each PWR/TEST pushbutton is released, the yaw force indicator needles will cross, then return to center.

(21) Check the pitch effort indicator as follows:
(a) With the autopilot disengaged, set the Left Stall Warning and Autopilot Switches, located on pilot's switch panel, ON.
(b) Position the control column for neutral elevator position. The pitch indicator must center.
(c) Move the control column forward. The indicator must return to center. Move the control column aft. The indicator must return to center.
(22) Check the trim switch command as follows:
(a) Using the pilot's Trim and Trim Arm Switch, trim the aircraft to approximate center trim position on the indicator.
(b) Engage the autopilot. Using the pilot's Trim and Trim Arm Switch, without pushing the ARM pushbutton, trim for a nose-down attitude. The control column must move forward.
(c) Trim the aircraft for a nose-up attitude. The control column must move aft.
(d) Repeat steps (a) thru (c) using the copilot's Trim and Trim Arm Switch.
(e) *On Aircraft 35-002 thru 35-093 and 36-002 thru 36-026 not modified per AAK 76-6, "Autopilot Computer Improvement Kit for FC-200 Autopilot System"*, pull the control wheel aft, push the Autopilot SOFT pushbutton and trim the aircraft for a nose-down attitude. The control column must move forward. Disengage the SOFT pushbutton. The rate of control column forward travel must increase.

NOTE: The autopilot SOFT mode will not engage with an ILS frequency selected on the NAV receiver.

(f) *On Aircraft 35-094 thru 35-407, 35-409 thru 35-505, 36-027 thru 36-053, and prior aircraft modified per AAK 76-6, "Autopilot Computer Improvement Kit for FC-200 Autopilot System"*, overpower the control column aft and release. The control column must move to its original position. Repeat the procedure with the control column in the forward position.
(23) Check the gyro inputs as follows:
(a) Using the pilot's Trim and Trim Arm Switch, trim the aircraft to approximate center trim position on the indicator.
(b) Engage the autopilot. Tilt the vertical gyro sufficient to simulate a nose-up attitude. The control column must move forward.
(c) Tilt the vertical gyro sufficient to simulate a nose-down attitude. The control column must move aft.

(d) Push the pilot's VG-ERECT pushbutton, located on the pilot's switch panel. The autopilot must disengage. *On Aircraft 35-094 thru 35-407, 35-409 thru 35-505, 36-027 thru 36-053, and prior Aircraft Modified per AAK 76-6, "Autopilot Computer Improvement Kit for FC-200 Autopilot System"*, make sure that no autopilot vertical modes will engage with the VG-ERECT pushbutton pushed. Release the VG-ERECT pushbutton.

(24) Check the altitude control as follows:
(a) Simulate an altitude of 10,000 feet with the pitot-static tester and push the Autopilot ALT pushbutton. There must not be more than 1/8-inch of control column movement when the ALT pushbutton is pushed.
(b) Increase altitude to 10,050 feet. The control column must move forward.
(c) Decrease altitude to 9,950 feet. The control column must move aft.
(d) Disengage the autopilot altitude mode.

(25) Check the speed hold as follows:
(a) With the pitot-static tester simulate an altitude of 28,000 feet and an airspeed of 200 KIAS. Push the Autopilot SPD pushbutton. The SPD IAS light must come on.
(b) Increase airspeed to 220 KIAS. The control column must move aft.
(c) Decrease airspeed to 180 KIAS. The control column must move forward.
(d) Increase altitude to 29,000 (±250) feet. The SPD IAS light must go out and SPD MACH lamp must come on. The control column must not move abruptly at crossover.
(e) Disengage the speed mode.

(26) Check the Mach hold as follows:
(a) Simulate an altitude of 30,000 feet and 0.73 Mach with the pitot-static tester. Push the Autopilot SPD pushbutton. The SPD MACH light must come on.
(b) Increase Mach speed to 0.735. The control column must move aft.
(c) Decrease Mach speed to 0.725. The control column must move forward.
(d) Disengage the speed mode.

(27) Check the vertical speed hold as follows:
(a) With simulated altitude at 30,000 feet, simulate a vertical speed of 1,000 feet per minute (fpm) up with the pitot-static tester. Push the Autopilot V/S pushbutton. The V/S lamp must come on.
(b) Increase the vertical speed to approximately 1,050 fpm up. The control column must move forward.
(c) Decrease the vertical speed to approximately 950 fpm up. The control column must move aft.
(d) Disengage the autopilot vertical speed mode.

(28) Check the Mach trim interface.
(a) Using the pitot-static tester, set the Mach number to 0.78 MI on the pilot's airspeed indicator with altitude at 30,000 feet.
(b) Engage the autopilot and pull the MACH TRIM circuit breaker.
(c) Push and hold the MANUV R/P Switch on the pilot's control wheel. Make sure that the overspeed tone does not sound.
(d) Release the MANUV R/P Switch.
(e) Repeat steps (c) and (d) using the copilot's MANUV R/P Switch.

(29) Check the glideslope as follows:
(a) Tune the NAV receiver to a localizer frequency. Cause a glideslope up indication with an ILS radio simulator. Push, in sequence, the Autopilot ALT and G/S pushbuttons. The ALT light and G/S ARM light must come on.

(b) Reduce the glideslope up indication to zero. The ALT and G/S ARM lights must go out when the glideslope needle is between zero and is one needle width below zero. The G/S ENG light must come on.
(c) Cause a glideslope up indication. The control column must move aft.
(d) Cause a glideslope down indication. The control column must move forward.
(e) Simulate an altitude of 5000 feet and a vertical speed of 500 feet per minute (fpm) down with the pitot-static tester.
(f) Disable the glideslope signal from the ILS radio simulator. The glideslope flag must drop into view, G/S ENG light must go out, and V/S and G/S ARM lights must come on.

NOTE: *On Aircraft 35-094 thru 35-407, 35-409 thru 35-505, 36-027 thru 36-053, and prior aircraft modified per AAK 76-6, "Autopilot Computer Improvement Kit for FC-200 Autopilot System"*, V/S mode will not engage automatically with glideslope disengagement.

(g) Increase the vertical speed to 950 fpm down. The control column must move aft.
(h) Decrease vertical speed to 50 fpm down. The control column must move forward.

NOTE: Steps (g) and (h) are not applicable to *Aircraft 35-094 thru 35-407, 35-409 thru 35-505, 36-027 thru 36-053, and prior aircraft modified per AAK 76-6, "Autopilot Computer Improvement Kit for FC-200 Autopilot System"*.

(i) Generate a valid glideslope signal with the ILS radio simulator. The glideslope flag must disappear, G/S ENG light must come on, and V/S light and G/S ARM light must go out.

NOTE: *On Aircraft 35-094 thru 35-407, 35-409 thru 35-505, 36-027 thru 36-053, and prior aircraft modified per AAK 76-6, "Autopilot Computer Improvement Kit for FC-200 Autopilot System"*, V/S mode will not engage automatically with glideslope disengagement.

(j) Disengage the autopilot glideslope mode.

(30) Check the autopilot go-around mode as follows: (*Aircraft 35-002 thru 35-019, 36-002 thru 36-006 only.*)
(a) Engage the glideslope. With the flaps below 13°, push the Go-Around pushbutton on the left thrust lever. The autopilot must not change pitch command.
(b) Move the left thrust lever forward to stop and push the Go-Around pushbutton.
(c) The control column must move aft and the glideslope must disengage.
(d) Slowly tilt the vertical gyro for 11° pitch up. The control column must move forward. Move the left thrust lever back to cutoff and level the gyro.
(e) Push the G/S pushbutton on the Autopilot Controller and move the right thrust lever forward to stop.
(f) Push the Go-Around pushbutton, located on the left thrust lever. The control column must move aft and the glideslope must disengage.
(g) Move the right thrust lever back to cutoff. Disengage the go-around by pushing the MANUV R/P Switch on the pilot's control wheel.

(31) Check the A/P - Stall pusher/puller interface as follows:
  (a) Make sure that the NAV receiver is tuned to a localizer frequency. Engage the autopilot and a pitch mode.
  (b) Do the Right Stall Test. The autopilot must remain engaged. The stall test must function normally and the selected pitch mode must disengage.
  (c) Repeat steps (a) and (b) with each autopilot pitch mode selected.
  (d) Repeat steps (a) through (c) for the Left Stall Test.
  (e) Repeat steps (a) through (c) for the Mach Test.

(32) Check the pilot's and copilot's Control Wheel Master Switches (MSW) as follows:
  (a) Set the Autopilot and Left and Right Stall Warning Switches, located on the pilot's switch panel, OFF.
  (b) Using the pilot's Trim and Trim Arm Switch, trim the control column to an upright, neutral position.
  (c) Move the control column forward and aft and note the relative friction level.
  (d) Set the Autopilot and Left and Right Stall Warning Switches, located on the pilot's switch panel, ON. Move the control column forward and aft and note the relative friction level.
  (e) While moving the control column, push and hold the pilot's MSW. Note the relative friction change caused by pitch capstan drop out.
  (f) Release the pilot's MSW and note the pitch capstan engagement.
  (g) Repeat steps (a) through (f) for the copilot's MSW.

(33) Check the roll effort indicator as follows:
  (a) Engage the autopilot. Using the pilot's control wheel, overpower the autopilot roll axis control in both directions. The roll indicator must indicate the direction of the control wheel overpower.
  (b) Repeat step (a) for the copilot's control wheel.

(34) Check the trim switch steering as follows:
  (a) Without pushing the ARM pushbutton, move the pilot's Trim and Trim Arm Switch to left. The control wheel must turn left.
  (b) Without pushing the ARM pushbutton, move the pilot's Trim and Trim Arm Switch to right. The control wheel must turn right.
  (c) Repeat steps (a) and (b) for the copilot's Trim and Trim Arm Switch.

(35) Check the heading select as follows:
  (a) Turn the heading knob on the course indicator until the heading marker is 90° off indicated heading.
  (b) Push the Autopilot HDG pushbutton. The control wheel must turn in the direction of the heading marker.
  (c) Tilt the vertical gyro to a 35° bank in the direction of the commanded turn. The control wheel must return to approximately center position.
  (d) Repeat steps (a) through (c) for a 90° turn in the opposite direction.
  (e) Disengage the autopilot heading mode.

(36) Check the NAV VOR operation.
  (a) Make sure that the flaps are fully up. Tune the NAV receiver to the VOR frequency of simulator.
  (b) Turn the heading knob to the aircraft heading and course knob 90° off the aircraft indicated heading.
  (c) Set the VOR simulator to the aircraft bearing.
  (d) Push the Autopilot HDG and NAV pushbuttons. The HDG and NAV ARM lights must come on.

(e) Slowly turn the course knob to the aircraft heading. The HDG and NAV ARM lights must go out and NAV ENG and TRK lights must come on.

NOTE: If the course knob is turned too fast, the NAV ARM light will start to blink. Stop turning the course knob and in 15 seconds the NAV ARM light will stop blinking and go out. The NAV ENG and TRK lights will come on.

(f) Slowly turn the course knob for a right turn. The control wheel must turn right.
(g) Slowly turn course knob for a left turn. The control wheel must turn left.
(h) Push the Autopilot REV pushbutton. The REV mode must not engage.
(i) Disable the VOR simulator. Make sure that the NAV flag drops into view, the NAV ARM light must start blinking and the NAV ENG light must go out. After 10 to 20 seconds, the NAV ARM light may go out and LVL mode light may come on.
(j) Enable the VOR simulator. The NAV flag must pull from view and the NAV ENG and TRK lights must come on.
(k) Disengage the Autopilot NAV mode.

(37) Check NAV ILS operation as follows:
(a) Set the ILS simulator to a localizer frequency.
(b) Tune the NAV receiver to the same frequency. Push the Autopilot NAV pushbutton. Turn the course knob to the center ILS beam. The NAV ENG and TRK lights must come on.
(c) Lower the flaps below 13°. The autopilot APPR light must come on at approximately 13° of flap down.
(d) Simulate a Marker Beacon outer marker navigation signal. The autopilot FNL light must come on.
(e) On ILS simulator, move the localizer beam to the left of aircraft heading. The control wheel must turn left.
(f) On the ILS simulator, move the localizer beam to the right of aircraft heading. The control wheel must turn right.
(g) Push the Autopilot SOFT pushbutton. The SOFT mode must not engage.
(h) Push the Autopilot REV pushbutton.
(i) On the ILS simulator, move the localizer beam to the left of aircraft heading. The control wheel must turn right.
(j) On the ILS simulator, move the localizer beam to the right of aircraft heading. The control wheel must turn left.

(38) Check the directional gyro as follows:
(a) Set the SLAVE-FREE Switch, located on the pilot's switch panel, to FREE. Disengage the Autopilot LVL mode.
(b) With only the ENG pushbutton on the Autopilot Controller engaged, turn the directional gyro to indicate a right turn. The control wheel must not turn.
(c) Turn the directional gyro to indicate a left turn. The control wheel must not turn.
(d) Push the Autopilot LVL pushbutton. The autopilot LVL light must come on.
(e) Turn the directional gyro to indicate a right turn. The control wheel must turn left to maintain level flight.
(f) Turn the directional gyro to indicate a left turn. The control wheel must turn right to maintain level flight.

(g) Disengage the autopilot.

(39) Check the roll rate gyro phasing as follows:

(a) Push the Autopilot ENG pushbutton and push the left wing down.

(b) First movement of the control wheel must be slightly to right, then back to neutral as the left wing moves back to level.

NOTE: It may be necessary to push up on the right wing to obtain a proper result. If the roll rate gyro is suspected of being defective because the desired effect in step (b) cannot be obtained, do the check by removing the gyro from its mounting. With the gyro still connected to the aircraft wiring, tilt to simulate the left wing down. Check for the desired effect in step (b).

(c) Disengage the autopilot.

(40) Check the vertical gyro phasing as follows:

(a) Push the Autopilot ENG pushbutton and tilt the vertical gyro for a right wing down condition. The control wheel must turn left.

(b) Tilt the vertical gyro for a left wing down condition. The control wheel must turn right.

(c) Level the gyro and disengage autopilot.

(41) Check the yaw axis as follows:

(a) Push the PRI PWR/TEST and ENG pushbuttons on the yaw damper controller.

(b) With the autopilot disengaged, push the aircraft tail sideways. The first rudder movement must be in the direction of push.

(c) Remove the lateral accelerometer from its mount.

(d) With the autopilot disengaged, tilt the lateral accelerometer for approximately a 15° right bank. The rudder force indicator must move left. Allow 15 to 30 seconds for an indication. Disengage the primary yaw damper.

(e) Repeat step (d) with the secondary yaw damper engaged.

(f) Install and level the lateral accelerometer.

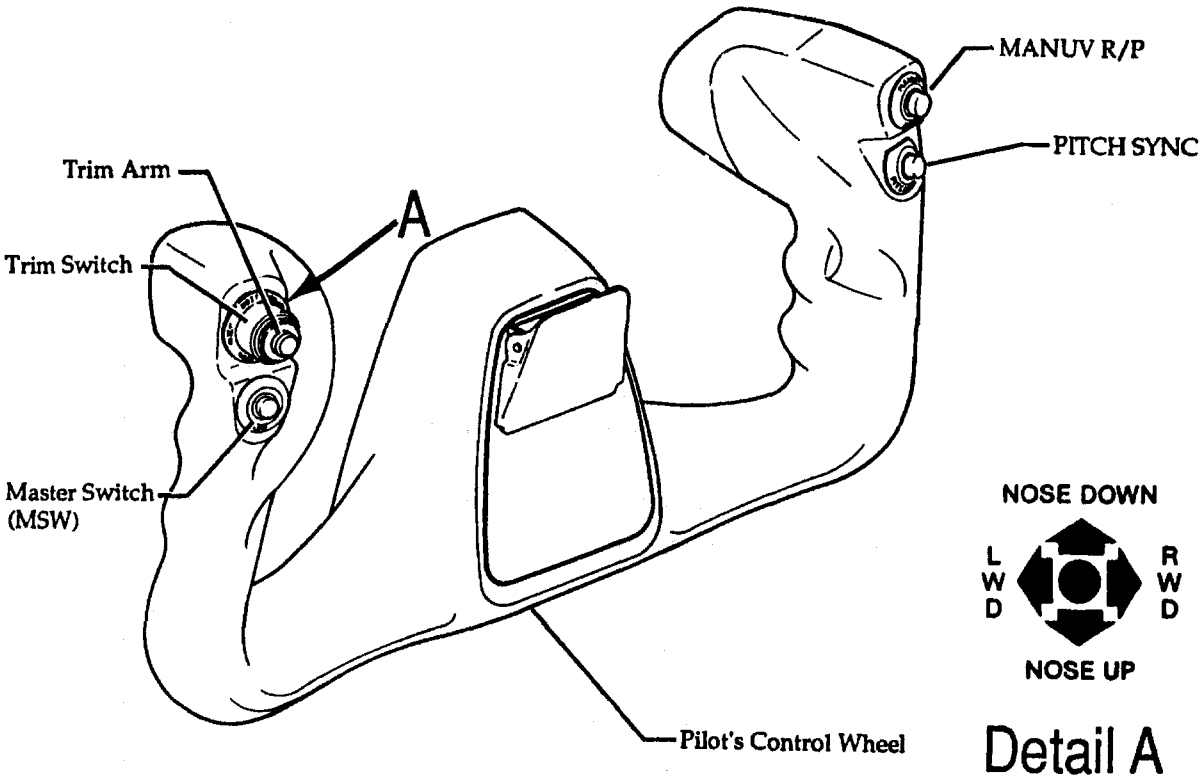
(42) Disconnect the vertical and directional gyro extension cables.

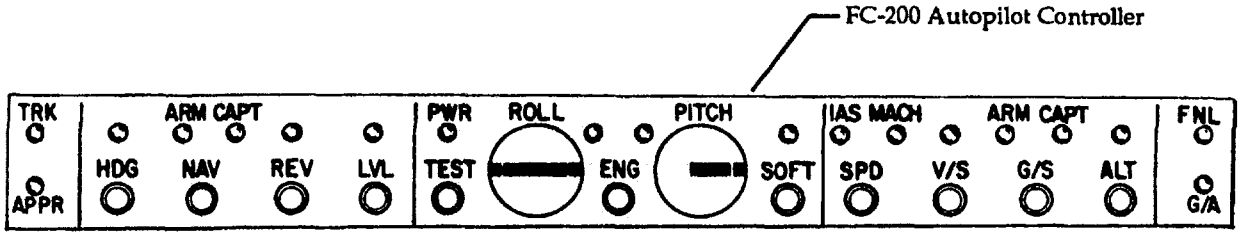
CAUTION: BEFORE REMOVING GYROS FROM the TABLES, ALLOW 20 MINUTES AFTER REMOVAL OF ELECTRICAL POWER FOR GYROS TO SPIN DOWN.

(43) Install the vertical and directional gyros in the aircraft. (Refer to 34-23-01.)

(44) Set all the switches off.

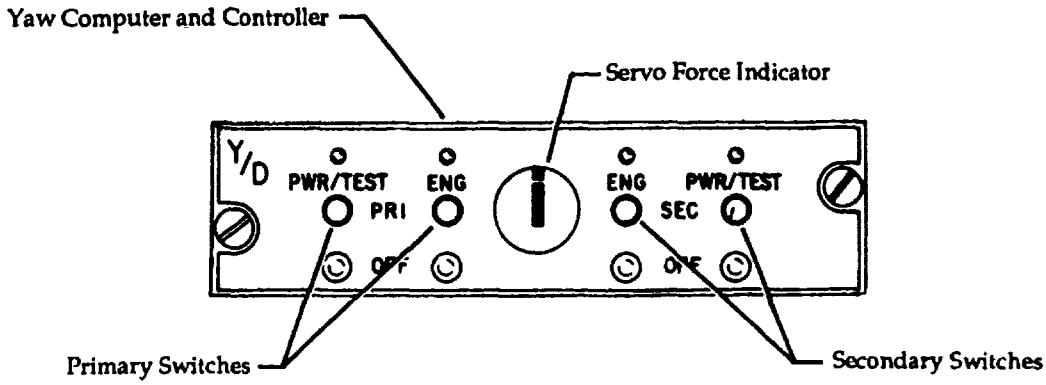
(45) Disconnect the external power.

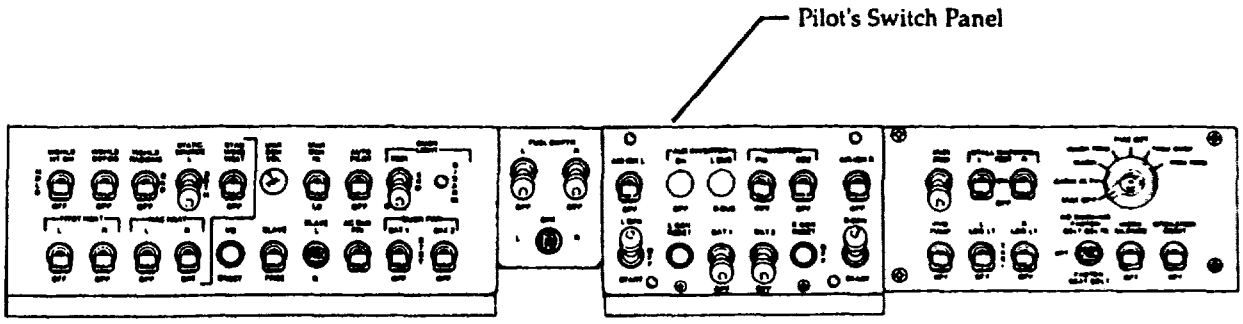




(TYPICAL)

Autopilot Control and Switch Locations
Figure 201 (Sheet 1 of 2)





(TYPICAL)

Autopilot Control and Switch Locations
Figure 201 (Sheet 2 of 2)

B. Functional Test of the Automatic Flight Control System - FC-530 *(Aircraft 35-408, 35-506 and Subsequent, 36-504 and Subsequent and prior aircraft modified per AAK 83-2, Installation of FC-350 Autopilot)* (See Figure 202.) *(1295)*

(1) Get the necessary tools and equipment.

NOTE: You can use equivalent alternatives for these items:

* Adapters (2 ea.) PSS50476-3-4-4 must be modified with kits (2 ea.) SSR 476. The modified adapter part number is PSS 50476M1-3-4-4. SSR 476 kits are available through the spare parts department at Learjet Inc.

NAME	PART NUMBER	MANUFACTURER	USE
Tilt Table	TN026410	Learjet Inc. Wichita, KS	Mounting for the vertical gyro.
Turntable	TN026409	Learjet Inc. Wichita, KS	Mounting for the directional gyro.
Rate Table	1270	Ideal Aerosmith Inc. E. Grand Forks, MN	Mounting for the roll rate gyro.
Vertical Gyro Extension Cable		Manufacture Locally	Connect vertical gyro.
Roll Rate Gyro Extension Cable		Manufacture Locally	Connect roll rate gyro.
VOR/ILS Simulator	NAV-401L	IFR Systems Inc. Wichita, KS	Simulate Nav Ground Stations.
Pitot-Static Tester	1811F	Barfield Co. Miami, FL	Nose jack pads replacement.
Pitot-Static Test Adapter Kit	L50-612*	Learjet Inc. Wichita, KS	Adapt system tester to pitot-static head.

(2) Remove the nose compartment access doors.
(3) Remove the roll rate gyro from the aircraft and install on the rate table. (Refer to 22-13-04.)
(4) Remove the primary vertical gyro from the aircraft and install on the turn table. (Refer to 34-22-00.)
(5) Connect the primary vertical gyro and roll rate gyro to the aircraft wiring with the extension cables.
(6) Attach the pitot-static tester and adapters on the pitot-static heads.

NOTE: Using the lubricant supplied with the pitot-static system test set, lubricate the internal glands of the test set adapters sparingly prior to the installation of the adapters on the pitot-static heads

(7) Connect the external power source to the aircraft.
(8) Set the Battery and Primary and Secondary Inverter Switches ON.

(9) Make sure that the PRI VERT GY, PRI DIR GY, and all AFCS circuit breakers are pushed. Set the Pitch Trim Selector to PRI.

(10) Set the Autopilot Switch, located on the pilot's switch panel, ON. Allow the autopilot system sufficient time to warm up (the computer flag will disappear from view) and then proceed.

CAUTION: DO NOT MOVE THE CONTROL WHEEL OR SWITCHES DURING THE SELF TEST.

(11) Do the autopilot self-test as follows:
- (a) Push and release the Autopilot ENG and TST pushbuttons simultaneously.
- (b) All autopilot annunciators must come on.
- (c) Make sure that the autopilot computer is in test mode.
- (d) Make sure that the pitch and roll servo effort indicator needle moves.
- (e) When the needle movement stops (11 seconds), the pitch and roll annunciators must go out and the warning horn must sound.

NOTE: If an axis has a monitor failure, the monitor annunciator will remain on and the axis (in question) annunciator will come on intermittently.

The autopilot LVL mode may engage when in flight director mode.

(12) With the autopilot disengaged, push the Autopilot TST pushbutton. All the autopilot annunciators must come on.

(13) Release the Autopilot TST pushbutton, make sure that only the power annunciator remains on.

(14) Make sure that the Autopilot Controller (night) lights vary in intensity with the pedestal light dimmer control.

(15) Make sure that the autopilot annunciators increase in intensity while shining a flashlight at each glareshield photocell.

(16) Check the autopilot engagement and disengagement as follows:
- (a) Set the Pitch Trim PRI-OFF-SEC Switch, located on the trim switch panel, to PRI. Push the Autopilot ENG pushbutton. Set the Pitch Trim PRI-OFF-SEC Switch to OFF. The autopilot must disengage.
- (b) Set the Pitch Trim PRI-OFF-SEC Switch to PRI. Push the Autopilot ENG pushbutton.
- (c) Without pushing the ARM pushbutton, use the pilot's Trim and Trim Arm Switch to trim the aircraft to a nose-up and a nose-down attitude. The autopilot must remain engaged.
- (d) Push the Arm pushbutton on the pilot's Trim and Trim Arm Switch. The autopilot must disengage and the warning horn must sound.
- (e) Push the Autopilot ENG pushbutton. Push the pilot's Control Wheel Master Switch (MSW). Autopilot must disengage.
- (f) Repeat steps (c) thru (e) using the copilot's control wheel and switches.

(17) Check the autopilot AC interlock as follows:
- (a) Push the Autopilot ENG pushbutton.
- (b) Pull the AFCS (AC) PITCH circuit breaker. The pitch axis or both pitch and roll axes must disengage.
- (c) Push the Autopilot ENG pushbutton. Make sure that the pitch axis will not engage.

(d) Push the AFCS (AC) PITCH circuit breaker. Push the Autopilot ENG pushbutton. Make sure that the pitch and roll axes both engage. Disengage the autopilot.
(e) Pull the AFCS (AC) ROLL circuit breaker.
(f) Push the Autopilot ENG pushbutton. Make sure that the roll axis will not engage.
(g) Push the AFCS (AC) ROLL circuit breaker.
(h) Push the Autopilot ENG pushbutton. The pitch and roll axes must engage.
(i) Disengage the autopilot.

(18) Check the autopilot DC Interlock as follows:
(a) Push the Autopilot ENG pushbutton.
(b) Pull the PRI AFCS DC circuit breaker. Make sure that the pitch and roll axes disengage.
(c) Push the Autopilot ENG pushbutton. Make sure that the pitch and roll axes will not engage.
(d) Push the PRI AFCS DC circuit breaker.
(e) Push the Autopilot ENG pushbutton.
(f) Pull the AFCS DC PITCH circuit breaker. The pitch axis or both pitch and roll axes must disengage.
(g) Push the Autopilot ENG pushbutton. Make sure that the pitch axis will not engage.
(h) Push the AFCS DC PITCH circuit breaker. Push the Autopilot ENG push-button. The pitch axis must engage.
(i) Pull the AFCS DC ROLL circuit breaker. Make sure that the roll axis or both roll and pitch axes disengage.
(j) Push the Autopilot ENG pushbutton. Make sure that the roll axis will not engage.
(k) Push the AFCS DC ROLL circuit breaker. Push the Autopilot ENG pushbutton. The pitch and roll axes must engage.

(19) Set the Autopilot Switch, located on the pilot's switch panel, OFF. The autopilot pitch and roll axes must disengage.

(20) Set the Autopilot Switch, located on pilot's switch panel, ON. Push the Autopilot ENG pushbutton. Push and hold MANUV R/P Switch. Make sure that the torque on pitch and roll axes is relieved and no selected modes disengage.

(21) Push and hold the MANUV R/P Switch. Set the Pitch Trim PRI-OFF-SEC Switch, located on the trim switch panel, to PRI. Make sure that the autopilot does not disengage during trim activation.

(22) Release the MANUV R/P Switch.

(23) Push the Autopilot ENG pushbutton. Select the pitch mode and make sure that the pilot's PITCH SYNC Switch has no effect. Make sure that for the flight director only (autopilot not engaged), pushing the PITCH SYNC Switch will disengage all vertical modes.

(24) Check the secondary pitch trim as follows:
(a) Push the Autopilot ENG pushbutton.
(b) Set the Pitch Trim PRI-OFF-SEC Switch, located on the trim switch panel, to SEC.
(c) Using the pilot's Trim and Trim Arm Switch, without pushing the ARM pushbutton, trim the aircraft to a nose-down attitude. The autopilot must disengage.
(d) Repeat step (c) for a nose-up attitude.
(e) Repeat step (c) and (d) using the copilot's Trim and Trim Arm Switch.

(25) Check the autopilot pitch axis as follows:
(a) Using the Pitch Trim Switch, located on the trim switch panel, trim the horizontal stabilizer to take-off (T.O.) position.
(b) Push the Autopilot ENG pushbutton.

(c) Using the pilot's Trim and Trim Arm Switch, without pushing the ARM pushbutton, trim the aircraft for a nose-down attitude. Control column must move forward.
(d) Repeat step (c) for an aircraft nose-up attitude. The control column must move aft.
(e) Push the Autopilot ENG and SFT pushbuttons. The PITCH SOFT light must come on. Push and release the SFT pushbutton. The PITCH SOFT light must go out.
(f) Force the control column forward. The trim indicator needle must move toward to a nose-up attitude.
(g) Force the control column aft. The trim indicator needle must move toward to a nose-down attitude.
(h) Repeat steps (a) thru (g) using the copilot's Trim and Trim Arm Switch.

(26) Set the Pitch Trim PRI-OFF-SEC Switch, located on the trim switch panel, to PRI. Using the pilot's Trim and Trim Arm Switch, trim the aircraft until the trim indicator needle indicates that the horizontal stabilizer is in center position.
(27) Push the Autopilot ENG pushbutton. Tilt the vertical gyro sufficient to simulate a nose-up attitude. The control column must move forward.
(28) Tilt the vertical gyro sufficient to simulate a nose-down attitude. The control column must move aft.
(29) Level the vertical gyro. The control column must move to neutral position.
(30) Push and release the VG ERECT pushbutton. The autopilot must disengage.
(31) Push the Autopilot ENG pushbutton. Push the DG SLAVE pushbutton. The autopilot roll axis must disengage.
(32) Check the autopilot altitude hold as follows:
(a) Simulate an altitude of 10,000 feet with the pitot-static tester. Push the Autopilot ENG and ALT HLD pushbuttons.
(b) Increase the simulated altitude to 10,100 feet. The control column must move forward.
(c) Decrease the simulated altitude to 9,900 feet. The control column must move aft.
(d) Disengage the altitude hold mode.
(33) Check the autopilot airspeed hold mode as follows:
(a) Using the pitot-static tester, simulate an airspeed of 200 KIAS at 10,000 feet.
(b) Push the Autopilot SPD pushbutton.
(c) The autopilot IAS annunciator must come on.
(d) Increase the simulated airspeed to 220 KIAS. The control column must move aft.
(e) Decrease the simulated airspeed to 180 KIAS. The control column must move forward.
(34) Check the autopilot Mach hold as follows:
(a) Using the pitot-static tester, simulate an altitude of 20,000 feet and 0.63 The Mach airspeed indicated on the copilot's indicator.
(b) Push the Autopilot SPD pushbutton.
(c) The MACH annunciator must come on.
(d) Increase the simulated Mach speed to 0.64 or higher. The control column must move aft.
(e) Decrease the simulated Mach speed to 0.62 or lower. The control column must move forward.
(f) Disengage the Mach hold mode by selecting another pitch mode or by using the pitch command.
(35) Check the autopilot vertical speed hold as follows:
(a) Using the pitot-static tester, simulate an altitude of 20,000 feet.
(b) Simulate a vertical speed of 1,000 feet per minute (fpm) up.
(c) Push the Autopilot V/S pushbutton.

(d) Increase the vertical speed to 1,500 fpm up. The control column must move aft.
(e) Decrease the vertical speed to 500 fpm up. The control column must move forward.
(f) Disengage the autopilot vertical speed hold mode and the autopilot.
(g) Increase the altitude to 30,000 feet and airspeed to.75 Mach indication on the copilot's indicator.
(h) Pull the MACH TRIM circuit breaker. The Mach overspeed warning must sound when the autopilot is disengaged.
(i) Push the Autopilot ENG pushbutton. The overspeed horn must not sound.
(j) Reset the MACH TRIM circuit breaker and push the Autopilot MANUV R/P Switch on the pilot's control wheel. The overspeed horn must not sound while MANUV R/P Switch is pushed.

(36) Check the altitude preselect mode as follows:
(a) Set the Altitude Alerter to 5,000 feet above present simulated altitude.
(b) Push the Autopilot ENG, ALT SEL and V/S pushbuttons.
(c) Simulate a vertical speed of 3,000 feet per minute (fpm) up.
(d) The autopilot must engage at 750 (±200) feet from the altitude set on the Altitude Alerter (target altitude) in step (a). The control column must move forward to indicate a flare at the target altitude. Stop the simulator at the target altitude. The autopilot must switch to ALT HLD mode at the target altitude.
(e) Decrease the altitude. The control column must move aft.
(f) Disengage the altitude hold mode and autopilot.

(37) Check down the pitch limit as follows:
(a) Set the vertical gyro to 0° pitch attitude.
(b) While in F/D mode (autopilot disengaged), select ALT HLD. Increase altitude 500 feet on the simulator.
(c) Tilt the gyro down to null flight director pitch V/bar. The indication must be 10 (± 2)°.
(d) Return the aircraft pitot and static systems to an ambient condition.

(38) Check the glideslope as follows:
(a) Tune the NAV receiver to a localizer frequency.
(b) Simulate a glideslope up indication with an ILS radio simulator.
(c) Push the Autopilot ALT and then the G/S pushbuttons.
(d) The G/S ARM annunciator must come on.
(e) Reduce the glideslope up indication to zero. The ALT and G/S ARM annunciator must go out and the G/S CAPT annunciator must come on when the glideslope needle is approximately zero.
(f) Simulate a glideslope up indication. The control column must move aft.
(g) Simulate a glideslope down indication. The control column must move forward.
(h) Disable the glideslope signal from the ILS radio simulator. The glideslope indicator flag must drop into view, the G/S CAPT annunciator must go out, and the G/S ARM annunciator must come on.

NOTE: A flashing G/S ARM annunciator may be caused by noise interference. Loss (pulling out of view) of the glideslope indicator flag may initially cause the G/S ARM annunciator to flash.

(i) Simulate a valid glideslope signal with the ILS radio simulator. The glideslope indicator flag must pull out of view, the G/S ARM annunciator must go out and the G/S CAPT annunciator must come on.

(j) Disable the ILS radio simulator.

(39) Check the go-around mode as follows:

(a) Push the Autopilot ENG and V/S pushbuttons.

(b) Push the Go-Around Switch on left thrust lever. The autopilot must disengage and a flight director command of 9 (±1)° pitch up attitude must appear on the flight director indicator.

(c) Autopilot LVL must engage to indicate the wings level flight director command.

(40) Trim the horizontal stabilizer to the take-off (T.O.) position.

(a) Set the control column forward against stop (aircraft full nose-down).

(b) Push the Autopilot ENG pushbutton.

(c) Put the autopilot in the nose-down direction. After approximately 20 seconds, the PITCH annunciator must flash, indicating continuous pitch servo effort (out-of-trim condition). Upon release of the pitch command, the PITCH annunciator must stop flashing.

(d) Repeat steps (a) thru (c) with the control column aft against stop (aircraft full nose-up) and commanding the autopilot in the nose-up direction.

(41) Check the autopilot roll axis and bank angle cutoff as follows:

(a) Push the Autopilot ENG pushbutton.

(b) Using the pilot's Trim and Trim Arm Switch, without pushing the ARM pushbutton, trim the aircraft for a left wing down attitude. The control wheel must turn left.

(c) Without pushing the ARM pushbutton, using the pilot's Trim and Trim Arm Switch, trim the aircraft for a right wing down attitude. The control wheel must turn right.

(d) Trim the aircraft to a level attitude. The control wheel must attain a neutral position.

(e) Tilt the vertical gyro to a right wing down simulation until the roll axis disengages. Disengagement must occur at 36 (±4)°.

(f) Repeat step (e) for left wing down simulation. Disengagement must occur at 36 (±4)°.

(42) Check the autopilot roll rate cutoff as follows:

(a) With the roll rate gyro on a rate table, make sure that the roll axis disengages when the roll rate is more than 12 (±1.4)° per second. Do this test in both directions.

(43) Check the autopilot heading select mode as follows:

(a) Enter the aircraft heading into HSI. Push the Autopilot HDG pushbutton.

(b) Turn the heading knob to the left and right of the reference heading. The control wheel must turn in same direction as the heading marker indicates.

(c) Turn the heading knob 60° to 90° right from the reference heading. Tilt the vertical gyro to the right until the yoke stops roll motion. The bank angle must be 25 (±2)° right bank.

(d) Level the vertical gyro and push the Autopilot 1/2 BNK pushbutton. Tilt the vertical gyro to the right until the yoke stops roll motion. The bank angle must be 12 (±2)° right bank. Push and release the Autopilot 1/2 BNK pushbutton. The autopilot 1/2 BNK annunciator must go out.

(e) Repeat steps (c) and (d) for the left turn.

(f) Push and release the Autopilot HDG pushbutton.

(44) Check the autopilot NAV VOR operation as follows:

(a) Tune the NAV receiver to 108.00 MHz.

(b) Set the heading knob to an aircraft heading. Set the course knob 90° off of the aircraft indicated heading.

(c) Set the VOR simulator to the aircraft bearing.
(d) Push the Autopilot HDG and NAV pushbutton. The HDG and NAV ARM annunciators must come on.
(e) Slowly turn the course knob to the aircraft heading. When the course needle and beam signals are near zero, the HDG and NAV ARM annunciators must go out and the NAV CAPT and TRK annunciator must come on.

NOTE: If the simulator beam moves at a rate greater than 20 microamperes per second, NAV ARM annunciator may flash.

(f) Turn the course knob on the course indicator for a 45° right turn. The control wheel must turn right.
(g) Turn the course knob on the course indicator for a 45° left turn. The control wheel must turn left.
(h) Push and release the Autopilot BC pushbutton. Make sure that the BC mode will not engage while the VOR frequency is tuned in.
(i) Disable the VOR simulator. The NAV flag must drop into view, the NAV CAPT and TRK annunciators must go out and the NAV ARM annunciator must flash.
(j) Activate the VOR simulator. The NAV flag must pull from view, the NAV CAPT and the TRK annunciators must come on.
(k) Disengage the autopilot NAV mode.

(45) Check the autopilot NAV ILS operation as follows:
(a) Set the ILS simulator to a localizer frequency.
(b) Tune the NAV receiver to the same frequency set in step (a).
(c) Push the Autopilot NAV pushbutton. With the system centered on the beam and on-course, the NAV CAPT and TRK annunciators must come on.
(d) On the ILS simulator, slowly move the localizer beam to the left of the aircraft. The control wheel must turn left.
(e) On the ILS simulator, slowly move the localizer beam to the right of the aircraft. The control wheel must turn right.

NOTE: If the simulator beam moves at a rate greater than 20 microamperes per second, the NAV ARM annunciator may flash.

(f) Push the Autopilot BC pushbutton. The BC annunciator must come on.
(g) On the ILS simulator, slowly move the localizer beam to the left of the aircraft. The control wheel must turn right.
(h) On the ILS simulator, slowly move the localizer beam to the right of the aircraft. The control wheel must turn left.
(i) Push and release the Autopilot SFT pushbutton. The Autopilot SFT mode must not engage.
(j) Disengage the autopilot BC mode.
(k) Make sure that the NAV receiver is tuned to the same frequency as the ILS simulator (the NAV CAPT and TRK annunciators are on).
(l) Set the Radio Altimeter Switch, located on the pilot's switch panel, ON. The Autopilot FNL annunciator must come on.

(m) Disengage the autopilot NAV mode.
(n) Engage the Autopilot NAV mode. Simulate a Marker Beacon outer marker signal with the simulator or with the TEST button on the primary NAV control panel. the Autopilot FNL annunciator must come on.
(o) Push the Autopilot NAV pushbutton.
(p) Set the Radio Altimeter Switch off.
(q) Set the ILS simulator off.

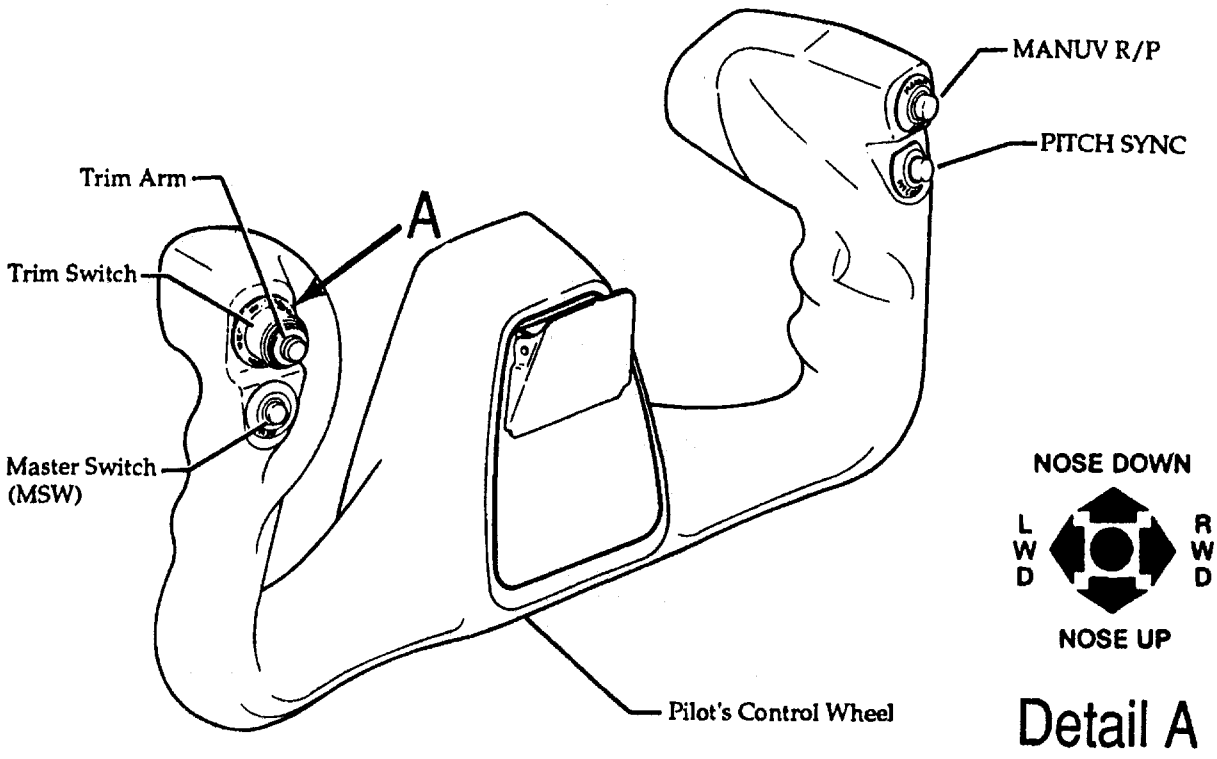
(46) Check the autopilot level mode operation as follows:
(a) Push the Autopilot ENG and LVL pushbuttons.
(b) The LVL ON annunciator must come on.
(c) Turn the vertical gyro to simulate a right turn. The control wheel must turn left.
(d) Turn the vertical gyro to simulate a left turn until level flight is simulated. The control wheel must turn right, then back to center.
(e) Push the Autopilot LVL pushbutton. The LVL ON annunciator must go out.
(f) Repeat steps (c) and (d). Make sure that the same results occur with the autopilot LVL mode off.

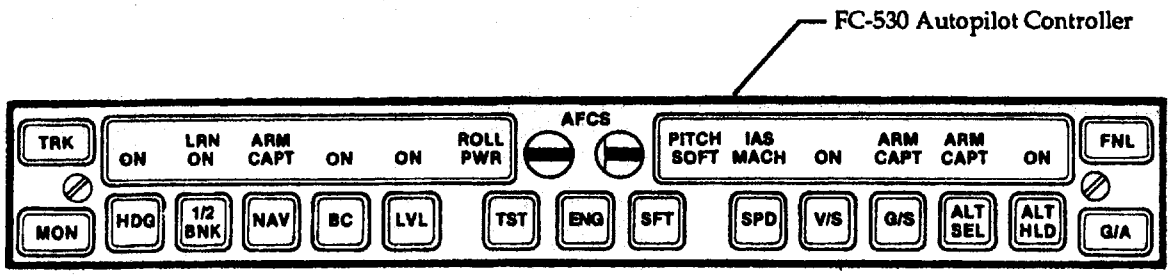
(47) Check the roll force overload operation as follows:
(a) Push the Autopilot ENG and HDG pushbuttons.
(b) Set the heading select knob to 90° right or left of the aircraft heading.
(c) In 30 seconds or less, the roll axis annunciator must flash indicating a continuous roll torquer load.
(d) Set the heading select knob back to the aircraft heading.
(e) As the torquer force is relaxed, the roll axis annunciator must stop flashing and come on continuously.
(f) Disengage the Autopilot ENG and HDG pushbuttons.

(48) Set the Primary and Secondary Inverter and the Battery Switches off.
(49) Disconnect the external power source from the aircraft.
(50) Disconnect the pitot-static tester and the adapters from aircraft.
(51) Remove the pitot-static adapters from the pitot-static tester.

CAUTION: ALLOW 20 MINUTES, AFTER REMOVAL OF THE ELECTRICAL POWER, FOR THE GYRO TO SPIN DOWN AND BEFORE REMOVING THE GYRO FROM THE TILT TABLE.

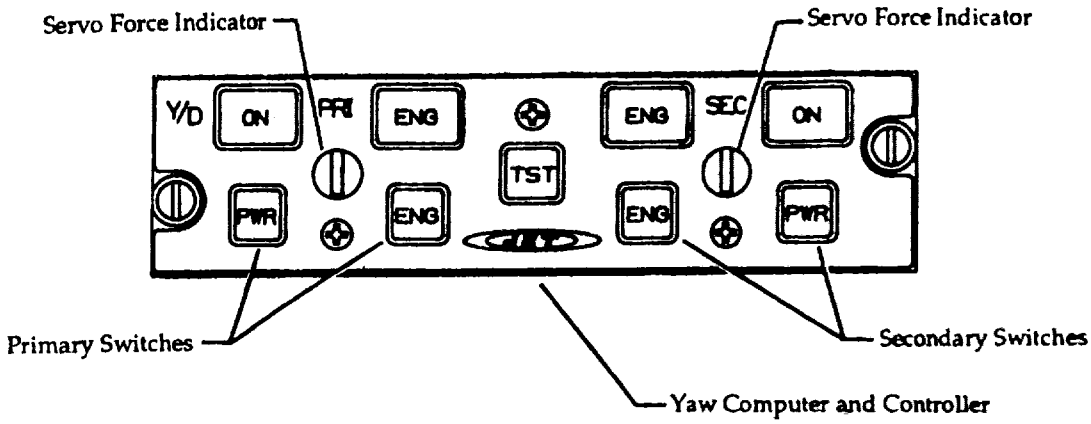
(52) Disconnect the primary vertical gyro and roll rate gyro extension cables from the aircraft wiring and gyros.
(53) Install the primary vertical gyro in aircraft. (Refer to 34-22-00.)
(54) Install the roll rate gyro in the aircraft. (Refer to 22-13-04.)
(55) Install and safety the nose compartment access door.

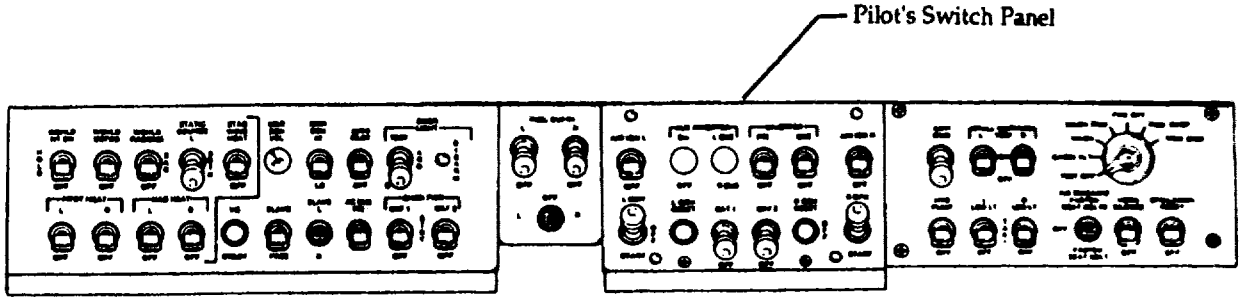




(TYPICAL)

Autopilot Control and Switch Locations
Figure 202 (Sheet 1 of 2)





(TYPICAL)

Autopilot Control and Switch Locations
Figure 202 (Sheet 2 of 2)

2. Inspection/Check

A. Autopilot Control System Operational Check - FC-200 *(Aircraft 35-002 thru 35-407, 35-409 thru 35-505 and 36-002 thru 36-053 not modified per AAK83-2, "Installation of FC-530 Autopilot")* (See Figure 201.)

NOTE: Refer to Chapter 5 for the current inspection interval for the Autopilot Control System Operational Check.

CAUTION: BEFORE DOING ENGAGED OPERATIONAL TESTS OF THE AUTOPILOT, MAKE SURE THAT THE AIRCRAFT FLIGHT CONTROLS ARE UNLOCKED AND FULL CONTROL MOVEMENT IS UNRESTRICTED.

(1) Make sure that all autopilot circuit breakers are pushed in.
(2) Set the Battery Switches on.
(3) Set the Primary and Secondary Inverter Switches on.
(4) Set the Pitch Trim Switch on the trim switch panel to PRI. Push the ARM pushbutton on the pilot's Trim and Trim Arm Switch, and adjust the trim to position the pointer within the take-off (T.O.) segment of the Pitch Trim indicator.
(5) Set the Autopilot Switch, on the pilot's switch panel, ON. The PWR light on the Autopilot Controller must come on.
(6) Push the Autopilot TEST pushbutton. All lights on the Autopilot Controller must come on.
(7) Make sure that the Attitude Director Indicator (ADI) and Horizontal Situation Indicator (HSI) flags have disappeared. This indicates that the primary vertical and directional gyros have been energized long enough to time-out the erection cycles (approximately 90 seconds).
(8) Push the Autopilot ENG pushbutton. The ROLL, PITCH and LVL lights must come on and the autopilot must oppose movement of the elevator and aileron.
(9) Push and hold the TEST pushbutton.
(10) Without pushing the ARM pushbutton, move the pilot's Trim and Trim Arm Switch to the LWD position. The autopilot disconnect horn must sound within 6 seconds.
(11) Release the pilot's Trim and Trim Arm Switch and Autopilot TEST pushbutton. The ROLL light must go out.
(12) Repeat steps (8) thru (11) moving the pilot's Trim and Trim Arm Switch to the RWD position.
(13) Repeat steps (8) and (9).
(14) Without pushing the ARM pushbutton, move the pilot's Trim and Trim Arm Switch to the NOSE DOWN position while holding moderate pull force on the control column. The autopilot disconnect horn must sound within six seconds.

NOTE: Normally the roll axis will disengage also, but if such disengagement does not occur, it may be disregarded since the roll axis disengagement is not required.

(15) Release the pilot's Trim and Trim Arm Switch and Autopilot TEST pushbutton. The PITCH light must go out.
(16) Push the Autopilot ENG pushbutton.
(17) While holding moderate pressure (less than overpower values) on the control wheel and column simultaneously, push the pilot's Control Wheel Master Switch (MSW). The autopilot opposition

must disappear from both axes, the ROLL and PITCH ENG lights must go out, and the autopilot disconnect horn must sound. Release the control wheel and column.

(18) Push the Autopilot ENG pushbutton.

(19) While holding moderate pressure (less than overpower values) on the control wheel and column simultaneously, push the copilot's Control Wheel Master Switch (MSW). The autopilot opposition must disappear from both axes, the ROLL and PITCH ENG lights must go out, and the autopilot disconnect horn must sound. Release the control wheel and column.

(20) Push the Autopilot ENG pushbutton.

(21) While holding moderate pressure (less than overpower values) on pilot's control wheel and column simultaneously, push MANUV R/P Switch. Autopilot opposition must disappear in roll and pitch axes only.

(22) Release the pilot's R/P Switch. The autopilot opposition must reappear.

(23) Repeat steps (19) thru (21) using the copilot's MANUV R/P Switch.

(24) Holding moderate pressure on the pilot's control wheel and column, push the PITCH SYNC Switch on the control wheel. The autopilot opposition must disappear in pitch axis only.

(25) Release the pilot's PITCH SYNC Switch. The autopilot opposition must reappear.

(26) Without pushing the ARM pushbutton, move the pilot's Trim and Trim Arm Switch in each of the four directions. The control wheel and column must respond by moving in the direction commanded by the trim switch.

(27) Repeat steps (24) thru (26) using the copilot's Trim and Trim Arm Switch.

(28) Overpower the autopilot in both pitch directions and both roll directions. It must be possible to move the control wheel and column in all directions in opposition of the autopilot. The roll and pitch force indicators on the Autopilot Controller must deflect to indicate direction of input.

NOTE: A forward or aft overpower force on the control column will, after a short interval, be accepted by the autopilot and autopilot opposing force will disappear. The control column will then remain in the overpower position. The autopilot opposition will then be centered about the new position of the control column.

(29) Push the ARM pushbutton and move the pilot's Trim and Trim Arm Switch in any of the four directions. The ROLL and PITCH ENG lights must go out, the opposition to control movement must disappear in the roll and pitch axis and the autopilot disconnect warning horn must sound.

(30) Push the Autopilot ENG pushbutton.

(31) Repeat step (29) using the copilot's Trim and Trim Arm Switch.

(32) Push the Autopilot ENG pushbutton.

(33) Set the heading bug on the pilot's HSI to the aircraft's present heading.

(34) Push the Autopilot HDG pushbutton. The HDG light must come on.

(35) Move the heading bug to left and right of the aircraft heading. The roll axis must correspond to the heading changes.

(36) Push the Autopilot LVL pushbutton. The LVL light must come on and the HDG light must go out.

(37) Push the Autopilot ALT pushbutton. The ALT light must come on.

(38) Push the SOFT pushbutton. The SOFT light must come on.

NOTE: Do not have an ILS frequency tuned on the primary NAV for this check.

(39) Push the MANUV R/P Switch on the pilot's control wheel. The autopilot LVL and ALT lights must go out and the SOFT light must remain on. Repeat steps using the copilot's control wheel.
(40) Turn on the NAV receiver and tune to a VOR frequency. Set the HSI heading bug to present aircraft heading.
(41) Push the Autopilot HDG pushbutton.
(42) Turn the HSI course select knob until the course bar is fully displaced from the center in front of the HSI aircraft symbol and just begins movement toward the center.
(43) Push the Autopilot NAV pushbutton. The NAV ARM light must come on.
(44) Gradually move the HSI course select knob to cause the course bar to move toward HSI aircraft symbol. The NAV ARM and HDG lights must go out and the NAV CAPT light must come on. The autopilot roll axis must respond by turning the control wheel to start a turn toward alignment with the course bar.
(45) With the course bar centered, move the HSI course select knob quickly right and left to cause rapid course bar deflections. The NAV CAPT light must go out and the NAV ARM light must flash while the course bar is being moved. The NAV CAPT must engage approximately 20 seconds after the course bar is allowed to stabilize near the center.
(46) Push the Autopilot SPD button. The IAS light must come on.
(47) Push the Autopilot V/S button. The IAS light must go out and the V/S light must come on.
(48) Extend the flaps beyond approximately 13°. The APPR light must come on.
(49) Push the pilot's Control Wheel Master Switch (MSW) to disengage all autopilot functions.
(50) Set the Autopilot Switch, on the pilot's switch panel, and NAV receiver OFF.
(51) Set the Primary and Secondary Inverter and Battery Switches off.

B. Autopilot Control System Operational Check - FC-530 *(Aircraft 35-408, 35-506 and Subsequent, 36-054 and subsequent and prior aircraft modified per AAK83-2, "Installation of FC-530 Autopilot")* (See Figure 202.)
(1) Make sure that all the Autopilot circuit breakers are pushed in.
(2) Set the Battery and Primary and Secondary Inverter Switches ON.
(3) Set the Pitch Trim PRI-OFF-SEC Switch to PRI, push the ARM pushbutton on the pilot's Trim and Trim Arm Switch, and adjust the trim to position the pointer within the take-off (T.O.) segment on the Pitch Trim indicator.
(4) Set the Autopilot Switch, on the pilot's switch panel, ON. The PWR annunciator must come on.
(5) Push and hold the TST pushbutton on the Autopilot Controller. All controller annunciators must come on while the pushbutton is held in.
(6) Check the autopilot monitors as follows:

NOTE: It is not required that the Attitude Director Indicator (ADI) and Horizontal Situation Indicator (HSI) flags be retracted in order to complete the autopilot monitor check.

(a) Push the Autopilot ENG and TST pushbutton simultaneously, then release. MON, PITCH, and ROLL annunciators must come on, then go out, and the disengage tone must sound. The ROLL annunciator must go out after approximately 8 seconds. The PITCH annunciator must go out after approximately 11 seconds. The PWR annunciator must remain on.

NOTE: If the test fails, the failed axis (PITCH and/or ROLL) annunciator(s) must start flashing and continue to flash, and the MON annunciator must remain on. The pat-

tern of flashes can be used for trouble shooting. The failed axis annunciator(s) must continue to flash and the MON annunciator must remain come on until the Autopilot Switch is cycled.

(7) Check the autopilot engagement and disengagement as follows:

NOTE: Prior to engaging the autopilot, make sure that the ADI and HSI gyro flags are retracted. This indicates that the erection cycles have timed out (approximately 90 seconds).

The autopilot is engaged by pushing the ENG pushbutton on the Autopilot Controller. Verify that autopilot engages by observing illumination of the ROLL and PITCH annunciators and autopilot opposition to elevator and aileron control movement.

When autopilot disengages, autopilot opposition to control pressure must disappear in both the roll and pitch axes, ROLL and PITCH annunciators must go out, and autopilot disengage tone must sound.

(a) Check the autopilot disengagement through the Control Wheel Master Switch (MSW).
1) Push the ENG pushbutton on the Autopilot Controller.
2) Push the pilot's MSW. The autopilot must disengage.
3) Repeat step 2) using the copilot's MSW.

(b) Check the disengagement through the trim system.
1) Push the Autopilot ENG pushbutton.
2) Push the ARM pushbutton on pilot's Trim and Trim Arm Switch and adjust the trim in any of four directions, (NOSE UP, NOSE DOWN, LWD or RWD). The autopilot must disengage.
3) Push the Autopilot ENG pushbutton.
4) Repeat step 2) using the copilot's Trim and Trim Arm Switch.
5) Push the Autopilot ENG pushbutton.
6) Set the Pitch Trim PRI-OFF-SEC Switch, located on the trim switch panel, OFF. The autopilot must disengage.
7) Push the Autopilot ENG pushbutton. The autopilot must not engage.
8) Set the Pitch Trim PRI-OFF-SEC Switch, located on the trim switch panel, to SEC.
9) Push the Autopilot ENG pushbutton.
10) Move the NOSE DN-OFF-NOSE UP Switch on the trim switch panel in NOSE DN or NOSE UP direction. The autopilot must disengage.
11) Set the Pitch Trim PRI-OFF-SEC Switch, located on the trim switch panel, to PRI.

(c) Check the autopilot disengagement through the go-around switch.
1) Push the Autopilot ENG pushbutton.
2) Push the Go-Around Switch, located on the left thrust lever knob. The autopilot must disengage and the G/A and LVL ON annunciators must come on.

(8) Check the Maneuver R/P Switch operation as follows:
(a) Push the Autopilot ENG pushbutton.
(b) Select any desired roll and pitch mode.

(c) While holding moderate pressure on pilot's control wheel and column, push the pilot's MANUV R/P Switch. The autopilot opposition to the control pressure must disappear, the PITCH and ROLL annunciators must go out, the selected modes must remain engaged, and the autopilot disengage tone must not sound. Release the MANUV R/P Switch. The autopilot opposition to the control movement must resume. The PITCH and ROLL annunciators must come on.

(d) Repeat step (c) using the copilot's MANUV R/P Switch.

(e) Push and hold the pilot's MANUV R/P Switch. Actuate the pilot's Trim and Trim Arm Switch in any direction with the ARM pushbutton pushed. The trim inputs must not disengage the autopilot while the MANUV R/P Switch is pushed.

(f) Repeat step (e) using the copilot's MANUV R/P and Trim and Trim Arm Switches.

(9) Check the attitude command as follows:

(a) Without pushing the ARM pushbutton, move the pilot's Trim and Trim Arm Switch to NOSE UP, NOSE DOWN, LWD and RWD. The control column and wheel must respond by moving in direction commanded.

(b) Repeat step (a) using the copilot's Trim and Trim Arm Switch.

(10) Check the overpower and out-of-trim monitor operation as follows:

(a) Using the pilot's control wheel and column, overpower the autopilot in nose-up and nose-down directions. It must be possible to overpower the autopilot in both directions. The trim-in-motion audio clicker may sound after initiating overpower force. The pitch force indicator must indicate the direction of autopilot effort.

NOTE: If the pitch or roll servo becomes saturated due to continuous overpower forces or the command against the stops for approximately 20 seconds, the out-of-trim monitors must cause the applicable (PITCH or ROLL) annunciator to flash.

A forward or aft overpower force on the control column will, after a short interval, be accepted by the autopilot and autopilot opposing force will disappear. The control column will then remain in the overpower position and autopilot opposition will be centered around the new position of the control column.

(b) Push the pilot's Master Switch (MSW).

(c) Move the control column full forward.

(d) Push the Autopilot ENG pushbutton.

(e) Using the pilot's control wheel, overpower the autopilot in both roll directions. It must be possible to overpower the autopilot in both directions. The roll force indicator must indicate the direction of autopilot effort.

(f) Repeat steps (a) thru (e) using the copilot's control wheel, control column and MSW.

(11) Check the autopilot lateral mode as follows:

NOTE: Lateral modes (HDG, NAV CAPT, LRN, LVL and ROLL command [autopilot only]) will cancel each other. NAV ARM is not affected by lateral mode switching. Any engaged lateral mode can be disengaged by pushing the engaged mode's selector pushbutton.

(a) Check the autopilot HDG Mode.

1) Set the HSI heading bug to the present aircraft heading.

2) Push the Autopilot HDG pushbutton. The HDG ON annunciator must come on.
3) Turn the HSI heading selector left, then right. The control wheel must follow.
4) Push the Autopilot 1/2 BNK pushbutton. The Autopilot 1/2 BNK ON annunciator must come on.

(b) Push the Autopilot LVL pushbutton. The LVL ON annunciator must come on. The HDG and 1/2 BNK ON annunciators must go out.

(c) Check the autopilot NAV mode (VHF NAV function)
1) Tune the NAV receiver to an active VOR frequency and set the HSI heading bug to the present aircraft heading.
2) Push the Autopilot HDG pushbutton.
3) Turn the HSI course selector as required to fully displace the HSI course deviation bar in front of the airplane symbol.
4) Push the Autopilot NAV pushbutton. The NAV ARM annunciator must come on.
5) Gradually turn the HSI course selector to cause the HSI course deviation bar to move toward the airplane symbol. The NAV ARM and HDG ON annunciators must go out. The NAV CAPT annunciator must come on. The autopilot roll axis must respond by moving the control wheel as if to start a turn toward alignment with the course bar.

NOTE: In the event of a weak signal, it may be necessary to push the NAV receiver TEST pushbutton to cause NAV CAPT annunciator to come on.

6) Push the Autopilot NAV pushbutton. The NAV CAPT annunciator must go out.

(12) Check the ILS mode as follows:

NOTE: Ground ILS operational checks require strong ILS signals.

(a) Tune the NAV receiver to an ILS frequency.
(b) Set the Radio Altimeter Switch, located on the pilot's switch panel, ON.
(c) Push the Autopilot NAV pushbutton. The NAV ARM annunciator must come on.
(d) Push the Autopilot BC pushbutton. The BC ON annunciator must come on.
(e) Push the Autopilot G/S pushbutton. The G/S ARM annunciator must not come on. The BC ON annunciator must remain on.
(f) Check the glideslope:
1) Push and hold the NAV receiver TEST pushbutton. Push the Autopilot G/S pushbutton. The G/S ARM annunciator must come on.
2) Release the NAV receiver TEST pushbutton.
3) After the HSI glideslope needle centers, push and hold the NAV receiver TEST pushbutton. The NAV CAPT, TRK, G/S CAPT and FNL annunciators must come on.

NOTE: The autopilot FNL annunciator will not come on if Radio Altimeter is off.

4) Release the NAV receiver TEST pushbutton. The NAV CAPT, TRK and G/S CAPT annunciators must go out. The G/S ARM and NAV ARM annunciator must come on and flash.

(13) Check the autopilot vertical modes as follows:

NOTE: The pitch modes (IAS, MACH, V/S, G/S CAPT, ALT SEL CAPT, ALT HLD, pitch command [autopilot only] and PITCH SYNC [flight director only]) will cancel each other. The G/S ARM and ALT SEL ARM are not affected by the pitch mode switching. Any engaged pitch mode, except IAS/MACH hold, can be disengaged by pushing that mode's selector pushbutton.

(a) Check the autopilot speed mode.
1) Push the Autopilot SPD pushbutton. The IAS annunciator must come on.
2) Push the Autopilot SPD pushbutton. The MACH annunciator must come on. The IAS annunciator must go out.
3) Push the Autopilot SPD pushbutton. The IAS annunciator must come on. The MACH annunciator must go out.
4) Push the Autopilot V/S pushbutton. The V/S ON annunciator must come on. The IAS annunciator must go out.

(b) Check the autopilot altitude mode.
1) Push the Autopilot SFT pushbutton. The SOFT annunciator must come on.
2) Set the Altitude Alerter to approximately 500 feet above field elevation.
3) Push the Autopilot ALT SEL pushbutton. ALT SEL ARM annunciator must come on.
4) Using the altimeter barometer knob, gradually increase the indicated altitude to Altitude Alerter setting. The ALT SEL CAPT annunciator must come on. The ALT SEL ARM, V/S ON, and SOFT annunciators must go out. When the indicated altitude is within approximately 40 feet of the altitude alerter setting, the ALT HLD ON annunciator must come on. The ALT SEL CAPT annunciator must go out.
5) Push the Autopilot ALT HLD pushbutton. The ALT HLD ON annunciator must go out.
6) Push the Autopilot ALT HLD pushbutton. The ALT HLD ON annunciator must come on.
7) Set the altimeter barometer knob to the correct barometric pressure altimeter setting.

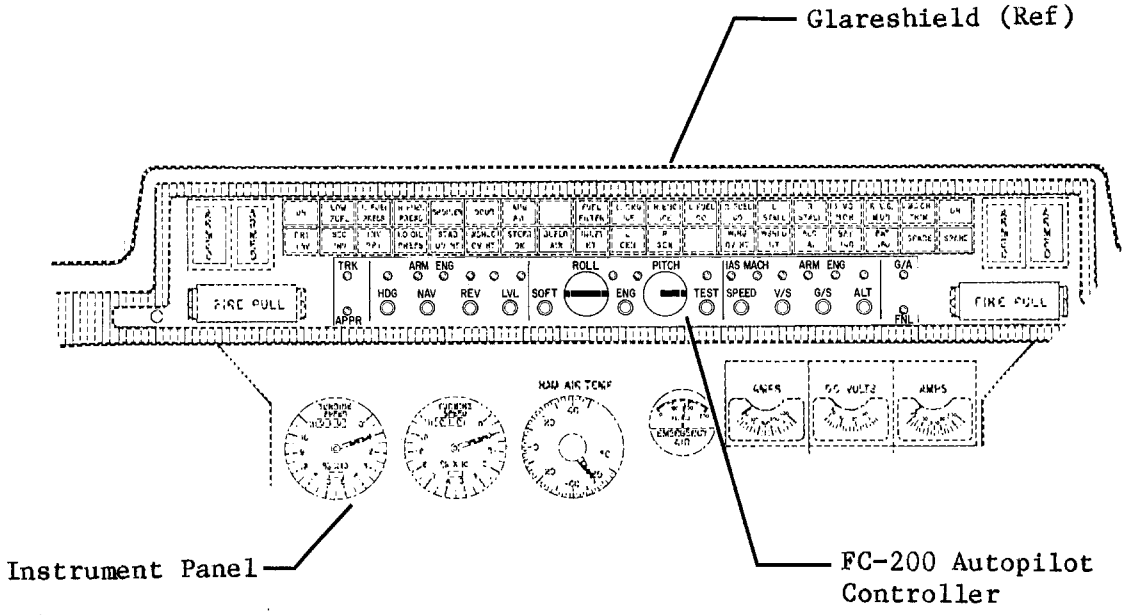
(14) Set the Autopilot Switch, located on the pilot's switch panel, OFF.
(15) Set the NAV receiver off.
(16) Set the Radio Altimeter Switch, located on the pilot's switch panel, OFF.
(17) Set the Primary and Secondary Inverter and Battery Switches OFF.

AUTOPILOT CONTROLLER - MAINTENANCE PRACTICES

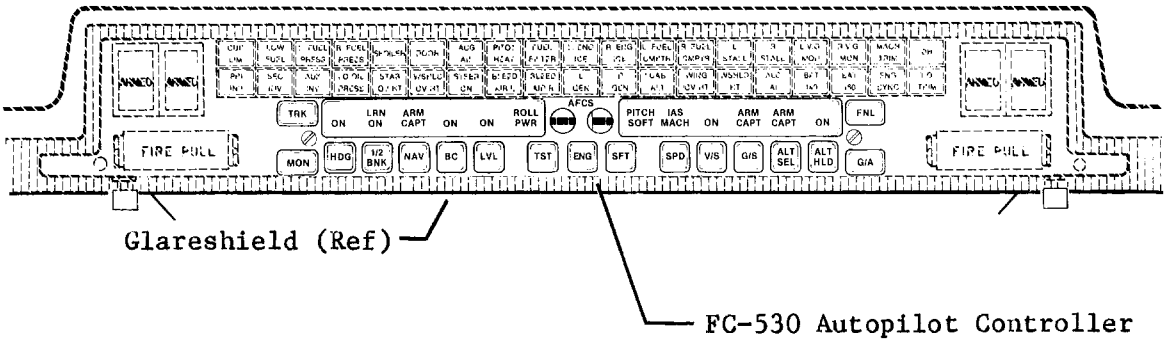
1. REMOVAL/INSTALLATION

A. Remove Autopilot Controller (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Disconnect electrical connectors from controller.
   (3) Remove attaching parts and controller from glareshield.

B. Install Autopilot Controller (See figure 201.)
   (1) Install controller and secure with attaching parts.
   (2) Connect electrical connectors to controller.
   (3) Restore electrical power to aircraft.



(Typical 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot")



(35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2,"Installation of FC-530 Autopilot")

Autopilot Controller
Figure 201

AIR DATA SENSOR - MAINTENANCE PRACTICES

1. REMOVAL/INSTALLATION

A. Remove Air Data Sensor (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Gain access to air data sensor through nose compartment access doors.
   (3) Disconnect pitot and static lines from air data sensor. Install protective caps in pitot and static lines and ports of air data sensor.
   (4) Disconnect electrical connector from air data sensor.
   (5) Remove attaching parts and remove air data sensor from aircraft.

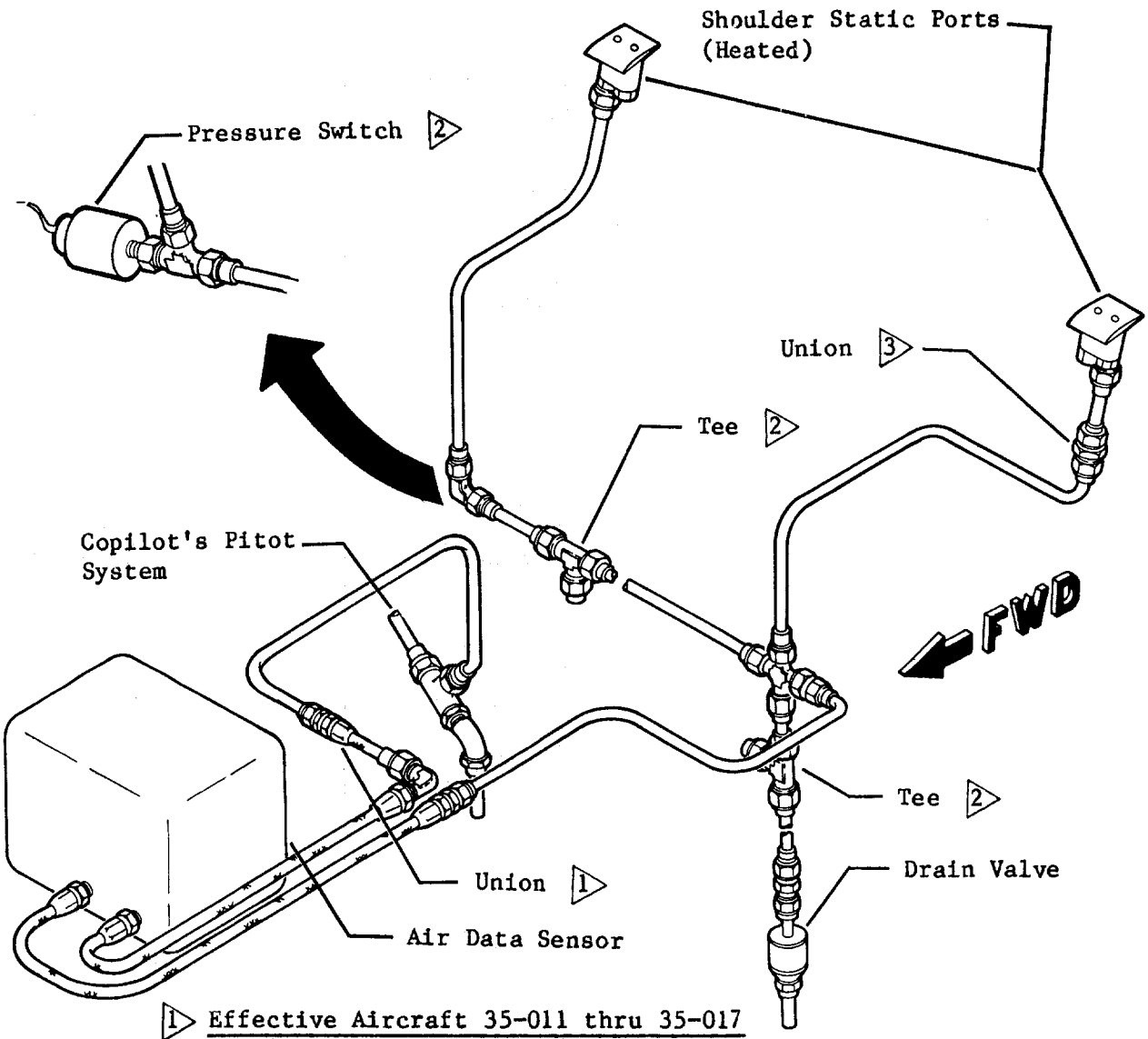
B. Install Air Data Sensor (See figure 201.)
   (1) Position air data sensor on mounting bracket and secure with attaching parts.
   (2) Connect electrical power to air data sensor.
   (3) Remove caps from pitot and static lines and ports of air data sensor and connect pitot and static lines to air data sensor.
   (4) Close and secure nose compartment access doors.
   (5) Restore electrical power to aircraft.

2. INSPECTION/CHECK

A. Perform Leak Check

CAUTION: TO AVOID DAMAGE TO THE AIR DATA SENSOR, ALWAYS APPLY EQUAL VACUUM TO THE RH PITOT HEAD, SHOULDER STATIC PORTS, AND COPILOT'S STATIC SYSTEM.

   (1) Assure that lines are securely connected and the alternate static source is capped.
   (2) Connect pitot static tester to the one shoulder static port (block remaining one), copilot's static system, and RH pitot tube. Slowly apply a vacuum until altimeter indicates 28,000 feet.
   (3) Turn off vacuum source sealing the system. The altimeter should not decrease more than 560 feet in one minute.
   (4) If acceptable, release vacuum slowly and return system to normal.



1 Effective Aircraft 35-011 thru 35-017 and 35-020 and Subsequent, and 36-006 thru 36-009 and 36-011 and Subsequent an elbow is installed in lieu of the union.

2 Effective Aircraft 35-067 thru 35-505, 36-018 thru 36-053, and prior aircraft equipped with Reduced Approach Speed System

3 Effective Aircraft 35-152 and Subsequent and 36-037 and Subsequent.

Air Data Sensor and Plumbing Installation
Figure 201

AUTOPILOT ELECTRIC BOX - MAINTENANCE PRACTICES

1. REMOVAL/INSTALLATION

NOTE:
- On *Aircraft 35-002 and 36-002*, the autopilot electric box (AE88) is installed in the nose compartment adjacent to the radar receiver- transmitter.
- On *Aircraft 35-003 and Subsequent, 36-003 and Subsequent*, the autopilot electric box (AE88) is installed beneath the pilot's seat.

A. Remove Autopilot Electric Box *(Aircraft 35-002 and 36-002)*
   (1) Remove electrical power from aircraft.
   (2) Remove nose compartment access doors.
   (3) Disconnect electrical connectors from autopilot electric box.
   (4) Remove attaching parts and autopilot electric box from aircraft.

B. Install Autopilot Electric Box *(Aircraft 35-002 and 36-002)*
   (1) Position autopilot electric box on mounting bracket and secure with attaching parts.
   (2) Connect electrical connectors to autopilot electric box.
   (3) Install nose compartment access doors.
   (4) Restore electrical power to aircraft.

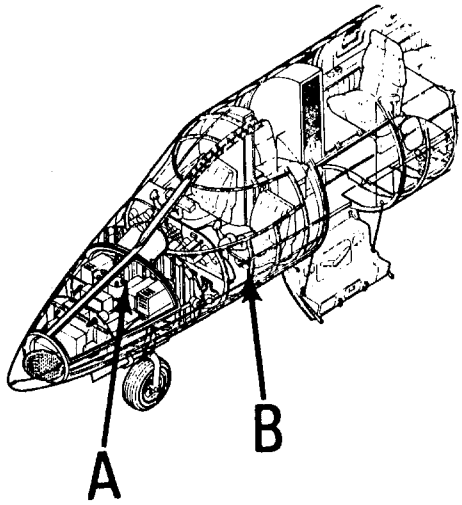
C. Remove Autopilot Electric Box *(Aircraft 35-003 and Subsequent, 36-003 and Subsequent)* (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Remove pilot's seat. (Refer to Chapter 25.)
   (3) Remove autopilot computer. (Refer to 22-10-04.)
   (4) Disconnect electrical connector(s) from autopilot electric box.
   (5) Remove attaching parts and remove autopilot electric box from aircraft.

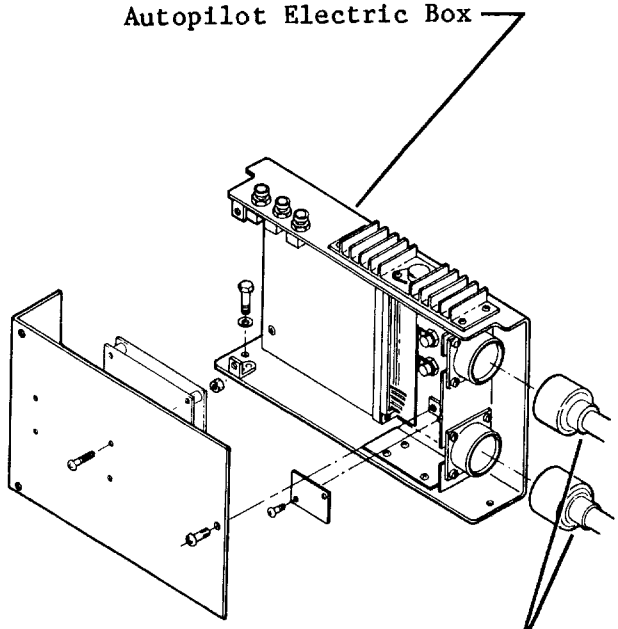
D. Install Autopilot Electric Box *(Aircraft 35-003 and Subsequent, 36-003 and Subsequent)*
   (1) Position autopilot electric box on mounting bracket and secure with attaching parts.
   (2) Connect electrical connector(s) to autopilot electric box.
   (3) Install autopilot computer. (Refer to 22-10-04.)
   (4) Install pilot's seat. (Refer to Chapter 25.)
   (5) Restore electrical power to aircraft.

2. ADJUSTMENT/TEST *(Aircraft Equipped with FC-530 Autopilot)*

NOTE: Fabricate a patch cable using two plugs (P/N DPX2MA67S67S-33B-0001) and a receptacle (P/N DPX2MA67P67P-34B-0001). Refer to Wiring Manual for pins to be connected.

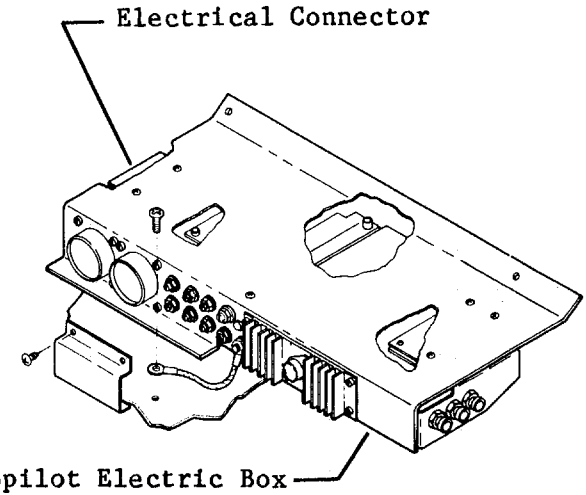
A. Perform functional test of primary yaw damper limiter function of autopilot electric box as follows:
   (1) Connect ground power unit to aircraft and set ground power unit control to on.
   (2) Set Battery Switches to BAT 1 and BAT 2.
   (3) Set Inverter Switches on.
   (4) Ensure all AFCS and Stall Warning circuit breakers are engaged (depressed).
   (5) Position left stall vane to simulate straight and level flight (0° position).
   (6) Connect DC voltmeter leads between pins B38 (+) and B34 (GND) of patch cable to monitor yaw damper drive output of autopilot electric box.
   (7) Depress yaw damper PRI PWR and PRI ENG push buttons. Rudder pedals shall move full travel left or right. If not, rotate control wheel full left.
   (8) Voltmeter reading shall be greater than 9 vdc.
   (9) Rotate left stall vane to shaker actuation point. Voltmeter reading shall not change.





35-002 and 36-002

Detail A

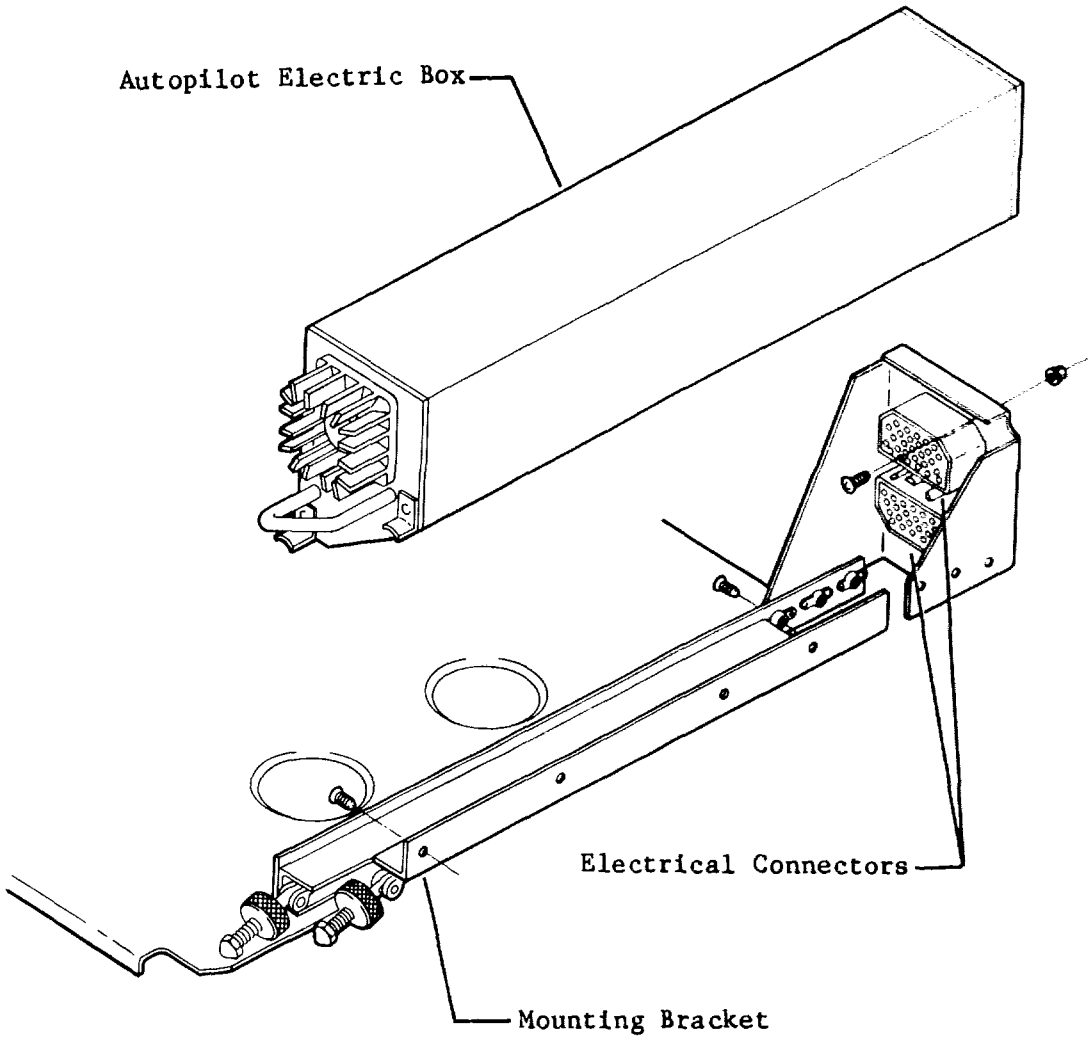


35-003 thru 35-505,
36-003 thru 36-053

Detail B

9-99C

Autopilot Electric Box Installation
Figure 201 (Sheet 1 of 2)



Detail B

9-353B

Autopilot Electric Box Installation
Figure 201 (Sheet 2 of 2)

(10) Slowly continue stall vane rotation. Between shaker actuation point and pusher actuation point, yaw damper drive voltage shall drop to less than 1 vdc.
(11) Rotate left stall vane to simulate straight and level flight (0° position). Verify that voltmeter reading returns to greater than 9 vdc.

B. Perform functional test of secondary yaw damper limiter function of autopilot electric box as follows:
(1) Ensure that steps A.(1) thru A.(4) are accomplished.
(2) Position right stall vane to simulate straight and level flight (0° position).
(3) Connect DC voltmeter leads between pins A38 (+) and A6 (GND) of patch cable to monitor secondary yaw damper drive output of autopilot electric box.
(4) Depress yaw damper SEC PWR and SEC ENG push buttons. Rudder pedals shall move full left or right. If not, rotate control wheel full left.
(5) Voltmeter reading shall be greater than 9 vdc.
(6) Rotate right stall vane to stall motor actuation point. Voltmeter reading shall not change.
(7) Slowly continue right stall vane rotation. Between shaker actuation point and pusher actuation point, yaw damper drive voltage shall decrease to less than 1 vdc.
(8) Rotate right stall vane back to simulate straight and level flight (0° position). Secondary yaw damper drive voltage shall be greater than 9 vdc.

C. Perform functional test of stall pusher function of autopilot electric box.
(1) Ensure that steps A.(1) thru A.(4) are accomplished.
(2) Rotate Test Switch to LEFT STALL. Depress press-to-test pushbutton. Verify normal stall warning operation. (Refer to Chapter 27.)
(3) Rotate Test Switch to RIGHT STALL. Depress press-to-test pushbutton. Verify normal stall warning operation. (Refer to Chapter 27.)

D. Perform functional test of nudger function of autopilot electric box.
(1) Ensure that steps A.(1) thru A.(4) are accomplished.
(2) Rotate left stall vane until angle-of-attack indicator needle is centered in the middle of the yellow band.
(3) Verify that the control wheel pushes nose-down (forward) at a rate of 2 Hz. Lower left stall vane.
(4) Rotate right stall vane until angle-of-attack indicator needle is centered in the middle of the yellow band.
(5) Verify that the control wheel pushes nose-down (forward) at a rate of 2 Hz. Lower right stall vane.

E. Perform functional test of flap extend function of autopilot electric box.
(1) Ensure that steps A.(1) thru A.(4) are accomplished.
(2) Set Autopilot Master Switch to ON.
(3) Set Flap Switch to 8°.
(4) Connect DC voltmeter leads between B26 and B4 (GND) of patch cable. Voltmeter shall read 28 vdc.
(5) Set lap Switch to UP. Observe voltmeter with flaps up.

F. Perform air data warning system functional test. (Refer to 22-21-00.)

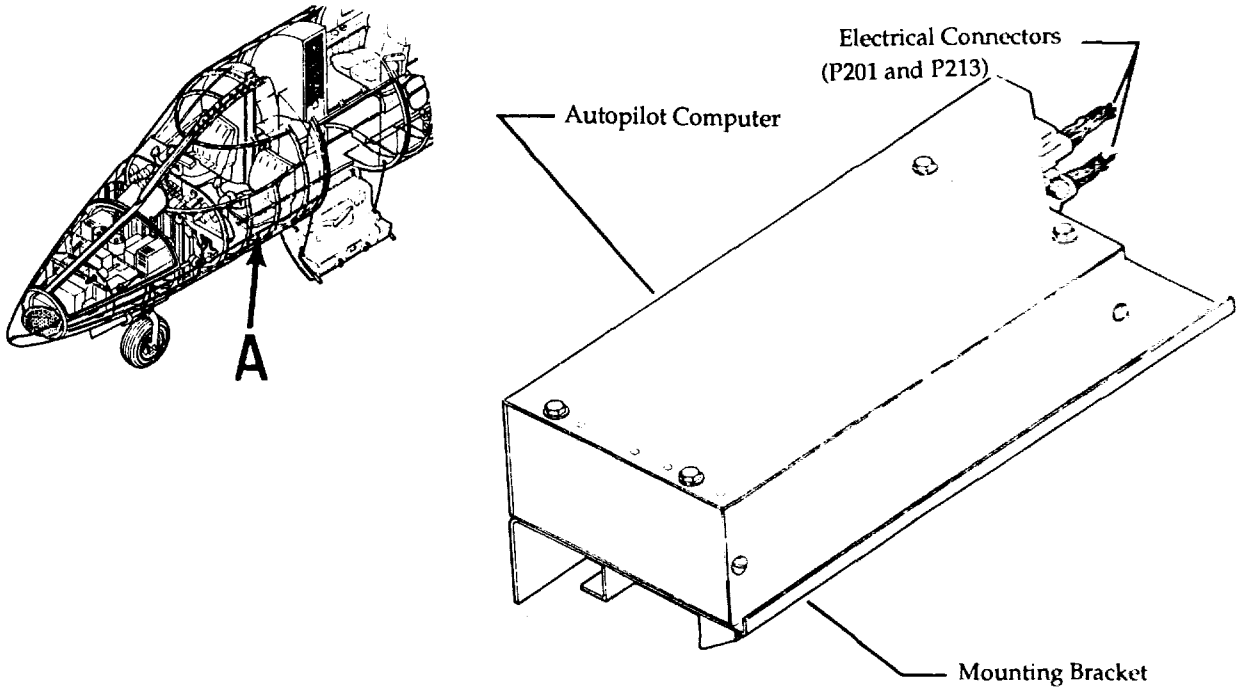
G. Perform functional test on go-around function of autopilot electric box as follows:
(1) Ensure that steps A.(1) thru A.(4) are accomplished.
(2) Set Autopilot Master Switch to ON.
(3) Depress autopilot ENG and V/S push buttons.
(4) Connect DC voltmeter leads between pins A56 (+) and B4 (GND) of patch cable. Depress go-around pushbutton on left throttle; voltmeter shall read 28 vdc.
(5) Disengage go-around push button on left throttle.
(6) Connect DC voltmeter leads between pins A57 (+) and B4 (GND) of patch cable. Depress go-around pushbutton on left throttle; voltmeter shall read 28 vdc.
(7) Disengage go-around push button. Verify G/A annunciator has extinguished.
(8) Depress and release autopilot ENG and V/S push buttons.
(9) Set Autopilot Master Switch to OFF.

H. Perform functional test on roll trim function of autopilot electric box.
   (1) Ensure that steps A.(1) thru A.(4) are accomplished.
   (2) Set Autopilot Master Switch to ON.
   (3) Depress autopilot ENG push button.
   (4) Using Control Wheel Trim Switch (not Trim Arming), trim aircraft for left wing down. Control wheel shall rotate left.
   (5) Using Control Wheel Trim Switch (not Trim Arming), trim aircraft for right wing down. Control wheel shall rotate right.
   (6) Disengage autopilot and set Autopilot Master Switch to OFF.

I. Perform functional test on pitch trim function of autopilot electric box.
   (1) Ensure that steps A.(1) thru A.(4) are accomplished.
   (2) Trim horizontal stabilizer to take-off position.
   (3) Set Autopilot Master Switch to AUTOPILOT.
   (4) Depress autopilot ENG push button.
   (5) Using pilot's or copilot's Control Wheel Trim Switch (not Trim Arming), trim aircraft to nose down (switch position forward). The control column shall move forward.
   (6) Trim aircraft to nose up (switch position aft). Control column shall move aft.
   (7) Depress Trim Arming push button. Verify that autopilot disengages.
   (8) Set Autopilot Master Switch to OFF.
   (9) Set Battery Switches to OFF.
   (10) Set Inverter Switches to OFF.
   (11) Set ground power unit control off and disconnect ground power unit from aircraft.

AUTOPILOT COMPUTER - MAINTENANCE PRACTICES

1. **Removal/Installation**
   A. Removal of Autopilot Computer (*Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See Figure 201.)
      (1) Set Battery Switch(es) off and disconnect aircraft batteries.
      (2) Gain access to autopilot computer by removing the pilot's seat. (Refer to Chapter 25.)
      (3) Disconnect electrical connectors (P201 and P213) from autopilot computer.
      (4) Remove attaching parts and autopilot computer from aircraft.
   B. Installation of Autopilot Computer (*Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See Figure 201.)
      (1) Install autopilot computer and secure with attaching parts.
      (2) Connect electrical connectors (P201 and P213) to autopilot computer.
      (3) Install pilot's seat. (Refer to Chapter 25.)
      (4) Connect electrical connectorsto aircraft batteries.
      (5) If autopilot computer is new, or other maintenance was performed on the autopilot system, perform Functional Test of Automatic Flight Control System - FC200. (Refer to 22-10-00, Adjustment/Test.)
      (6) If autopilot computer was removed to facilitate other maintenance, perform Autopilot Control System Operational Check - FC530. (Refer to 22-10-00, Inspection/Check.)

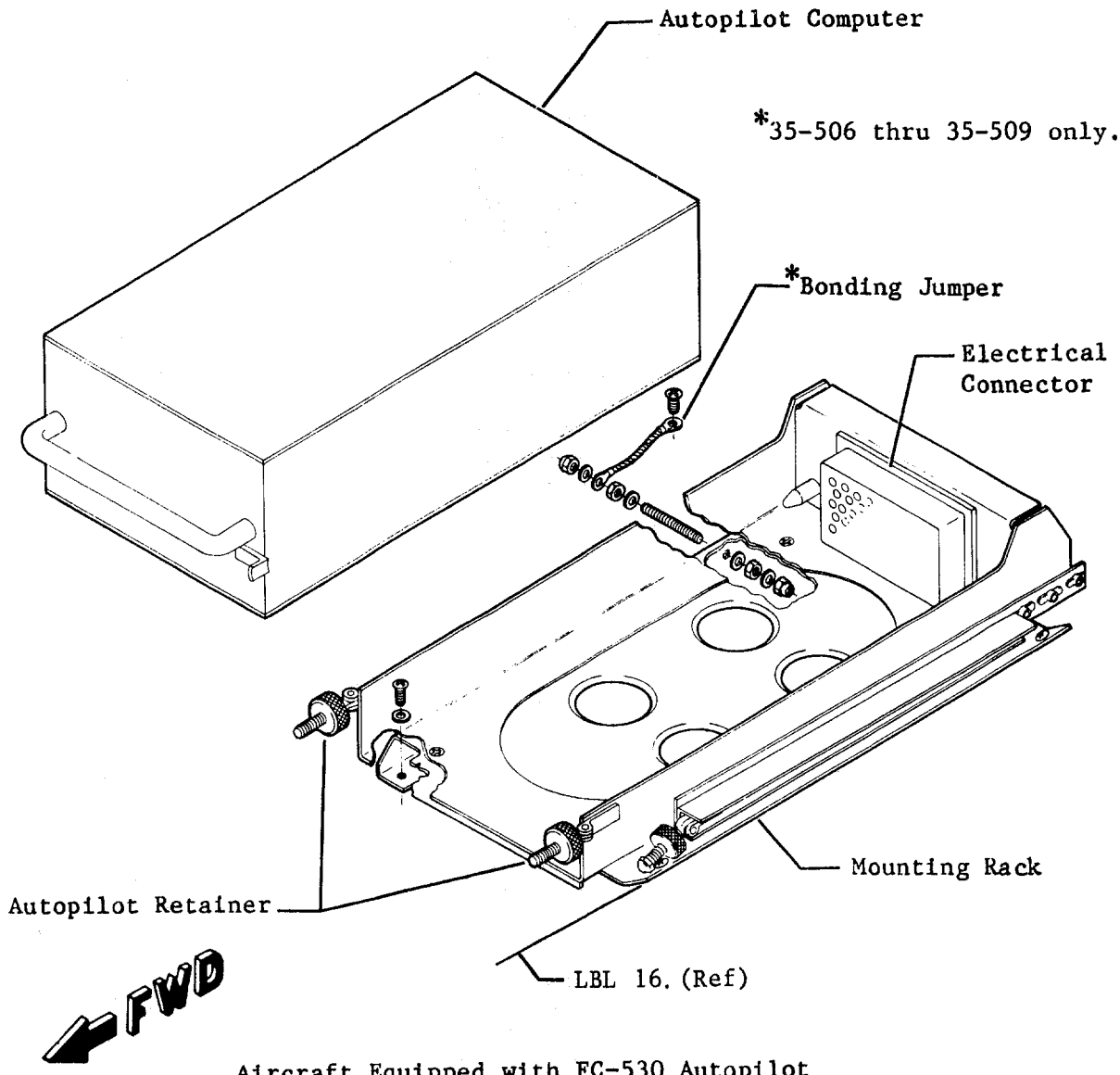


Aircraft Epuipped with FC-200 Autopilot

Detail A

9-173B

Autopilot Computer Installation
Figure 201 (Sheet 1 of 2)



Aircraft Equipped with FC-530 Autopilot

Detail A

9-352B

Autopilot Electric Box Installation
Figure 201 (Sheet 2 of 2)

C. Removal of Autopilot Computer (*Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See Figure 201.)
   (1) Set Battery Switch(es) off and disconnect aircraft batteries.
   (2) Gain access to autopilot computer by removing pilot's seat. (Refer to Chapter 25.)

CAUTION: WHEN REMOVING AUTOPILOT COMPUTER, PULL COMPUTER STRAIGHT FORWARD FROM MOUNTING RACK UNTIL ELECTRICAL CONNECTOR IS DISENGAGED. LIFTING THE COMPUTER TOO SOON MAY DAMAGE THE ELECTRICAL CONNECTOR.

   (3) Loosen retaining hardware and remove autopilot computer from mounting rack.

D. Installation of Autopilot Computer (*Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See Figure 201.)

CAUTION: TO PREVENT DAMAGE TO AUTOPILOT COMPUTER ELECTRICAL CONNECTOR, ENSURE THAT ELECTRICAL CONNECTOR HALVES ARE PROPERLY ALIGNED PRIOR TO COMPUTER ENGAGEMENT WITH BACK OF AUTOPILOT COMPUTER MOUNTING RACK.

   (1) Ensure that electrical connector halves are properly aligned and slide autopilot computer into mounting rack.
   (2) Secure autopilot computer with retainers.
   (3) Install pilot's seat. (Refer to Chapter 25.)
   (4) Connect electrical connectors to aircraft batteries.
   (5) If autopilot computer is new, or other maintenance was performed on the autopilot system, perform Functional Test of Automatic Flight Control System - FC530. (Refer to 22-10-00, Adjustment/Test.)
   (6) If autopilot computer was removed to facilitate other maintenance, perform Autopilot Control System Operational Check - FC530. (Refer to 22-10-00, Inspection/Check.)

FLIGHT DIRECTOR INTERFACE BOX - MAINTENANCE PRACTICES

1. REMOVAL/INSTALLATION

A. Remove Flight Director Interface Box

(1) Remove pilot's seat. (Refer to Chapter 25.)
(2) Disconnect electrical connectors from interface box.
(3) Remove attaching parts and interface box from aircraft.

B. Install Flight Director Interface Box

(1) Install interface box and secure with attaching parts.
(2) Connect electrical connectors to interface box.
(3) Install pilot's seat. (Refer to Chapter 25.)

DUAL YAW DAMPER SYSTEM - DESCRIPTION AND OPERATION

1. **Description** (See Figure 1.)
   A. The dual yaw damper system (primary and secondary) consists of a yaw damper computer/controller, primary and secondary servo actuators with capstan slip clutch, primary (left) and secondary (right) aileron position sensors, two rate gyros, two lateral accelerometers, and *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent, and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* have two yaw damper force sensors, a yaw calibration assembly and a three-axis disconnect box installed.
   B. Component Description
      (1) The yaw damper computer/controller is located in the aft pedestal.
      (2) The primary yaw damper servo actuator is located forward of the rudder servo sector. The primary yaw damper servo is connected to the rudder servo sector by two cables.
      (3) The secondary yaw damper servo actuator is located forward of the primary yaw damper servo actuator. The secondary yaw damper servo sector is connected to the rudder control cables by two cables.
      (4) Both primary and secondary yaw damper servo actuators incorporate a capstan slip clutch which is set to slip at 120-126 inch-pounds.
      (5) Two position sensors (one adjacent to each aileron) are installed for the dual yaw damper system.
      (6) Two yaw rate gyros are installed on the forward side of frame 5. Each gyro is mounted on wedge blocks.
      (7) The two lateral accelerometers are installed aft of frame 2.
      (8) *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent, and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* two yaw damper force sensors (one each for the pilot and copilot) are attached between the rudder pedal bellcrank and the forward rudder bellcrank.
      (9) *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent, and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* the yaw calibration assembly is located beneath the copilot's seat.
      (10) *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent, and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* the three-axis disconnect box is located at FS 174 under the floorboards.

2. **Operation** (See Figure 1.)
   A. The dual yaw damper system operates independently of the autopilot. The dual yaw damper system receives power from the AFCS YAW (DC) and PRI YAW DAMPER (AC) circuit breakers located on the pilot's circuit breaker panel and from the SEC AFCS (DC) and SEC YAW DAMPER (AC) circuit breakers located on the copilot's circuit breaker panel.
   B. Electrical power is transmitted to the yaw damper computer/controller and relayed to the various components of the dual yaw damper system depending on switch selection on the controller.
   C. The dual yaw damper system used with either the FC-200 or the FC-530 autopilot incorporates a yaw damper force reduction during aircraft stall condition.
   D. Component Operation
      (1) The yaw damper computer/controller contains all of the pushbuttons and annunciators necessary to operate the dual yaw damper system.
         (a) When the PRI PWR or SEC PWR pushbutton is depressed, the ON annunciator above the respective pushbutton will illuminate and power will be supplied to the respective system.
         (b) With either or both of the PWR pushbuttons depressed, depressing and holding the TST pushbutton will activate the test mode. When the test mode is in operation, the servo force meter of the system being tested will deflect right and then slowly left. The TST pushbutton cannot be depressed with the ENG pushbutton depressed.

(c) With either PRI PWR or SEC PWR pushbutton depressed, depress the corresponding ENG (PRI or SEC) pushbutton. This engages that system and the ON annunciator above the depressed ENG pushbutton will illuminate. Depressing the ENG pushbutton a second time removes power from the system and extinguishes the ON annunciator. Only one (either primary or secondary) of the yaw damper systems may be engaged at any one time. Engaging either the primary or secondary yaw damper system while the other system is engaged will disengage the operating system, extinguishing the ON annunciator.

(d) One servo force meter for each of the primary and secondary yaw damper systems is installed on the yaw damper computer/controller. The servo force meters are located between the PWR and ENG pushbuttons and annunciators on both sides of the yaw damper computer/controller. The servo force meter indicates rudder servo force. Clockwise deflection of the servo force meter needle indicates a right rudder servo force.

(e) The yaw damper computer/controller operates both the primary and secondary yaw damper systems in accordance with pushbutton and aircraft control selection, aircraft attitude, and control surface position.

(2) The primary yaw damper servo actuator receives electrical power from the yaw damper computer/controller to adjust rudder position by means of two cables attached to the rudder servo sector. The cables from the servo actuator are routed through the capstan slip clutch which is installed with the servo actuator. The capstan slip clutch is easily overpowered by the pilot or copilot should a malfunction occur in the operation of the primary servo actuator.

(3) The secondary yaw damper servo actuator operates the same as the primary yaw damper servo actuator. (Refer to step (2).)

(4) The primary (left) and secondary (right) aileron position sensors report the position of the ailerons to the yaw damper computer/ controller. The yaw damper computer/controller processes the aileron information and sends signals to the yaw damper servo actuators to reposition the rudder as required. *Aircraft equipped with FC-200 Autopilot*, the outboard sensors in each wing are the yaw damper position sensors. *Aircraft equipped with FC-530 Autopilot*, the inboard sensors in each wing are the yaw damper position sensors.

(5) The rate gyros electrically report the yaw rate to the yaw damper computer/controller. The yaw damper computer/controller processes the yaw rate information and sends signals to the yaw damper servo actuators to reposition the rudder as required to compensate for the yaw rate.

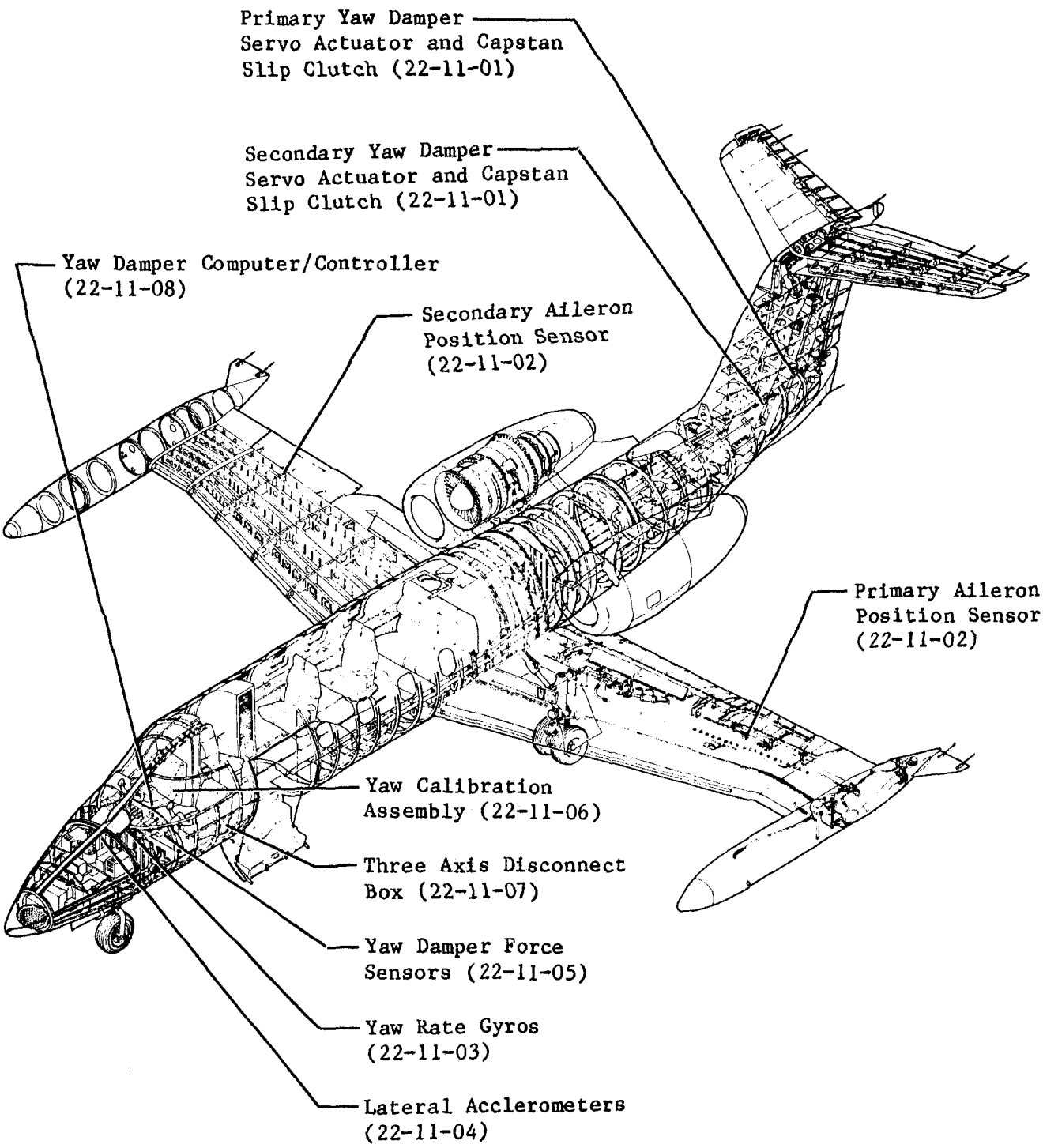
(6) The lateral accelerometer electrically reports the lateral speed of the aircraft to the yaw damper computer/controller. The yaw damper computer/controller processes the lateral speed information together with all other inputs to determine rudder position changes as required.

E. *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* the yaw damper force sensor system provides a means by which the aircraft may be flown in all phases of aircraft operation (including final approach, touchdown, and rollout), within the flight envelope, with yaw damper engaged.

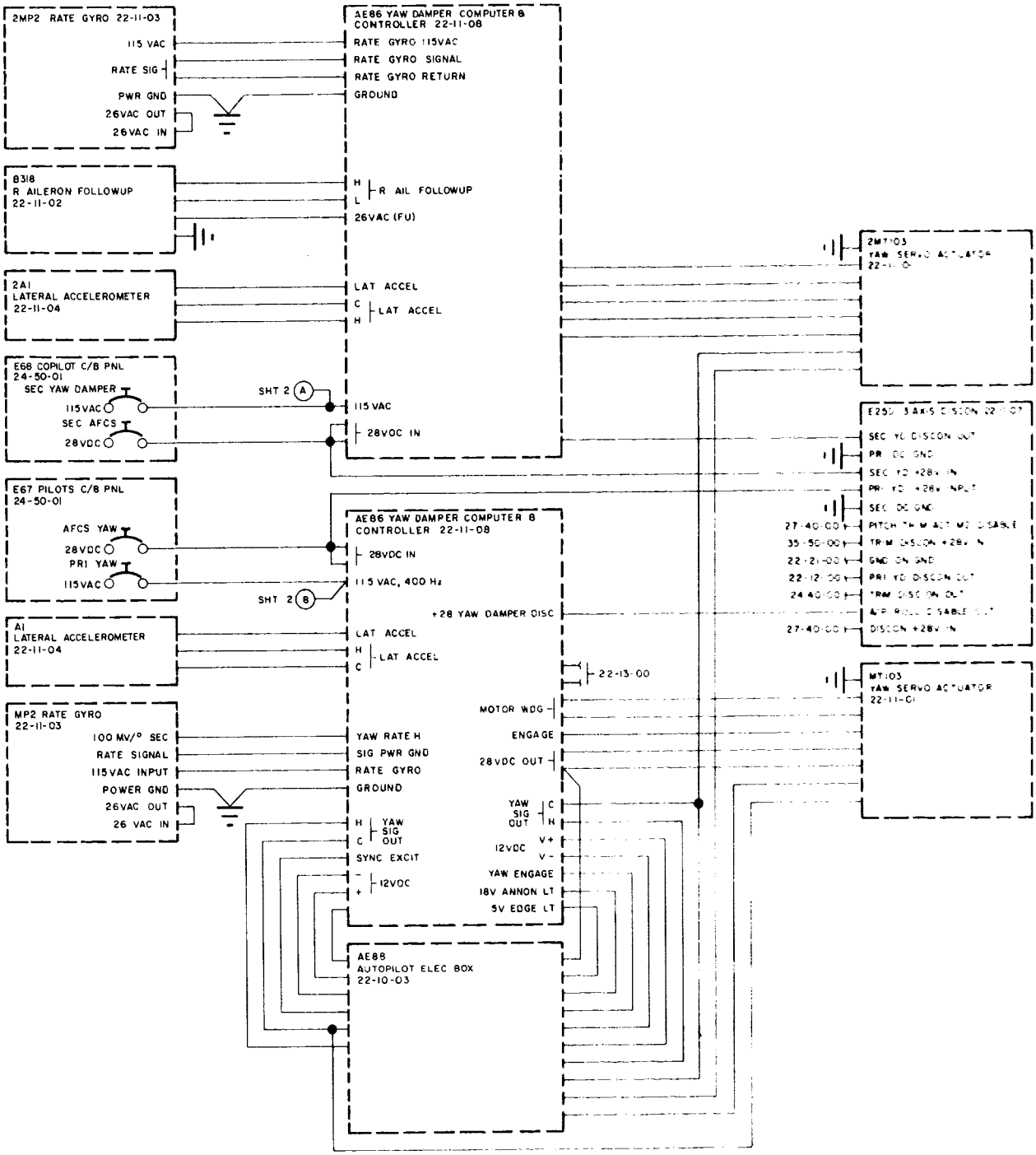
F. *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* under normal flight conditions (yaw damper engaged and feet off rudder pedals) and no load on the yaw damper force sensors, the pilot or copilot must resist rudder pedal movement or initiate override load on the rudder pedals to provide a load on the yaw damper force sensor.

G. *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* when a force of 30 pounds is applied to the rudder pedals, the yaw damper force sensor electrically notifies the yaw calibration assembly. The yaw calibration assembly then switches the yaw damper system to a low override torque configuration (allowing pilot or copilot to control rudder position). The yaw calibration assembly will wash out (follow) to the established rudder position, then the yaw damper system is switched back into normal mode of operation when the override force is released from the rudder pedals.

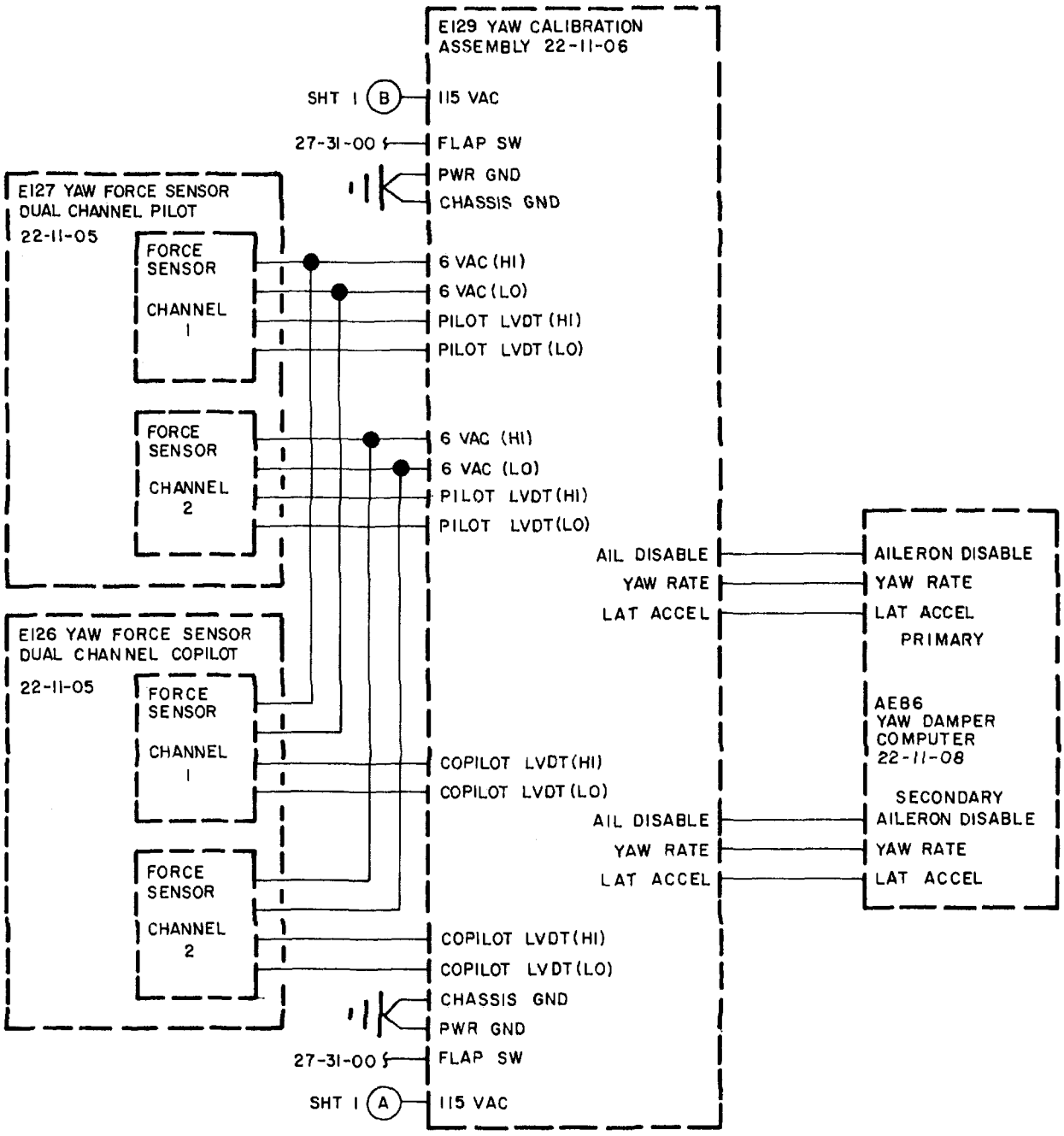
H. *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* when either of the Control Wheel Master Switches is depressed, power is applied thru the 3 axis disconnect box and to the autopilot electric box master disconnect relay (K193) which removes power from the pitch, roll and yaw engage circuits.



Dual Yaw Damper Component Location
Figure 1



Dual Yaw Damper Electrical Control Schematic
Figure 2 (Sheet 1 of 2)



Dual Yaw Damper Electrical Control Schematic
Figure 2 (Sheet 2 of 2)

DUAL YAW DAMPER SYSTEM - MAINTENANCE PRACTICES

1. **Inspection/Check**
   A. Operational Check of Dual Yaw Damper System *(Aircraft 35-002 thru 35-505 except 35-408, and 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot")*
      (1) Depress and hold primary yaw damper PWR/TEST push button. Verify that PWR/TEST annunciator and PRI ENG annunciator illuminate.
      (2) Release PWR/TEST push button. Verify that PWR/TEST annunciator remains illuminated and PRI ENG annunciator extinguishes.
      (3) Depress and hold secondary yaw damper PWR/TEST push button. Verify that PWR/TEST annunciator and SEC ENG annunciator illuminate.
      (4) Release PWR/TEST push button. Verify that PWR/TEST annunciator remains illuminated and SEC ENG annunciator extinguishes.
      (5) Center yaw force indicator by rotating control wheel.
      (6) Depress SEC ENG push button.
      (7) Depress first one rudder pedal and then the other while holding control wheel centered. It must be possible to depress each rudder pedal against the opposition of the yaw damper system. The yaw force indicator will indicate the direction of input.
      (8) On *Aircraft 35-067 thru 35-505 and 36-018 thru 36-053 and prior aircraft equipped with Reduced Approach Speed System*, with left stall system on, repeat step (7) with the left stall vane lifted to just below pusher point. Rudder pedals shall depress with decreased force.
      (9) Turn control wheel to full left. Verify that rudder deflects to the left.
      (10) Turn control wheel to full right. Verify that rudder deflects to the right.
      (11) Depress SEC ENG OFF push button. Verify that SEC ENG annunciator extinguishes and yaw damper disengages.
      (12) Depress PRI ENG push button. Verify that PRI ENG annunciator illuminates.
      (13) Depress first one rudder pedal and then the other while holding control wheel centered. It must be possible to depress each rudder pedal against the opposition of the yaw damper system. The yaw force indicator will indicate the direction of input.
      (14) On *Aircraft 35-067 thru 35-505 and 36-018 thru 36-053 and prior aircraft equipped with Reduced Approach Speed System*, with right stall system on, repeat step (13) with the right stall vane lifted to just below pusher point. Rudder pedals shall depress with decreased force.
      (15) Turn control wheel to full left. Verify that rudder deflects to the left.
      (16) Turn control wheel to full right. Verify that rudder deflects to the right.
      (17) Depress control wheel master switch. Verify that PRI ENG annunciator extinguishes and that yaw damper disengages.
      (18) Check yaw axis as follows:
         (a) Depress PRI PWR/TEST and ENG push buttons on yaw damper controller.
         (b) With autopilot disengaged, push aircraft tail sideways. The first rudder movement shall be in direction of push.
   B. Operational Check of Dual Yaw Damper System *(LES-FT-1296A)* *(Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot")*
      (1) Depress and release yaw damper PRI PWR push button. Verify that PRI PWR annunciator illuminates.
      (2) Depress and release yaw damper PRI PWR push button. Verify that PRI PWR annunciator extinguishes.

(3) Depress and release yaw damper SEC PWR push button. Verify that SEC PWR annunciator illuminates.
(4) Depress and release yaw damper SEC PWR push button. Verify that SEC PWR annunciator extinguishes.
(5) Depress and release yaw damper PRI PWR and PRI ENG push buttons. Verify that PRI PWR and PRI ENG annunciators are illuminated.
(6) Verify that primary yaw damper is engaged by pushing rudder pedals off of center. Primary yaw damper shall force rudder back to center position.
(7) Depress and release yaw damper PRI PWR push button. Verify that both PRI PWR and PRI ENG annunciators extinguish and aural tone sounds.
(8) Perform steps (5) thru (7) using yaw damper SEC PWR and SEC ENG push buttons.
(9) Depress and release yaw damper PRI PWR and PRI ENG push buttons. Verify that PRI PWR and PRI ENG annunciators extinguish (primary yaw damper disengaged) when yaw damper SEC PWR and SEC ENG push buttons are depressed and released (secondary yaw damper engaged). Verify that SEC PWR and SEC ENG annunciators illuminate and no aural tone sounds.
(10) Verify that SEC PWR and SEC ENG annunciators extinguish (secondary yaw damper disengaged) when yaw damper PRI PWR and PRI ENG push buttons are depressed and released (primary yaw damper engaged). Verify that PRI PWR and PRI ENG annunciators illuminate and no aural tone sounds.
(11) Depress and release yaw damper PRI ENG push button. Verify that PRI ENG annunciator extinguishes.
(12) Depress and hold yaw damper PRI TEST push button. PRI TEST and PRI ENG annunciator shall illuminate. Aileron effort indicator needle will move right of center, then gradually move back (left) past zero (to left of center).
(13) Release yaw damper PRI TEST push button. Verify that PRI ENG annunciator extinguishes. After 10-15 seconds note that aileron effort indicator needle moves to zero (center position). Depress and release yaw damper PRI PWR push button (disengage primary yaw damper).
(14) Performs steps (12) and (13) using yaw damper SEC TEST push button.
(15) Depress and release yaw damper PRI PWR and PRI ENG push button. Check rate gyro phasing by pushing tail of aircraft sideways. First rudder movement shall be in direction of push.
(16) Depress and release yaw damper PRI PWR and PRI ENG push buttons (disengaging primary yaw damper).
(17) Depress and release yaw damper SEC PWR and SEC ENG push buttons. Check rate gyro phasing by pushing tail of aircraft sideways. First rudder movement shall be in direction of push.
(18) Check Primary Yaw Damper Force Monitor as follows:
  (a) Center aircraft controls (control wheel and rudder pedals).
  (b) Depress and release yaw damper PRI PWR and PRI ENG push buttons (primary yaw damper engaged).
  (c) Lower flaps to 25° or more.
  (d) Using pilot's controls, turn control wheel right and depress left rudder pedal. Note smooth, low-level overpower force.
  (e) Using pilot's controls, turn control wheel right and depress right rudder pedal. Note smooth, low-level overpower force.
  (f) Perform steps (d) and (e) using copilot's controls.
  (g) Raise flaps above 25°.
  (h) Using copilot's controls, turn control wheel right and depress left rudder pedal. Note a high-level overpower force.
  (i) Using copilot's controls, turn control wheel left and depress right rudder pedal. Note a high-level overpower force.
  (j) Perform steps (h) and (i) using pilot's controls.
  (k) Center aircraft controls (control wheel and rudder pedals).
  (l) Depress and release yaw damper PRI ENG and PRI PWR push buttons (primary yaw damper disengaged).

(19) Check Secondary Yaw Damper Force Monitor as follows:
- (a) Center aircraft controls (control wheel and rudder pedals).
- (b) Depress and release yaw damper SEC PWR and SEC ENG push buttons (secondary yaw damper engaged).
- (c) Lower flaps to 25° or more.
- (d) Using pilot's controls, turn control wheel right and depress left rudder pedal. Note smooth, low-level overpower force.
- (e) Using pilot's controls, turn control wheel right and depress right rudder pedal. Note smooth, low-level overpower force.
- (f) Perform steps (d) and (e) using copilot's controls.
- (g) Raise flaps above 25°.
- (h) Using copilot's controls, turn control wheel right and depress left rudder pedal. Note a high-level overpower force.
- (i) Using copilot's controls, turn control wheel left and depress right rudder pedal. Note a high-level overpower force.
- (j) Perform steps (h) and (i) using pilot's controls.
- (k) Center aircraft controls (control wheel and rudder pedals).
- (l) Depress and release yaw damper SEC ENG and SEC PWR push buttons (secondary yaw damper disengaged).

(20) Check Angle of Attack Interface as follows:
- (a) Set flaps in full up position.
- (b) Ensure that control wheel is centered (ailerons in neutral position).
- (c) Move LH stall vane until angle of attack indicator needle is in green section.
- (d) Depress and release yaw damper PRI PWR and PRI ENG push buttons. Verify that PRI PWR and PRI ENG annunciators illuminate.
- (e) Turn control wheel right. Observe that right rudder pedal moves to floor (depressed).
- (f) With control wheel full right, depress left rudder pedal. Observe yaw damper force (resistance).
- (g) Turn control wheel left. Observe that left rudder pedal moves to floor (depressed).
- (h) With control wheel full left, depress right rudder pedal. Observe yaw damper force (resistance).
- (i) Depress and release yaw damper PRI PWR push button (disengage primary yaw damper). Observe that PRI PWR and PRI ENG annunciators extinguish and that aural tone sounds.
- (j) Depress and release yaw damper PRI PWR and PRI ENG push buttons (engage primary yaw damper).
- (k) Turn control wheel right.
- (l) Set Stall Warning Switch to ON.
- (m) Lift LH stall vane to just below pusher actuation point.
- (n) Depress left rudder pedal. Note a decreased overpower force.
- (o) Perform steps (20)(a) thru (20)(n) using yaw damper SEC PWR and SEC ENG push buttons and RH stall vane.

(21) Check DC Interlock as follows:
- (a) Depress and release yaw damper PRI PWR and PRI ENG push buttons (engage primary yaw damper). Verify that PRI PWR and PRI ENG annunciators are illuminated.
- (b) Pull AFCS YAW circuit breaker located on pilot's circuit breaker panel. Verify that primary yaw damper disengages (PRI PWR and PRI ENG annunciators extinguish and aural tone sounds).
- (c) Depress and release yaw damper SEC PWR and SEC ENG push buttons. Verify that SEC PWR/TEST and SEC ENG annunciators illuminate.
- (d) Depress and release yaw damper PRI PWR and PRI ENG push buttons. Verify that primary yaw damper does not engage. Secondary yaw damper remains engaged (SEC PWR and SEC ENG annunciators remain illuminated).

(e) Reset AFCS YAW circuit breaker. Depress and release yaw damper PRI PWR and PRI ENG push buttons. Verify that SEC PWR and SEC ENG annunciators extinguish and PRI PWR and PRI ENG annunciators illuminate.
(f) Depress and release yaw damper SEC PWR and SEC ENG push buttons. Observe that PRI PWR and PRI ENG annunciators extinguish and SEC PWR and SEC ENG annunciators illuminate.
(g) Pull SEC AFCS circuit breaker, located on copilot's circuit breaker panel. Observe that SEC PWR and SEC ENG annunciators extinguish and that aural tone sounds.
(h) Depress and release yaw damper PRI PWR and PRI ENG push buttons. Observe that PRI PWR and PRI ENG annunciators illuminate.
(i) Depress and release yaw damper SEC PWR and SEC ENG push buttons. Verify that secondary yaw damper does not engage. Primary yaw damper remains engaged (PRI PWR and PRI ENG annunciators remain illuminated).
(j) Reset SEC AFCS circuit breaker. Depress and release yaw damper SEC PWR and SEC ENG push buttons. Observe that PRI PWR and PRI ENG annunciators extinguish and SEC PWR and SEC ENG annunciators illuminate.
(k) Depress and release yaw damper SEC ENG and SEC PWR push buttons (disengaging secondary yaw damper).

(22) Check AC Interlock as follows:
(a) Depress and release autopilot ENG push button.
(b) Depress and release yaw damper PRI PWR and PRI ENG push buttons.
(c) Pull PRI YAW DAMPER circuit breaker located on pilot's circuit breaker panel. Observe that primary yaw damper disengages (PRI PWR and PRI ENG annunciators extinguish and aural tone sounds).
(d) Reset PRI YAW DAMPER circuit breaker.
(e) Depress and release yaw damper SEC PWR and SEC ENG push buttons.
(f) Pull SEC YAW DAMPER circuit breaker located on copilot's circuit breaker panel. Observe that secondary yaw damper disengages (SEC PWR and SEC ENG annunciators extinguish and aural tone sounds).
(g) Reset SEC YAW DAMPER circuit breaker.

(23) Check lateral accelerometers as follows:
(a) Level aircraft. (Refer to Chapter 8.)
(b) Verify that lateral accelerometers are level as mounted.
(c) Depress and release yaw damper PRI PWR and SEC PWR push buttons.

CAUTION: DO NOT MOVE RUDDER PEDALS OR RUDDER SURFACE DURING THIS TEST.

(d) Verify that servo effort indicator needles are centered with index line for both primary and secondary yaw damper.
(e) If either or both servo effort indicators are not centered, perform step (24). If both servo indicators are centered, continue with step (25).

(24) Adjust servo effort indicators as follows:
(a) Pull AFCS YAW and PRI YAW DAMPER circuit breakers located on pilot's circuit breaker panel.
(b) Pull SEC AFCS and SEC YAW DAMPER circuit breakers located on copilot's circuit breaker panel.
(c) Remove attaching parts and remove yaw damper controller from pedestal mounting. Do not disconnect connectors.

NOTE: An access hole in the yaw damper controller cover gives access to the adjusting potentiometer.

The top printed circuit board controls primary yaw damper functions. The lower printed circuit board controls secondary yaw damper functions.

(d) Locate primary and secondary yaw damper adjusting potentiometers.
(e) Reset AFCS YAW, PRI YAW DAMPER, SEC AFCS, and SEC YAW DAMPER circuit breaker.
(f) Depress and release yaw damper PRI PWR and SEC PWR push buttons. Verify that PRI PWR and SEC PWR annunciators illuminate. Do not depress PRI ENG and SEC ENG push buttons.
(g) Adjust primary yaw damper potentiometer to center yaw servo effort indicator needle on index line. Wait 30 seconds after adjustment is completed and verify that no change has taken place.
(h) Adjust secondary yaw damper potentiometer to center yaw servo effort indicator needle on index line. Wait 30 seconds after adjustment is completed and verify that no change has taken place.
(i) Pull AFCS YAW and PRI YAW DAMPER (located on pilot's circuit breaker panel) and SEC AFCS and SEC YAW DAMPER (located on copilot's circuit breaker panel).
(j) Install yaw damper computer.
(k) Reset AFCS YAW, PRI YAW DAMPER, SEC AFCS, and SEC YAW DAMPER circuit breakers.

(25) Remove aircraft from jacks.

C. Yaw Damper Force Sensor System Operational Check.
(1) Connect external power unit to aircraft. Apply 28 vdc power to aircraft.
(2) Set Battery Switches to BAT 1 and BAT 2.
(3) Set either PRI INVERTER or SEC INVERTER Switch on.
(4) Depress yaw damper PRI PWR and PRI ENG push button, located on yaw damper control panel.
(5) Using a push-pull scale, push down on pilot's left rudder pedal. Observe that yaw damper force indicator needle begins to deflect left when scale reaches 30 (±6) pounds [13.6 (±2.7) Kg]. Continue to push down on rudder pedal until yaw damper force indicator needle deflects to half scale left.
(6) Release force on rudder pedal. Observe that yaw damper force indicator needle slowly moves to center position as yaw calibration assembly switches dual yaw damper system back to normal operation.
(7) Using a push-pull scale, push down on copilot's right rudder pedal. Observe that yaw damper force indicator needle begins to deflect to right when scale reaches 30 (±6) pounds [13.6 (±2.7) Kg]. Continue to push down on rudder pedal until yaw damper force indicator needle deflects to half scale right.
(8) Release force on rudder pedal. Observe that yaw damper force needle slowly moves to center position as yaw calibration assembly switches dual yaw damper systems back to normal operation.
(9) Disengage yaw damper.
(10) Set both Inverter Switches off.
(11) Set Battery Switches off.
(12) Set external power source control switch off and disconnect external power source from aircraft.

YAW DAMPER SERVO ACTUATOR - MAINTENANCE PRACTICES

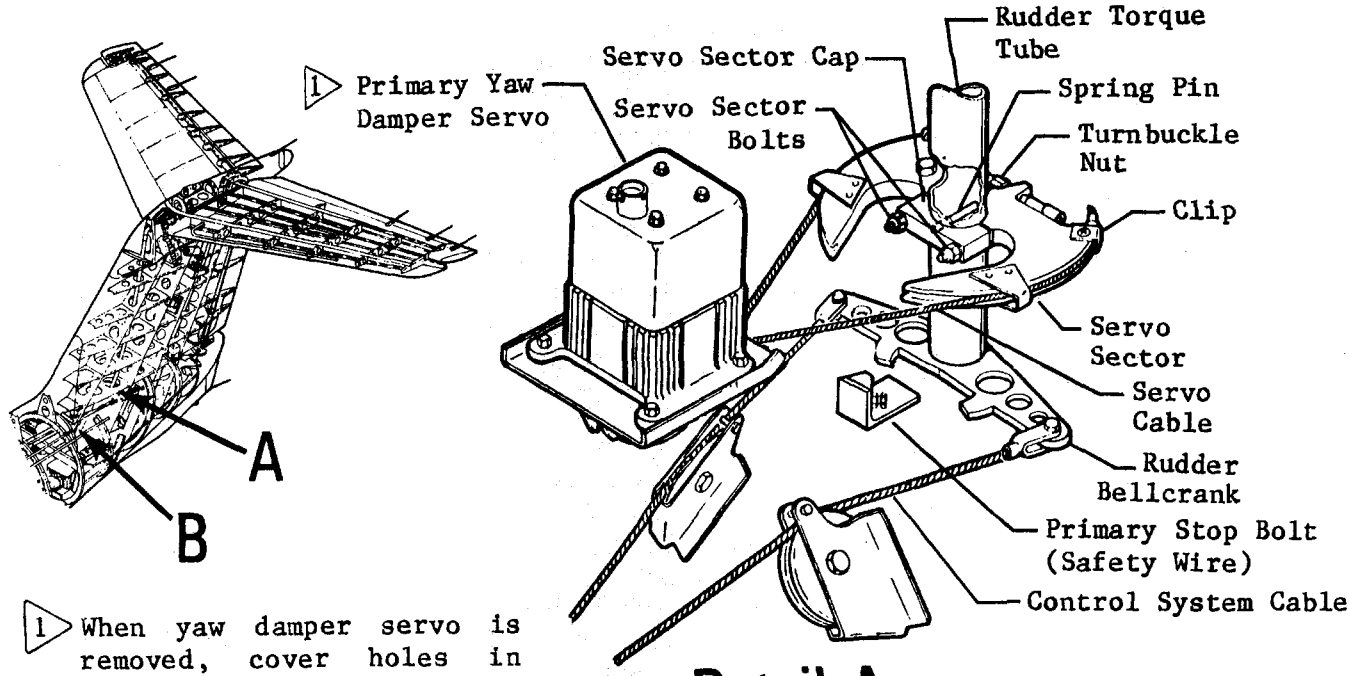
1. REMOVAL/INSTALLATION

A. Remove Primary Servo Actuator (See figure 201.)
   (1) Remove vertical stabilizer and aft tailcone access panels.
   (2) Disconnect electrical connector from servo actuator.
   (3) Remove attaching parts and servo actuator from aircraft.
   (4) Cover holes in servo mounting bracket with tape. This will prevent foreign matter from entering capstan slip clutch gear.

B. Install Primary Servo Actuator (See figure 201.)
   (1) Remove tape and install servo actuator and secure with attaching parts.
   (2) Connect electrical connector to servo actuator.
   (3) Perform operational check of yaw damper system. (Refer to 22-11-00, Inspection/Check.)
   (4) Install vertical stabilizer and aft tailcone access panels.

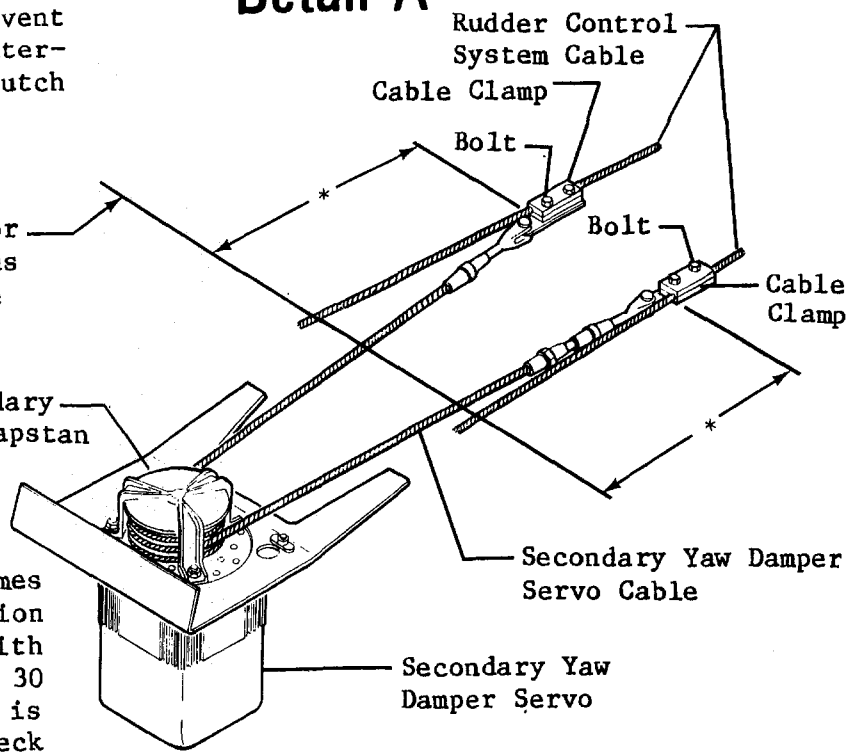
C. Remove Secondary Servo Actuator (See figure 201.)
   (1) Lower tailcone access door.
   (2) Disconnect electrical connector from servo actuator.
   (3) Remove attaching parts and servo actuator from aircraft.
   (4) Cover holes in servo mounting bracket with tape.

D. Install Secondary Servo Actuator (See figure 201.)
   (1) Remove tape from servo mounting bracket.
   (2) Install servo actuator and secure with attaching parts.
   (3) Perform operational check of yaw damper system. (Refer to 22-11-00, Inspection/Check.)
   (4) Connect electrical connector to servo actuator.



Detail A

1 When yaw damper servo is removed, cover holes in servo mounting bracket with tape. This will prevent foreign matter from entering capstan slip clutch gear.



Detail B

* With clamps between Frames 29 and 29A, this dimension is 3.75 (±0.10) inch. With clamps between Frames 30 and 31, this dimension is 1.75 (±0.25) inch. Check dimensions with rudder in neutral.

Primary and Secondary Yaw Servo Actuators Installation
Figure 201

YAW DAMPER CAPSTAN SLIP CLUTCH - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Primary Capstan Slip Clutch (See figure 201.)
   (1) Remove vertical stabilizer and aft tailcone access panels.
   (2) Remove primary servo actuator.
   (3) Place a mark on mounting plate in line with cable ball retainer hole in cable drum assembly to be used as a locator when installing cabin drum assembly.
   (4) Loosen cable at rudder sector.
   (5) Remove attaching parts and shroud from capstan clutch assembly.
   (6) Unwrap cable from cable drum assembly.
   (7) Remove cable drum assembly from mounting plate.
   (8) Perform capstan slip clutch check and adjustment.

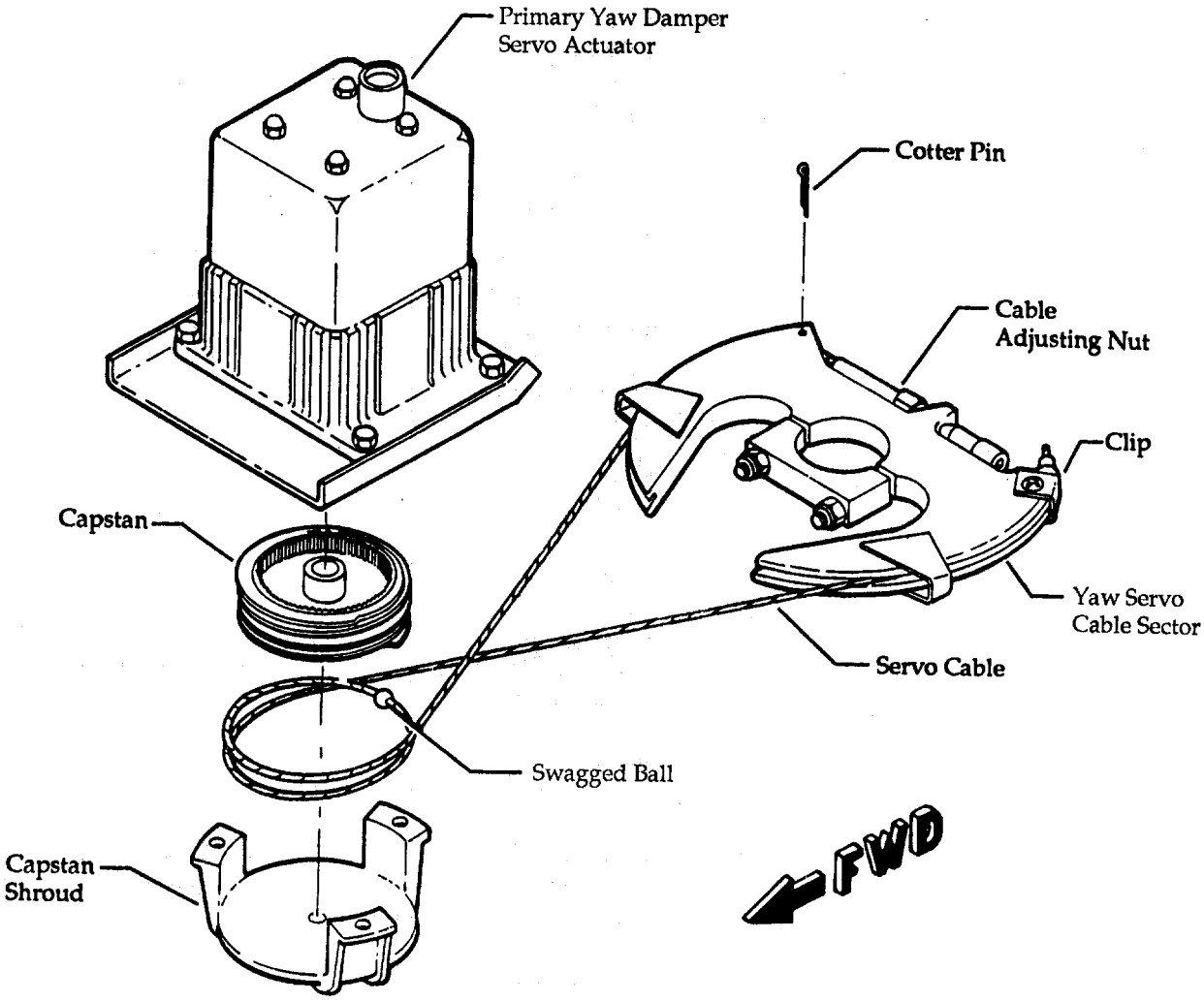
B. Install Primary Capstan Slip Clutch (See figure 201.)
   (1) Install capstan on mounting plate, assuring that mark on mounting plate is in line with cable ball retainer hole.
   (2) Wrap servo cable around cable drum assembly.
   (3) Secure ends of cable to rudder servo sector.
   (4) Install shroud over cable drum assembly and secure with attaching parts.
   (5) With rudder control system in neutral, adjust cable tension to 25 (±5) pounds. (Refer to Chapter 27 for cable tension temperature-load correction chart.)
   (6) Install servo actuator.
   (7) Perform operational check of dual yaw damper system. (Refer to 22-11-00, Inspection/Check.)
   (8) Install vertical stabilizer and tailcone access panels.

C. Remove Secondary Capstan Slip Clutch (See figure 201.)
   (1) Remove secondary servo actuator.
   (2) Place a mark on mounting plate in line with cable ball retainer hole in cable drum assembly to be used as a locator when installing cable drum assembly.
   (3) Loosen servo cable turnbuckle.
   (4) Remove attaching parts and shroud from cable drum assembly.
   (5) Unwrap cable from cable drum assembly.
   (6) Remove cable drum assembly from aircraft.

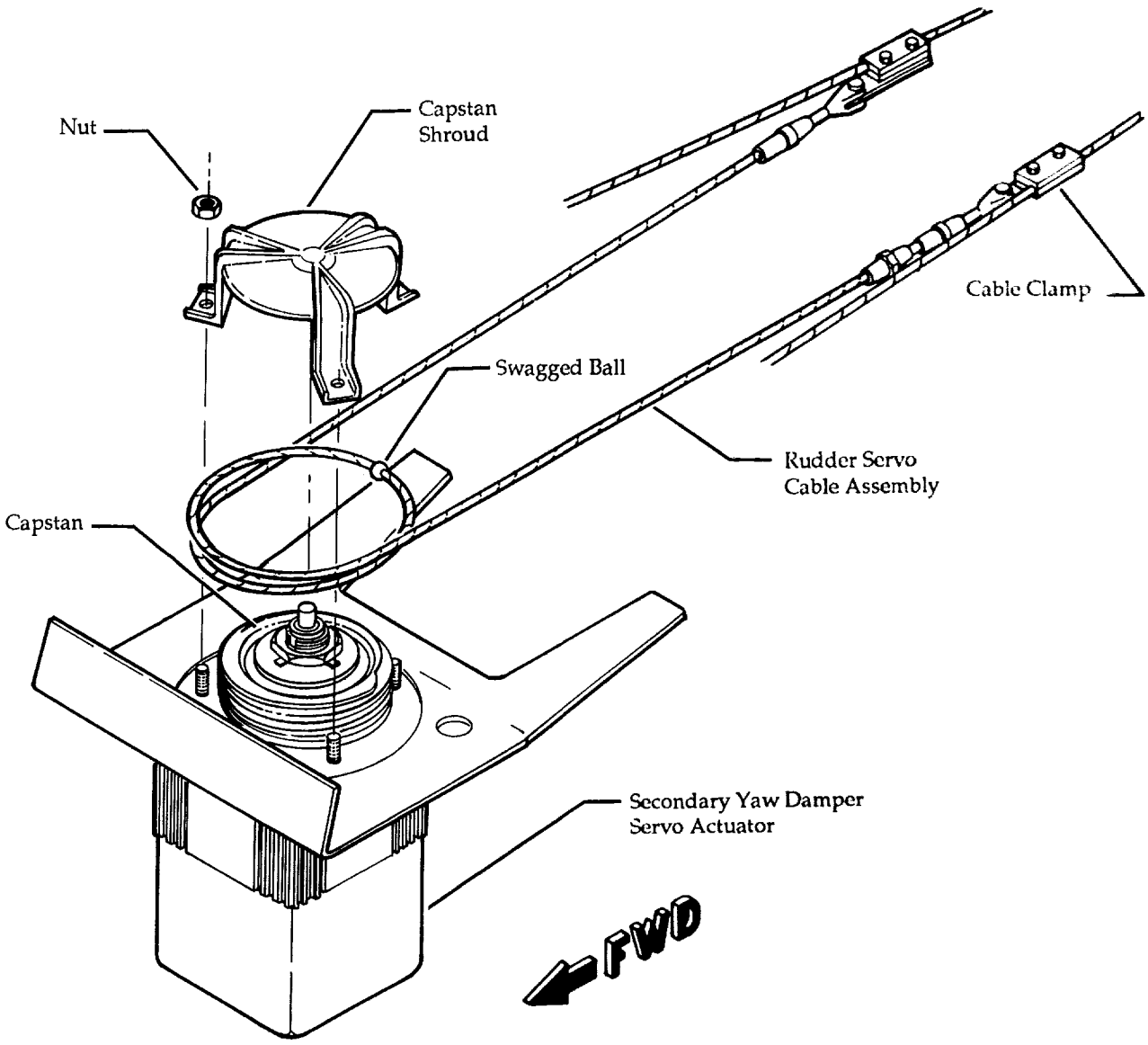
D. Install Secondary Capstan Slip Clutch (See figure 201.)
   (1) Install capstan slip clutch on servo actuator assuring that cable ball retainer hole and mark are aligned.
   (2) Wrap servo cable around cable drum assembly.
   (3) Secure servo cable to rudder control cables.
   (4) Install shroud over cable drum assembly and secure with attaching parts.
   (5) With rudder control system in neutral, adjust cable tension to 65 (±5) pounds. (Refer to Chapter 27 for cable tension temperature-load correction chart.)

   NOTE: On some aircraft, the secondary yaw damper servo cable clamps are located between frames 29 and 29A while others will have the clamps located between frames 30 and 31.

   (6) On aircraft with yaw damper cable clamps installed between frames 29 and 29A, deflect rudder to both full left and full right position while observing cable movement through frame 29A. Assure that a minimum of 0.50 inch clearance exists between the cable clamp bolts and frame 29A near lightening hole.
   (7) With rudder in neutral position, check dimension between each cable clamp and frame as shown in figure 201.



Yaw Damper Capstan Slip Clutch Installation
Figure 201 (Sheet 1 of 2)



Yaw Damper Capstan Slip Clutch Installation
Figure 201 (Sheet 2 of 2)

(8) Install secondary servo actuator.
(9) Perform Operational Check Of Dual Yaw Damper System. (Refer to 22-11-00, Inspection/Check.)

2. Adjustment/Test

A. Adjust Primary Capstan Slip Clutch (See Figure 202.)
(1) Remove primary capstan slip clutch.
(2) Place adapter block in vise. Set cable drum assembly in adapter block and secure with adapter pin.
(3) Attach torque wrench to adapter gear and place adapter gear into cable drum assembly.
(4) After initial clutch breaking force occurs, move torque wrench to the left and right through entire clutch travel range.
(5) Clutch slippage shall occur at 120 to 126 inch-pounds [13.6 to 14.2 Nm].
(6) Adjust clutch by loosening or tightening locknut. Tighten locknut to increase clutch torque; loosen locknut to decrease clutch torque.

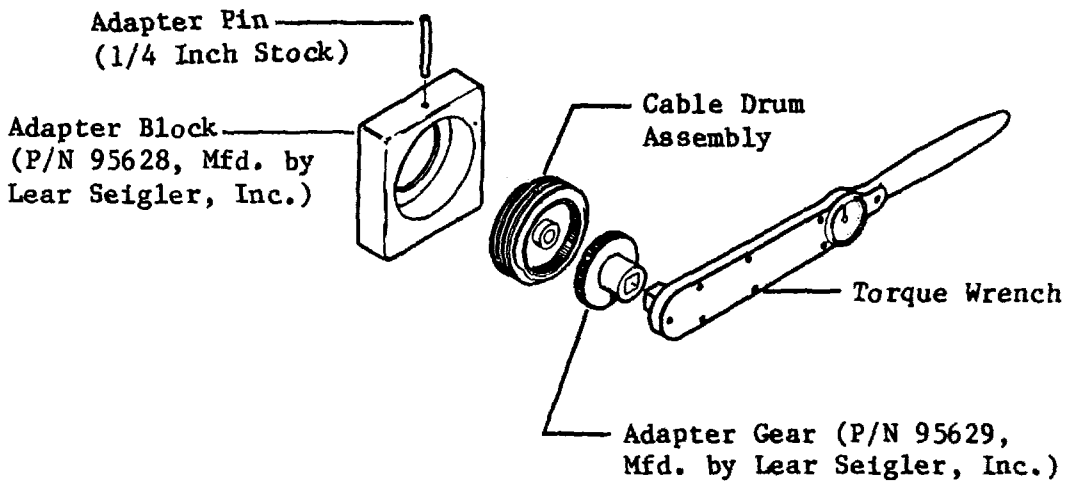
NOTE: If the correct clutch torque settings cannot be obtained, disassemble the drum assembly, clean, and relubricate the internal surface (both sides) of drum with a light application of Dow Corning No. 33 grease. Reassemble drum assembly and adjust slip clutch by repeating steps (2) thru (6).

(7) Remove cable drum assembly from adapter block. Wrap cable both ways around drum and temporarily secure loose ends of cable at drum.
(8) Clean and relubricate the mounting plate center stud with Mobilgrease 28 or MIL-G-81322 equivalent.
(9) Install capstan clutch.

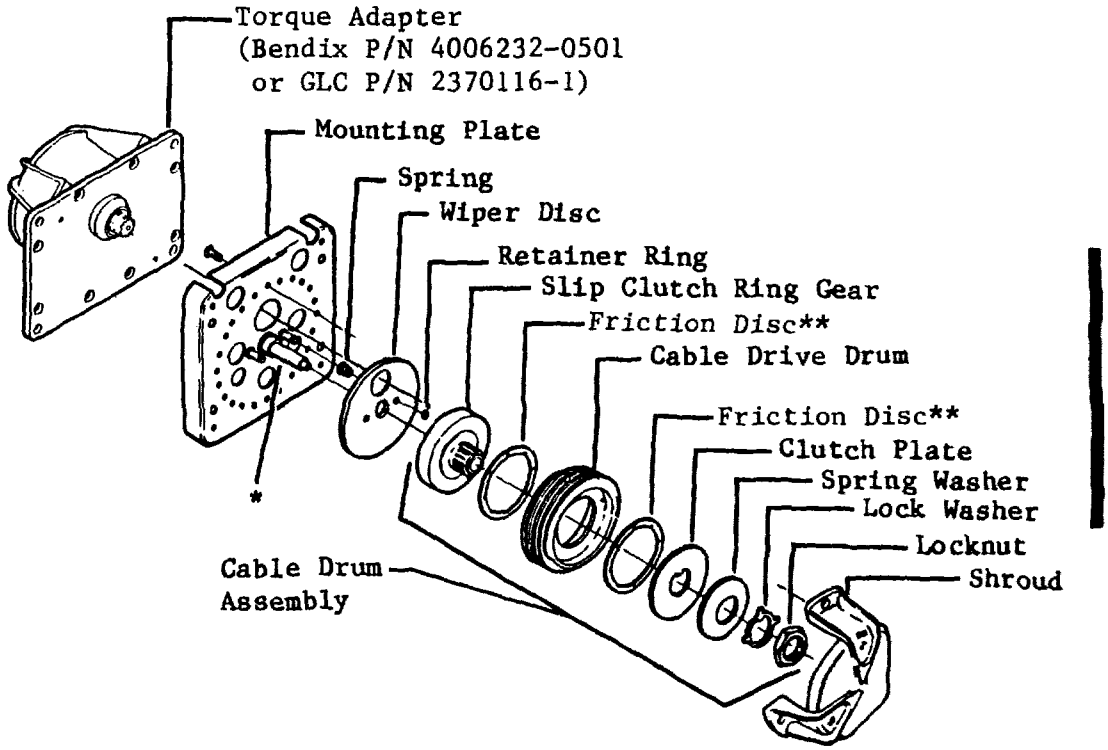
B. Adjust Secondary Capstan Slip Clutch (See Figure 202.)
(1) Open tailcone access door to gain access to secondary servo actuator and disconnect electrical connector from servo actuator.
(2) Remove servo from mounting plate. Attach torque wrench to adapter gear and place adapter gear into cable drum assembly.
(3) Move rudder pedals through full range of travel. After initial breaking force occurs, clutch slippage shall occur at 120 to 126 inch-pounds [13.6 to 14.2 Nm].
(4) If clutch slippage does not occur at this value, remove secondary capstan slip clutch from aircraft.
(5) Place adapter block in vise. Set cable drum assembly in adapter block and secure with adapter pin.
(6) Attach torque wrench to adapter gear and place adapter gear into cable drum assembly.
(7) Adjust clutch by loosening or tightening locknut. Tighten locknut to increase clutch torque; loosen locknut to decrease clutch torque.

NOTE: If the correct clutch torque settings cannot be obtained, disassemble the drum assembly, clean and relubricate the internal surface (both sides) of drum with light application of Dow Corning No. 33 grease. Reassemble drum assembly and adjust slip clutch by repeating steps (6) and (7).

(8) Remove cable drum assembly from adapter block.
(9) Wrap cable both ways around drum and temporarily secure loose ends of cable at drum.
(10) Clean and lubricate the mounting plate center stud with Mobilgrease 28 or MIL-G-81322 equivalent.
(11) Install capstan slip clutch.



* Lightly lubricate with Mobil Grease No. 28 (or MIL-G-81322 equivalent)
**Install rough side of friction disc toward cable drive drum



Capstan Slip Clutch Adjustment and Check
Figure 202

3. Inspection/Check
   A. Check Primary and Secondary Capstan Slip Clutch (See figure 202.)
      (1) Remove primary or secondary yaw damper servo from aircraft.
      (2) Bolt torque adapter to mounting plate, assuring that torque adapter gear is properly mated to cable drum assembly.

      NOTE:
      - When using torque adapter (Bendix P/N 4006232-0501 or GLC P/N 2370116-1), a 5.0:1 ratio occurs between the torque adapter drive gear and the slip clutch ring gear. Therefore, with a torque wrench reading of 24 to 25 inch-pounds, the actual slip clutch torque will be 120 to 125 inch-pounds.

      - Some GLC torque adapters may be marked "RATIO 5.65:1", this ratio is for pitch axis only.

      (3) Attach a torque wrench to torque adapter and check for proper clutch slippage.
      (4) Hold torque wrench against one side of tailcone structure so that wrench does not move. Move rudder pedals through full range of travel several times until clutch slippage is reasonably smooth. Observe torque wrench dial and take reading while moving rudder pedals through full travel range.
      (5) If clutch setting is not within tolerance, adjust capstan slip clutch. (Refer to step 2.A.)
      (6) Install applicable yaw damper servo.

YAW SERVO CABLE SECTOR - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Yaw Servo Cable Sector (See figure 201.)

(1) Remove floorboards as required to gain access to rudder pedal bellcrank. Insert rigging pin in rudder pedal bellcrank.

(2) Remove yaw servo cable sector and bellcrank access cover from tailcone.

(3) Remove primary yaw damper servo cable turnbuckle nut, clip, and cotter pin, releasing yaw damper servo cable ends from servo sector.

(4) Remove nuts and bolts from servo sector, releasing servo sector and cap from rudder torque tube.

B. Install Yaw Servo Cable Sector (See figure 201.)

(1) Align servo sector on aft side of rudder torque tube. Assure that spring pin through torque tube engages pin hole in sector.

NOTE: The servo sector is not symmetrical. Therefore, it must be installed with the correct side up. The sector will have the correct side up when the screw hole for the servo cable clip is on the left side of the aircraft.

(2) Align servo sector cap on forward side of rudder torque tube. Assure that spring pin through torque tube engages pin hole in cap.

(3) Install one washer on each bolt and insert both through sector and cap from aft side.

(4) Install washer and nut on each bolt and alternately torque nuts to 50 to 70 inch-pounds.

(5) Route servo cable around right-hand side of servo sector, insert turnbuckle threads through hole in sector and secure with nut.

(6) Install cable retaining cotter pin through hole in right half of sector.

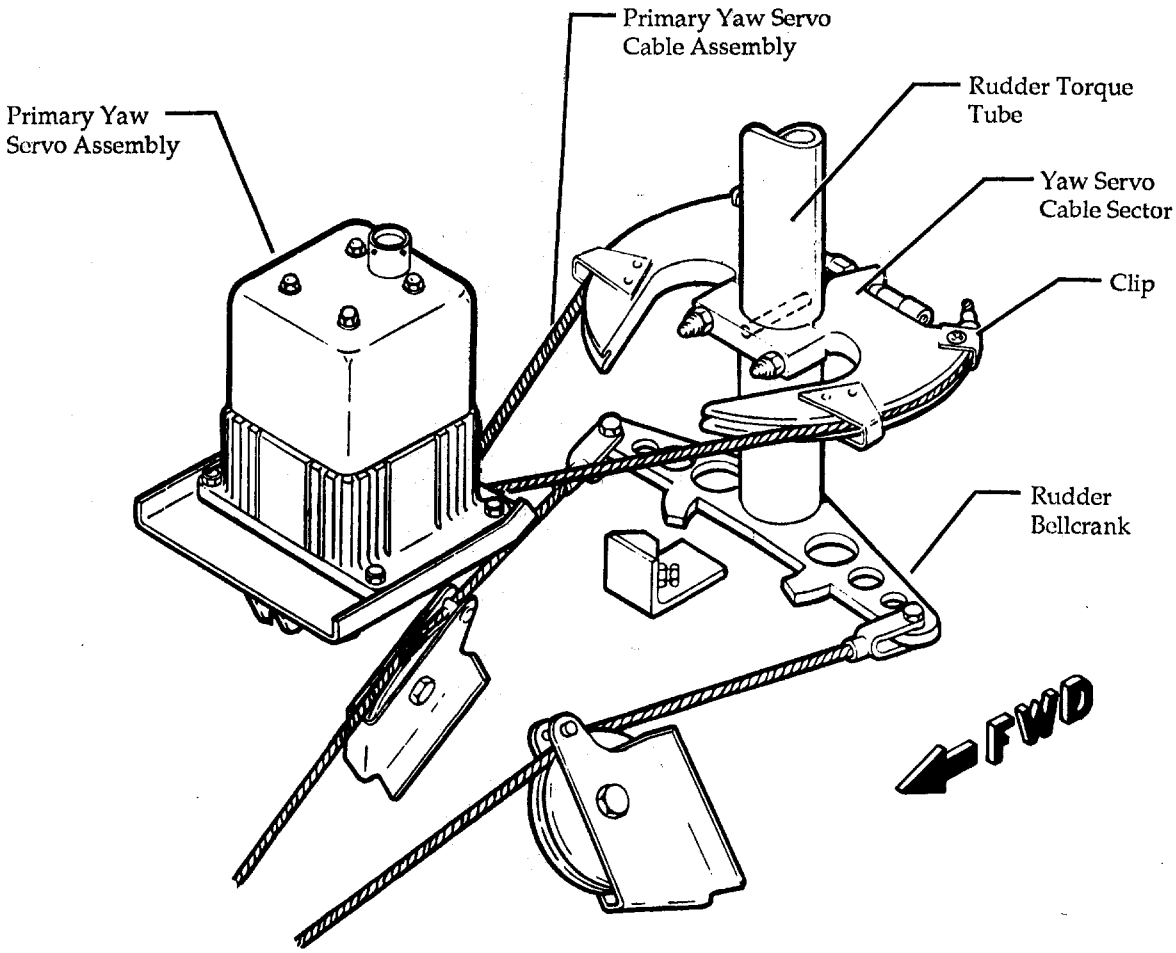
(7) Route other cable around left-hand side of servo sector, and secure with clip and attaching parts.

(8) Adjust servo cable tension to 25 (±5) pounds at 75°F. (Refer to Chapter 27 for cable tension temperature-load correction chart.)

(9) Remove rigging pin from rudder pedal bellcrank and install floorboards.

(10) Perform operational check of dual yaw damper system. (Refer to 22-11-00, Inspection/Check.)

(11) Install access covers on tailcone.



Yaw Servo Cable Sector Installation
Figure 201

YAW DAMPER SYSTEM POSITION SENSOR - MAINTENANCE PRACTICES

1. Removal/Installation

NOTE: Removal and installation procedures are identical for both position sensors except for location. The following procedures are for the LH wing position sensor (primary yaw damper).

A. Remove Position Sensor *(Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot")* (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Ensure that aileron control system is properly rigged and insert rigging pin in copilot control wheel. If RH wing position sensor is being replaced, gain access to rudder pedal bellcrank and insert rigging pin.
   (3) Remove access panel from lower wing to gain access to position sensor installation.
   (4) Disconnect electrical connector from outboard position sensor.
   (5) Remove safety wire and loosen screws securing potentiometer lever and followup shaft to aileron pulley drive shaft.
   (6) Remove attaching parts and position sensor from position sensor mounting bracket.

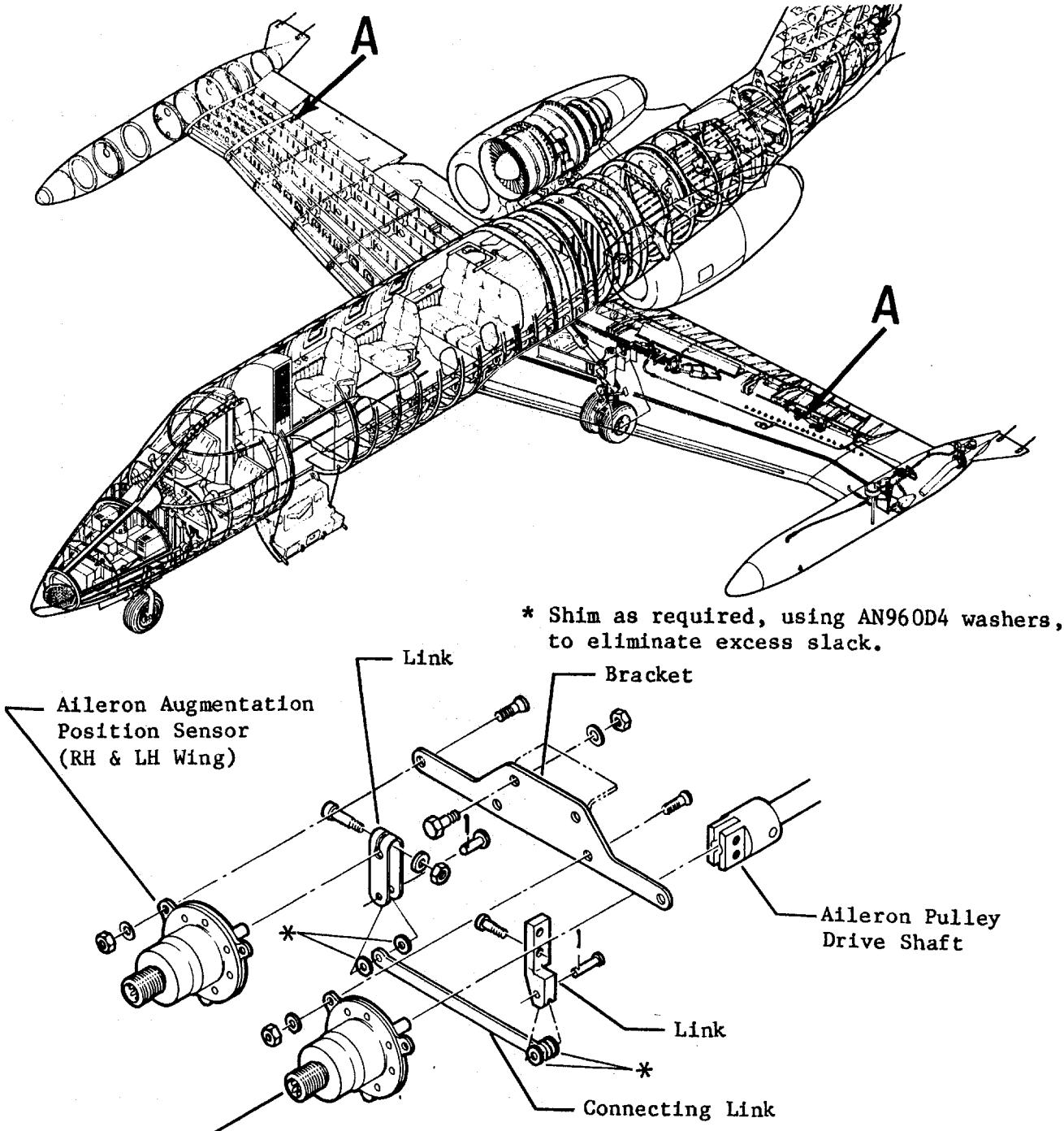
B. Install Position Sensor *(Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot")* (See figure 201.)
   (1) Align null dots on position sensor shaft and position sensor housing.
   (2) Carefully install position sensor by inserting position sensor shaft in pulley drive shaft and secure to position mounting bracket.
   (3) Connect electrical connector to position sensor.
   (4) Restore electrical power to aircraft.
   (5) Check position sensor adjustment. (Refer to step 2.A. or 2.B. as applicable.)
   (6) Install all access covers previously removed.

C. Remove Position Sensor *(Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot")* (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Ensure that aileron control system is properly rigged and insert rigging pin in copilot control wheel. If RH wing position sensor is being replaced, gain access to rudder pedal bellcrank and insert rigging pin.
   (3) Remove access panel from lower wing to gain access to position sensor installation.
   (4) Disconnect inboard position sensor electrical wires at splices.
   (5) Loosen screw securing position sensor shaft to arm.
   (6) Remove attaching parts and remove position sensor retainer and position sensor.

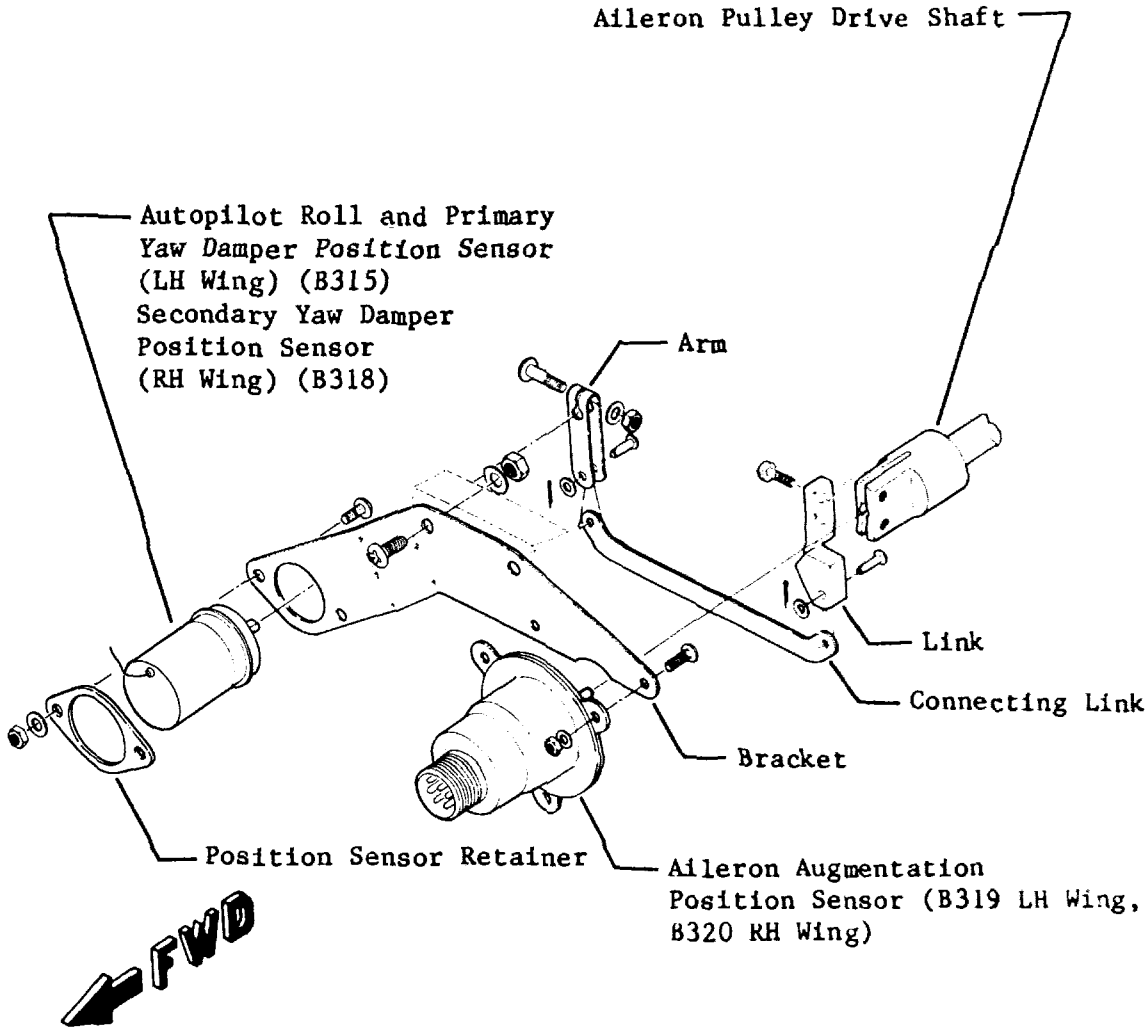
D. Install Position Sensor *(Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot")* (See figure 201.)
   (1) Ensure that null dot on shaft aligns with null mark on position sensor body.

   NOTE: Position sensor is to be installed with flat portion of shaft up.

   (2) Position position sensor and position sensor bracket in mounting bracket and secure with attaching parts.
   (3) Secure arm to position sensor shaft with attaching parts.
   (4) Connect electrical wires of position sensor to aircraft wiring at splices. (See Wiring Manual.)
   (5) Restore electrical power to aircraft.
   (6) Perform position sensor adjustment. (Refer to step 2.C.)
   (7) Install wing access panels.



Primary and Secondary Yaw Damper Position Sensor Installation
Figure 201 (Sheet 1 of 2)



Detail A

8-10C-2

Primary and Secondary Yaw Damper Position Sensor Installation
Figure 201 (Sheet 2 of 2)

2. Adjustment/Test

A. Primary Yaw Damper Position Sensor Adjustment *(Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot")*

NOTE: Adjustment of the primary yaw damper position sensor (LH wing) is accomplished through the autopilot roll axis using the test points (TP1 and TP2).

(1) Gain access to the autopilot computer and connect a voltmeter (Hewlett Packard Model 3430A or equivalent) to test points TP1 and TP2. The test points are located between the electrical connector on the computer. Insert rigging pin into copilot's control wheel.

NOTE: The position sensor output is measured in millivolts AC. Adjust voltmeter accordingly.

(2) Set Battery Switches to BAT 1 and BAT 2 and Inverter Switches on. Adjust position sensor until voltmeter indicates a null voltage. Only a slight adjustment shall be required.
(3) Remove rigging pin from control wheel. Engage the primary yaw damper system.
(4) Move rudder pedals for either a nose right or nose left and release; rudder pedals should return to neutral.
(5) Set Battery and Inverter Switches to OFF. Remove voltmeter leads from computer test points.
(6) Install access covers previously removed.

B. Secondary Yaw Damper Position Sensor Adjustment *(Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot")* (See Figure 202.)

NOTE: Adjustment of the secondary yaw damper position sensor (RH wing) requires a patch cable to be inserted in the position sensor output signal.

(1) Insert rigging pin into copilot's control wheel.
(2) Fabricate a patch cable as shown in Figure 202. Disconnect wheel well disconnect connector (P424).
(3) Install patch cable and reconnect wheel well disconnect connector to patch cable.

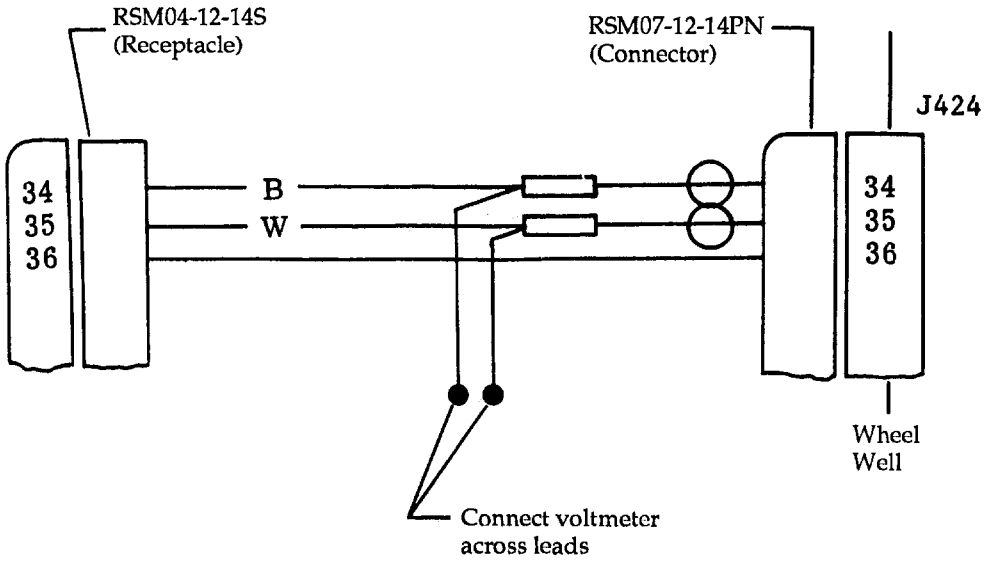
NOTE: The position sensor output is measured in millivolts AC. Adjust voltmeter accordingly.

(4) Set Battery Switches to BAT 1 and BAT 2 and Inverter Switches on. Adjust position sensor until voltmeter indicates a null voltage. Only a slight adjustment shall be required.
(5) Remove rigging pin from control wheel. Engage the secondary yaw damper system.
(6) Move rudder pedals for either a nose right or nose left and release; rudder pedals should return to neutral.
(7) Set Battery and Inverter Switches to OFF. Remove voltmeter leads from computer test points.
(8) Install access covers previously removed.

C. Primary and Secondary Yaw Damper Position Sensor Adjustment *(Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot")*

(1) Remove access panels from lower wing to gain access to position sensor installation (RH for secondary position sensor or LH for primary position sensor).
(2) Verify ailerons are properly rigged and insert rigging pin in copilot's control wheel.
(3) If secondary yaw damper position sensor is to be adjusted, gain access to rudder pedal bellcrank and insert rigging pin.
(4) Set Battery Switches to BAT 1 and BAT 2 and set Inverter Switch on.
(5) Depress applicable yaw damper power switch (primary for LH position sensor or secondary for RH position sensor).
(6) Locate splice between position sensor and aircraft wire harness.
(7) Using VTVM or equivalent, measure AC voltage between yellow wire and blue wire. Voltage shall be less than 0.1 vac.

(8) If voltage is greater than 0.1 vac, loosen position sensor attaching parts and rotate position sensor body until AC voltage is less than 0.1 vac.
(9) Secure position sensor with attaching parts.
(10) Depress and release yaw damper power switches.
(11) Set Battery and Inverter Switches to OFF.
(12) Install access panels in lower wing.
(13) Remove aileron and rudder rigging pins.



Wire - Use 2-BUB1936NAY6 or equivalent

Patch Cable Installation
Figure 202

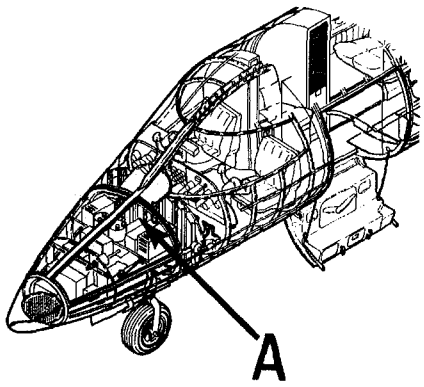
YAW RATE GYROS - MAINTENANCE PRACTICES

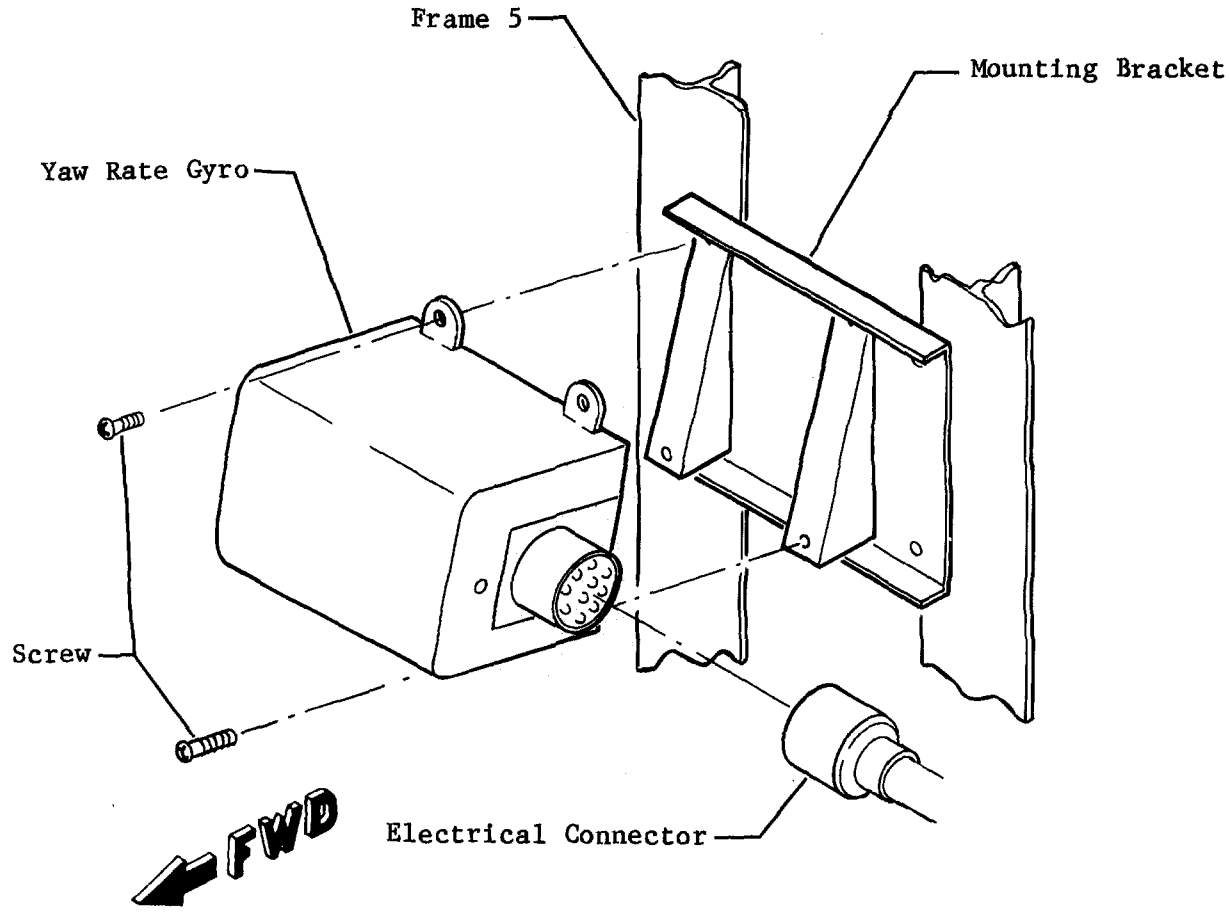
1. Removal/Installation

NOTE: *The removal and installation instructions for both gyros are identical.*

A. Remove Rate Gyro (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Remove nose compartment access doors.
   (3) Disconnect electrical connector from rate gyro.
   (4) Remove attaching parts and rate gyro from frame 5.

B. Install Rate Gyro (See figure 201.)
   (1) Install rate gyro on mounting plate and secure with attaching parts.
   (2) Connect electrical connector to rate gyro.
   (3) Restore electrical power to aircraft.
   (4) Perform yaw damper system operational check. (Refer to 22-11-00.)
   (5) Install nose compartment access doors.





Detail A

14-161B

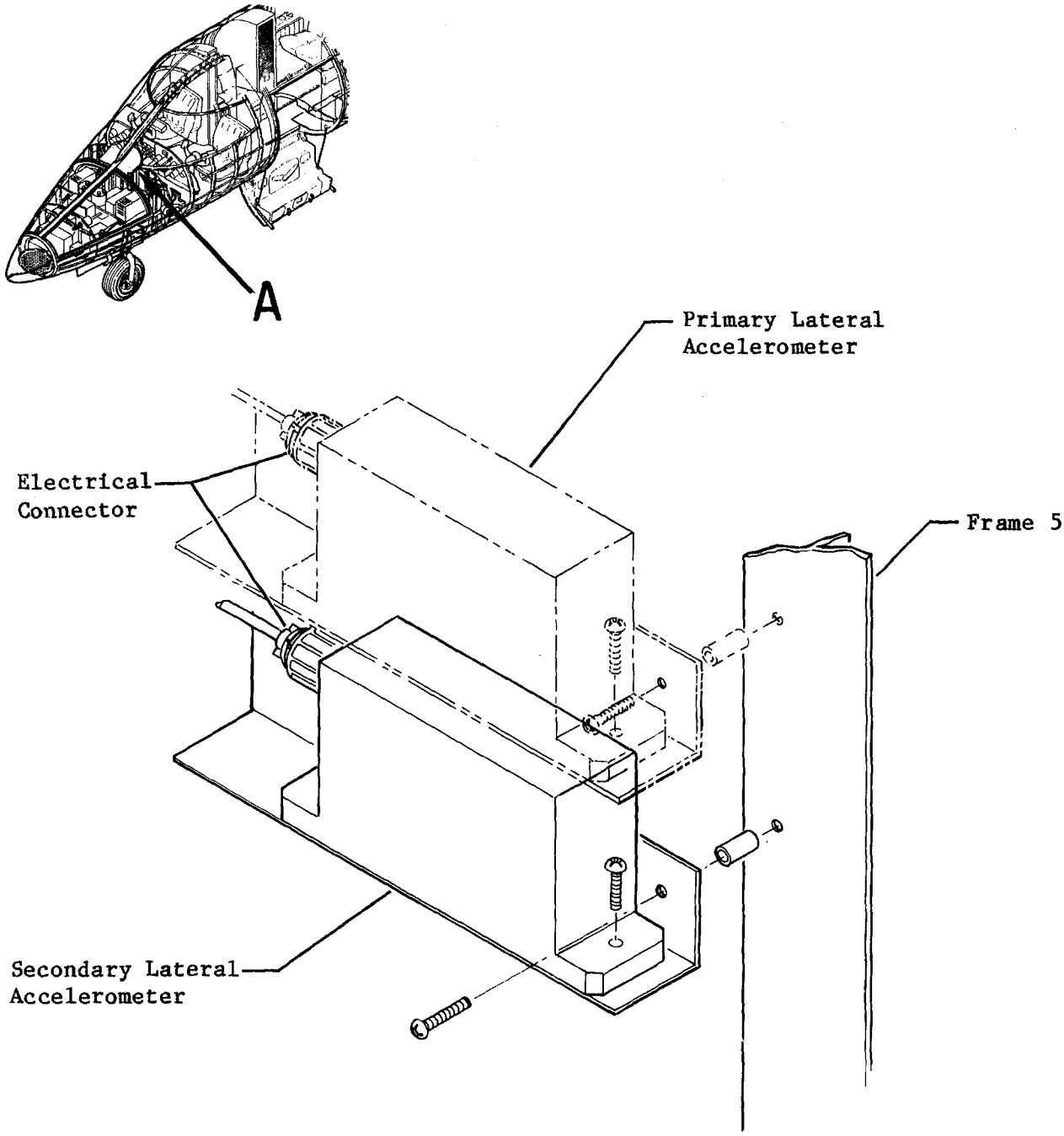
Yaw Rate Gyros Installation
Figure 201

LATERAL ACCELEROMETER - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Lateral Accelerometer (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Gain access to lateral accelerometers through nose avionics compartment doors.
   (3) Disconnect electrical connector.
   (4) Remove attaching parts and remove lateral accelerometer from aircraft.

B. Install Lateral Accelerometer (See figure 201.)
   (1) Position lateral accelerometer on mounting bracket and secure with attaching parts.
   (2) Connect electrical connector to lateral accelerometer.
   (3) Install all avionics equipment removed to facilitate removal of the lateral accelerometer.
   (4) Restore electrical power to aircraft.
   (5) Perform yaw damper system operational check. (Refer to 22-11-00.)



Detail A

14-161B

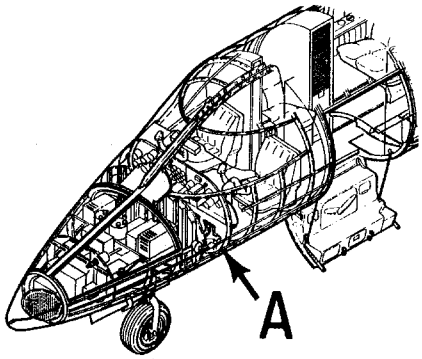
Lateral Accelerometer Installation
Figure 201

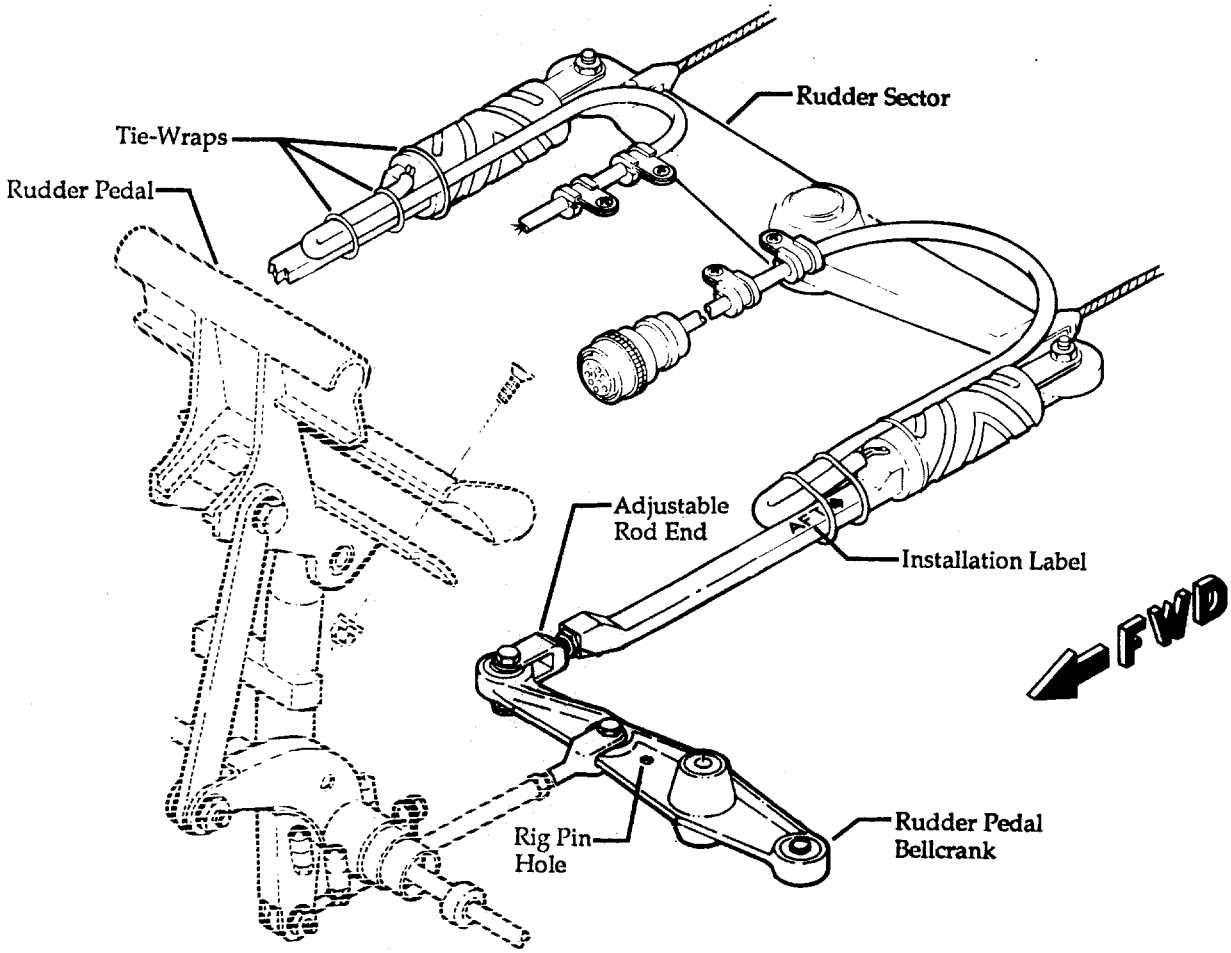
YAW DAMPER FORCE SENSOR - MAINTENANCE PRACTICES

1. **Removal/Installation**
   A. Remove Yaw Damper Force Sensors (See figure 201.)
      (1) Remove pilot's and copilot's seats. (Refer to Chapter 25.)
      (2) Remove cockpit floorboards between rudder pedals and frame 8.
      (3) Place rudder pedals in neutral position and install 0.25-inch diameter rigging pin in rudder pedal bellcrank.
      (4) Remove nylon tie-down which holds electrical wire to force sensor.
      (5) Disconnect electrical connector from yaw damper force sensor.
      (6) Remove attaching parts from each end of yaw damper force sensor and remove force sensor.
   B. Install Yaw Damper Force Sensors (See figure 201.)

      NOTE: With rudder pedals in neutral position, it may be necessary to adjust the adjustable rod end of the yaw damper force sensor.

      (1) Place yaw damper force sensor in position and secure with attaching parts.
      (2) Connect electrical connector to yaw damper force sensor.
      (3) Install nylon tie-down to hold electrical wiring in place.
      (4) Rig rudder control system. (Refer to Chapter 27.)
      (5) Remove rigging pins.
      (6) Perform yaw damper force sensor system operational test. (Refer to 22-11-00.)
      (7) Install cockpit floorboards.
      (8) Install pilot's and copilot's seats. (Refer to Chapter 25.)



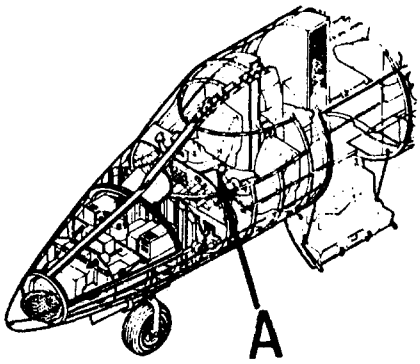


Detail A

Yaw Damper Force Sensor Installation
Figure 201

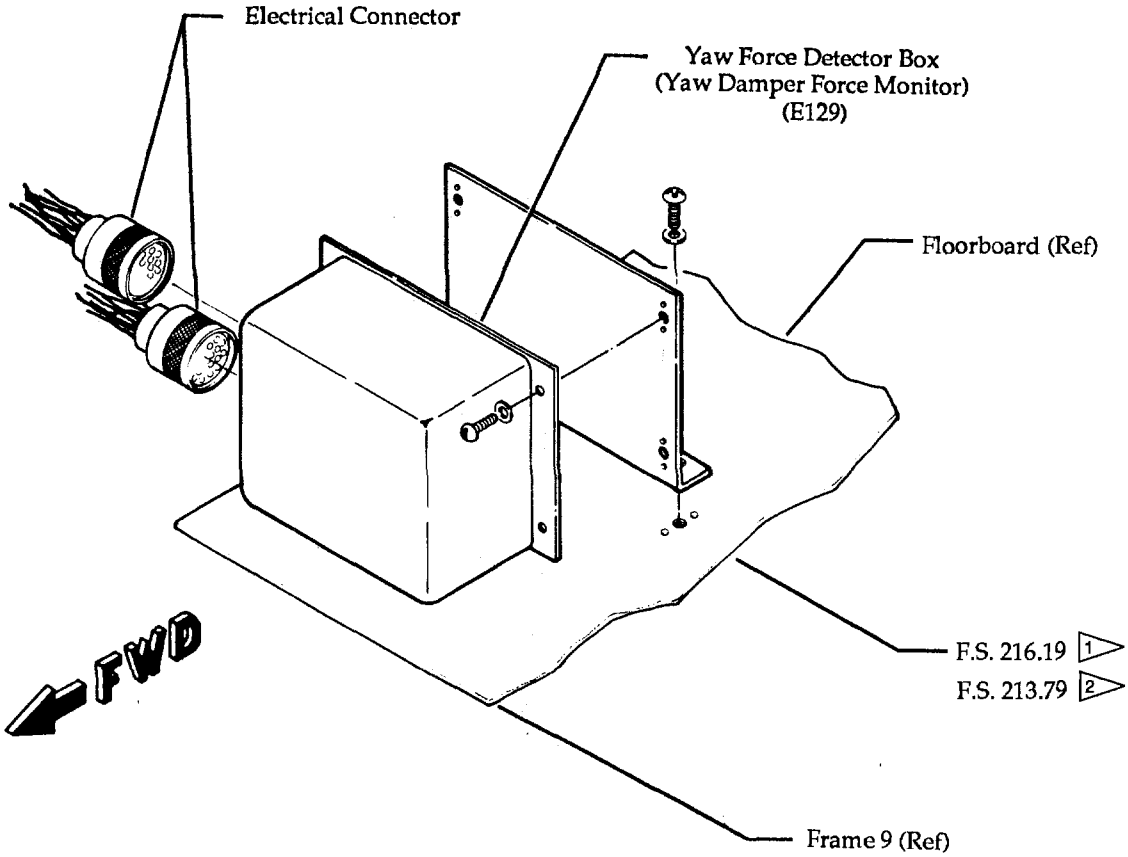
YAW FORCE DETECTOR BOX (YAW DAMPER FORCE MONITOR) - MAINTENANCE PRACTICES

1. **Removal/Installation**
   A. Remove Yaw Force Detector (Yaw Damper Force Monitor) (See figure 201.)
      (1) Remove electrical power from aircraft.
      (2) Remove copilot's seat. (Refer to Chapter 25.)
      (3) Disconnect electrical connector.
      (4) Remove yaw force detector attaching hardware and remove yaw force detector.
   B. Install Yaw Force Detector (Yaw Damper Force Monitor) (See figure 201.)
      (1) Position yaw force detector on mounting bracket and secure with attaching parts.
      (2) Connect electrical connector to yaw force detector.
      (3) Install copilot's seat. (Refer to Chapter 25.)
      (4) Restore electrical power to aircraft.
      (5) Perform yaw damper force sensor system operational check. (Refer to 22-11-00.)



1 *35-408, 35-506 THRU 35-670, 36-054 THRU 36-063 AND PRIOR AIRCRAFT MODIFIED PER AAK 83-2, "INSTALLATION OF FC-530 AUTOPILOT"*

2 *35-671 AND SUBSEQUENT; 36-064 AND SUBSEQUENT*



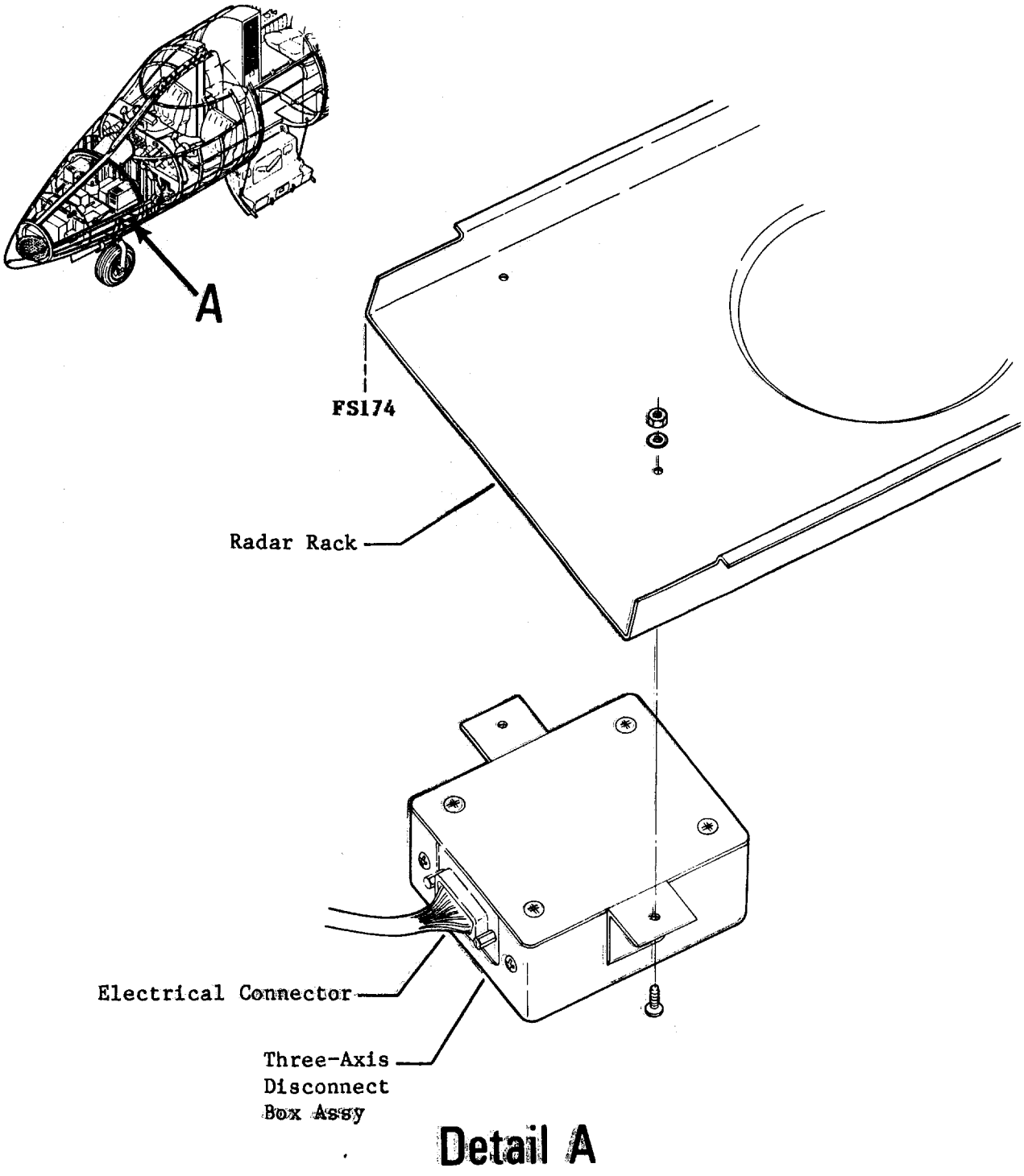
Detail A

10-93A

Yaw Force Detector Box (Yaw Damper Force Monitor) Installation
Figure 201

THREE-AXIS DISCONNECT BOX - MAINTENANCE PRACTICES

1. **Removal/Installation**
   A. Remove Three-Axis Disconnect Box (*Aircraft 35-002 thru 35-505 except 35-408 and 36-002 thru 36-053 modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See figure 201.)
      (1) Remove electrical power from aircraft.
      (2) Gain access to three-axis disconnect box by removing equipment and floorboards at FS 174, LBL 6.
      (3) Disconnect electrical connector from three-axis disconnect box. Remove attaching parts and three-axis disconnect box from aircraft.
   B. Install Three-Axis Disconnect Box (*Aircraft 35-002 thru 35-505 except 35-408 and 36-002 thru 36-053 modified per AAK 83-2, "Installation of FC-530 Autopilot"*)(See figure 201.)
      (1) Position three-axis disconnect box on mounting bracket and secure with attaching parts.
      (2) Connect electrical connector to three-axis disconnect box.
      (3) Install floorboards and equipment which were removed to facilitate removal of three-axis disconnect box.
      (4) Restore electrical power to aircraft.
   C. Remove Three-Axis Disconnect Box (*Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent*) (See figure 201.)
      (1) Remove electrical power from aircraft.
      (2) Gain access to three-axis disconnect box on copilot's floorboard aft of frame 9.
      (3) Disconnect electrical connector from three-axis disconnect box.
      (4) Remove attaching parts and three-axis disconnect box from aircraft.
   D. Install Three-Axis Disconnect Box (*Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent*) (See figure 201.)
      (1) Position three-axis disconnect box on bracket and secure with attaching parts.
      (2) Connect electrical connector to three-axis disconnect box.
      (3) Install any equipment removed to gain access to three-axis disconnect box.
      (4) Restore electrical power to aircraft.



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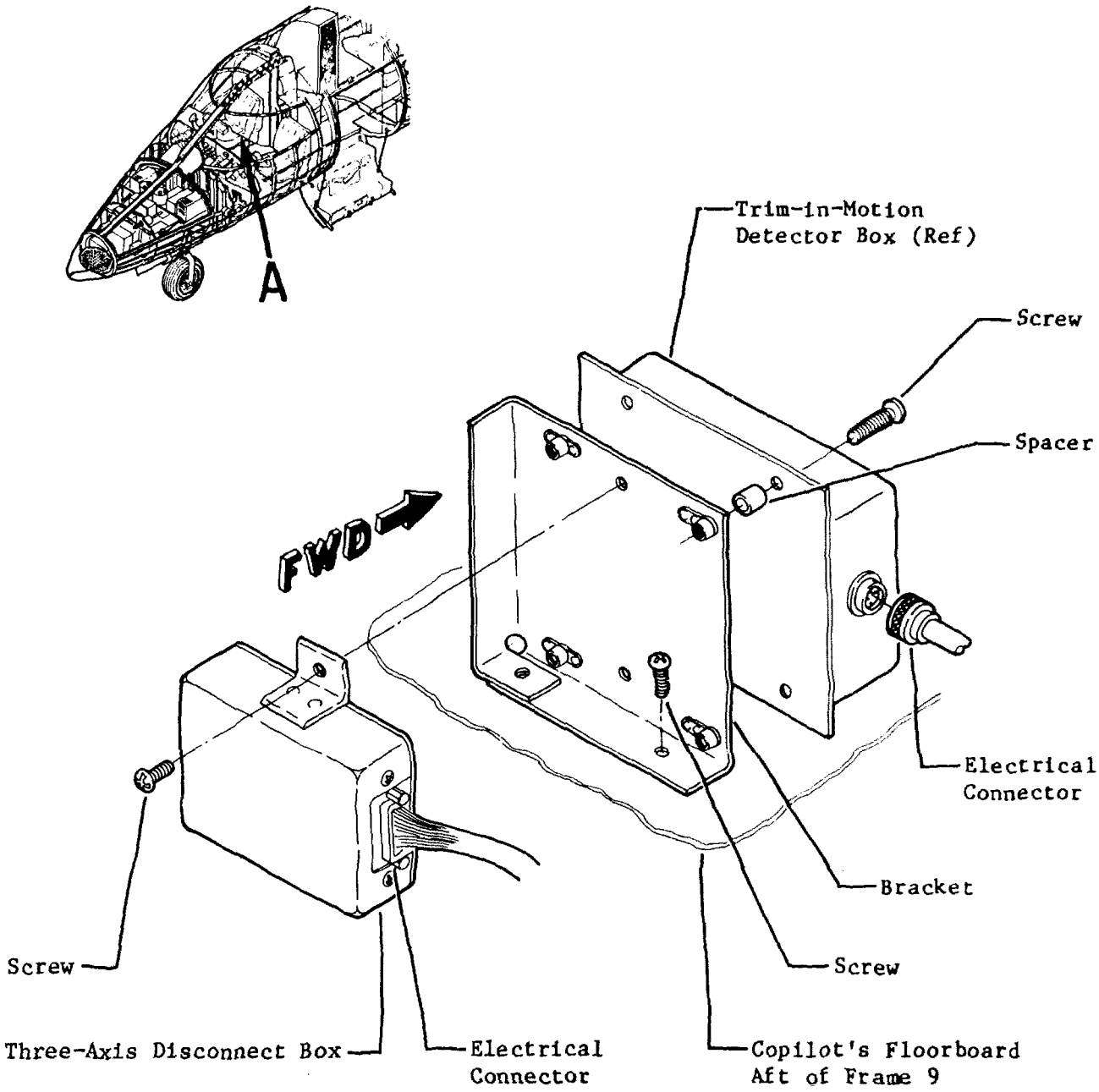
Three-Axis Disconnect Box Installation
Figure 201



Detail A

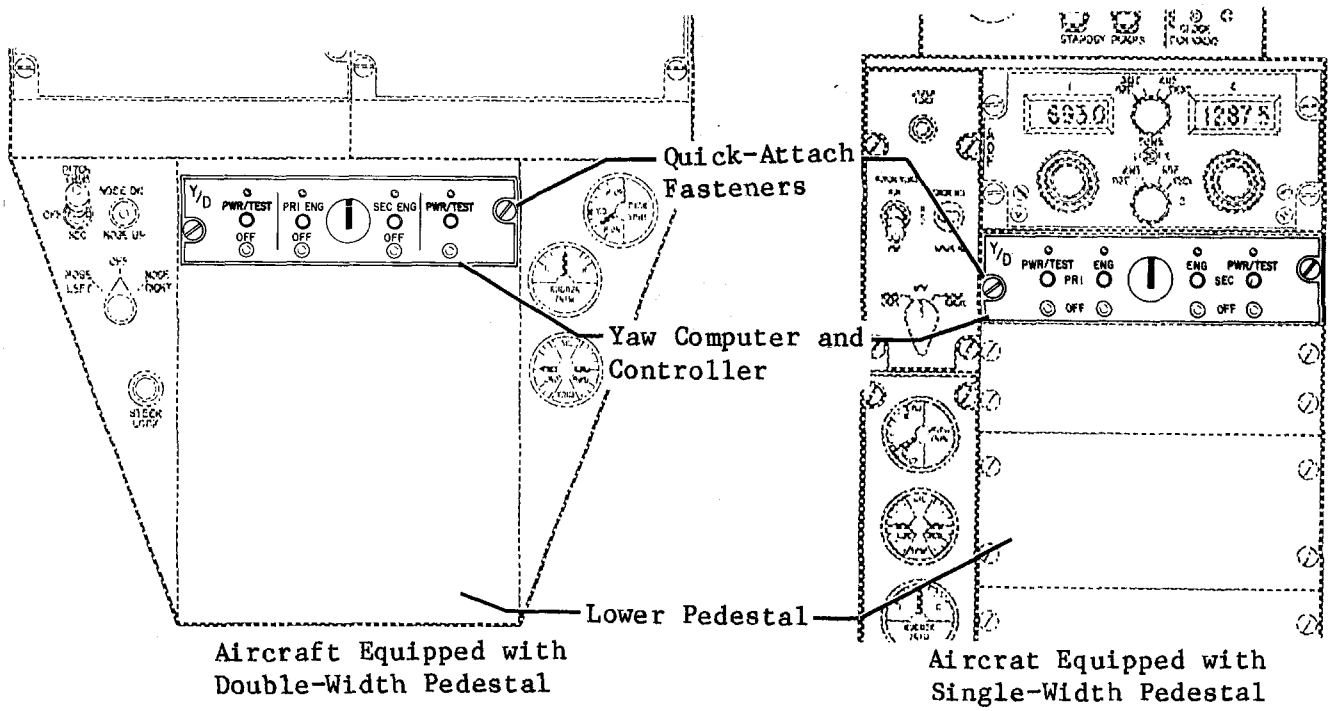
8-96B-2

Three-Axis Disconnect Box Installation
Figure 202

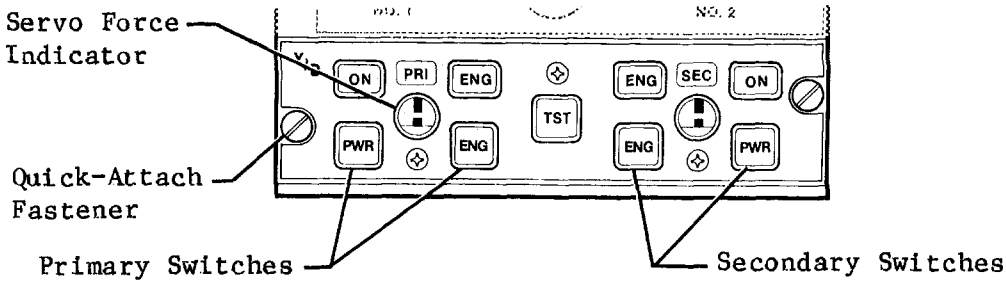
EFFECTIVITY: 35-408, 35-506 AND SUBSEQUENT,
36-054 AND SUBSEQUENT

YAW COMPUTER AND CONTROLLER - MAINTENANCE PRACTICES

1. **Removal/Installation**
   A. Removal of Yaw Computer and Controller (See Figure 201.)
      (1) Set Battery Switch(es) off and disconnect aircraft batteries.
      (2) Release quick-attach fasteners.
      (3) Remove yaw computer and controller sufficiently to gain access to electrical connectors.
      (4) Disconnect electrical connectors and remove computer and controller from pedestal.
   B. Installation of Yaw Computer and Controller (See Figure 201.)
      (1) Connect electrical connectors to computer and controller.
      (2) Install computer and controller in pedestal.
      (3) Secure with quick-attach fasteners.
      (4) Connect electrical connectors to aircraft batteries.
      (5) Perform Operational Check of the Dual Yaw Damper System. (Refer to 22-11-00, Inspection/ Check.)



(35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot")



(Typical 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2,"Installation of FC-530 Autopilot")

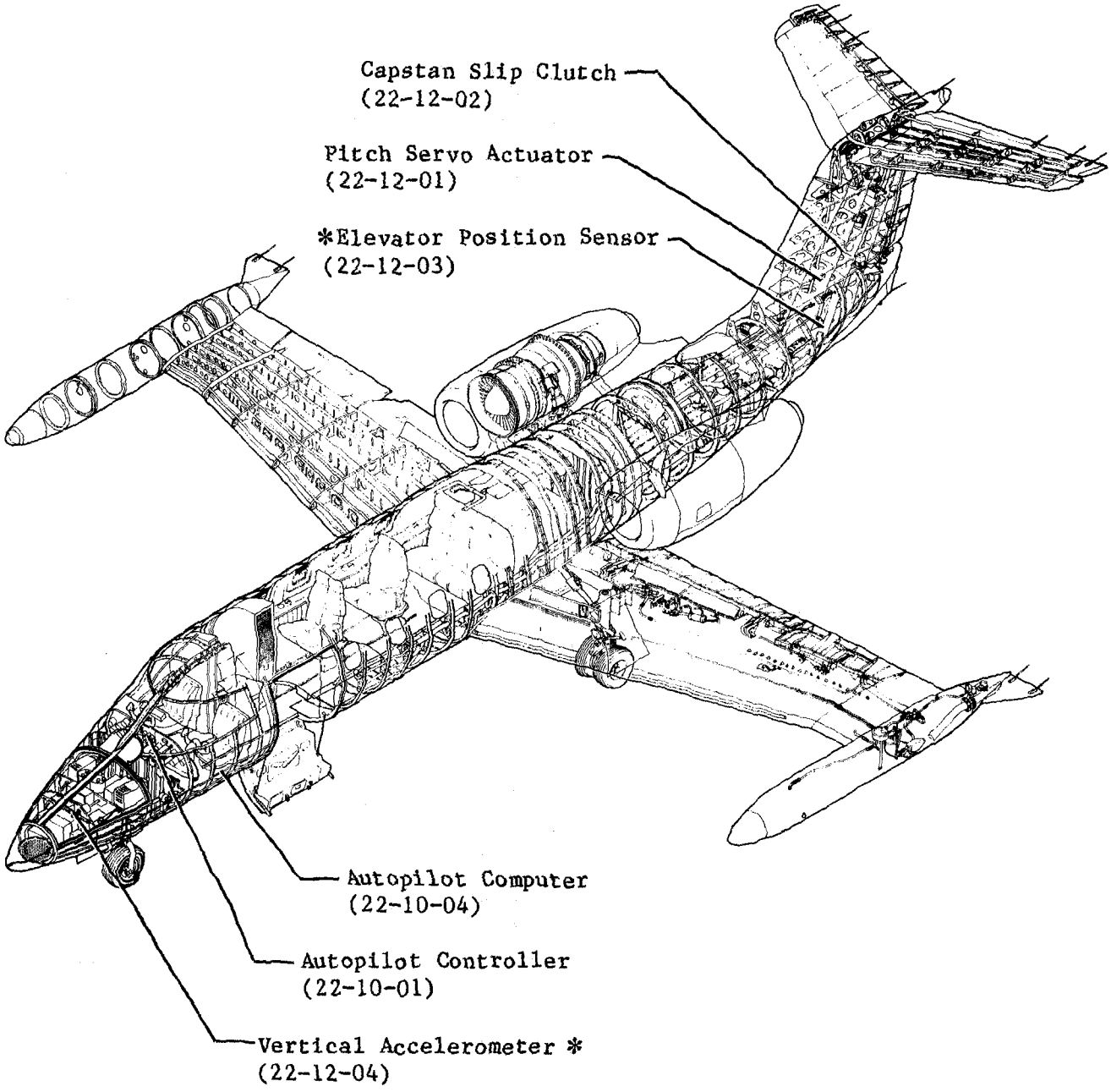
Yaw Computer and Controller
Figure 201

AUTOPILOT PITCH SYSTEM - DESCRIPTION AND OPERATION

1. DESCRIPTION (See figure 1.)
   A. The autopilot pitch system consists of the autopilot controller (22-10-01), autopilot computer (22-10-04), pitch servo actuator, capstan slip clutch, servo cables, pitch position sensor, and vertical accelerometer.
   B. Component Description
      (1) The autopilot controller is installed as part of the glareshield.
      (2) The autopilot-computer is installed under the pilot's seat.
      (3) The pitch servo actuator is located in the lower portion of the vertical stabilizer.
      (4) The capstan slip clutch is located adjacent to the pitch servo actuator.
      (5) The servo cables attach the pitch servo actuator to the elevator sector.
      (6) On *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* a pitch position sensor is installed in the vertical stabilizer on the elevator sector.
      (7) On *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* a vertical accelerometer is installed aft of frame 2.

2. OPERATION
   A. The autopilot pitch system controls elevator position as required to attain desired airspeed, vertical speed, or altitude.
      (1) Airspeed is maintained by coupling the autopilot computer with the air data information. This is accomplished by depressing the SPD pushbutton on the autopilot controller. Airspeed is maintained (throttle setting maintained by crew) by changing pitch attitude.
      (2) Vertical speed (rate-of-climb or descent) is maintained when the V/S pushbutton on the autopilot controller is depressed.
      (3) The desired altitude is selected on the altitude alerter and either altitude select (ALT SEL) or altitude hold (ALT HLD) pushbutton on the autopilot controller is depressed. The desired altitude is attained or maintained by elevator position.
      (4) The glideslope (G/S) mode is a subfunction of the navigation mode; however, to maintain G/S CAPT mode the elevator position is changed by the autopilot pitch system.
      (5) Selecting one pitch mode while operating another pitch mode will disengage the existing pitch mode, except for SPD, G/S ARM, and ALT SEL ARM.
   B. Component Operation
      (1) The autopilot controller contains the pushbutton switches necessary to select desired pitch modes.
      (2) The autopilot computer contains the logic circuitry necessary to process the various selected modes, respond to various inputs, and electrically command the pitch servo actuator to change elevator position as required to maintain the desired pitch mode.
      (3) The pitch servo actuator is attached to the elevator control system by a servo cable attached at the elevator yoke assembly.
      (4) The servo cables are attached to the pitch servo actuator through the capstan slip clutch.
      (5) The capstan slip clutch consists of a cable drum, electrical disconnect clutch, and a mechanical slip clutch in an arrangement that couples torque to the elevators. The capstan slip clutch permits the pilot to assume control of the aircraft when the autopilot is engaged by simply overpowering the autopilot system.
      (6) The capstan slip clutch is set to slip at 210 to 260 inch-pounds.
      (7) On *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* the pitch position sensor is mechanically linked to the elevator sector to provide the autopilot an electrical response of elevator position.
      (8) On *Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* the vertical accelerometer senses vertical speed and electrically reports the vertical speed information to the autopilot computer.

* 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2,"Installation of FC-530 Autopilot"



Autopilot Pitch System Component Location
Figure 1

AUTOPILOT PITCH SERVO ACTUATOR - MAINTENANCE PRACTICES

1. Removal/Installation

A. Removal of Pitch Servo Actuator (See Figure 201.)

(1) Set Battery Switch(es) off and disconnect aircraft batteries.

(2) Remove vertical stabilizer access panels to gain access to autopilot pitch servo installation.

(3) Disconnect electrical connector from pitch servo actuator.

CAUTION: WHEN CAPSTAN SLIP CLUTCH AND SERVO ACTUATOR ARE SEPARATED, THE COVER PLATE AND FOUR C-SHAPED WASHERS DETACH FREELY. USE CARE NOT TO LOSE SPACERS OR DAMAGE COVER PLATE.

(4) Remove attaching parts and remove pitch servo actuator and cover plate from capstan slip clutch assembly.

B. Installation of Pitch Servo Actuator (See Figure 201.)

(1) Tools and Equipment

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Grease	Mobilgrease 28 (MIL-G-81322)	Mobil Fairfax, VA	Lubricate parts.

(1) Lightly lubricate servo pinion gear and capstan gear with grease.

(2) Clean cover plate and apply a fresh thin coat of grease.

CAUTION: IF C-SHAPED WASHERS ARE OMITTED UPON INSTALLATION, THE PITCH SERVO ACTUATOR MOUNTING TABS WILL BREAK WHEN THE BOLTS ARE TIGHTENED.

(3) Ensure four C-shaped washers are in place on servo mounting tabs. Washers may be bonded to servo to ease installation.

(4) Set cover plate on servo actuator.

(5) Install pitch servo actuator on capstan and secure with attaching parts.

(6) Remove excess grease. Allow a small bead of grease to remain along edge of cover plate.

(7) Connect electrical connector to pitch servo actuator.

(8) Connect electrical connectors to aircraft batteries.

(9) Perform Operational Check of Pitch Servo Actuator. (Refer to Inspection/Check, this section.)

(10) Install vertical stabilizer access panels.

2. Inspection/Check

A. Operational Check of Pitch Servo Actuator

(1) Manually move control column to full forward and aft positions to ensure that no binding exists in control system.

(2) Set Battery and Primary Inverter Switches on.

(3) Set Autopilot Master Switch on and engage autopilot.

(4) Move control column forward and release. Column shall slowly return to neutral.

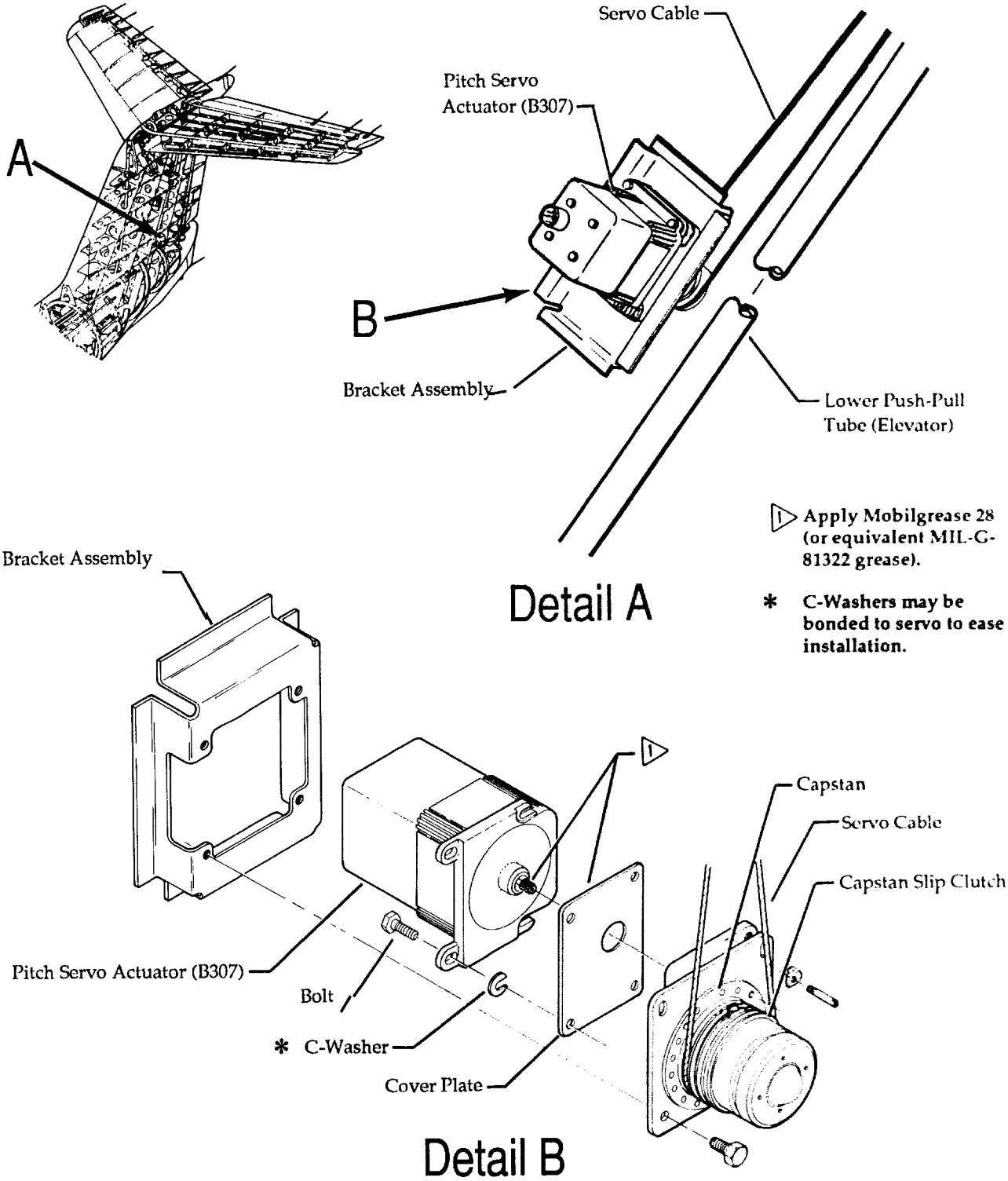
(5) Move control column aft and release. Column shall slowly return to neutral.

(6) Move pilot's or copilot's Control Wheel Trim Switch (arm push buton not depressed) to nose down. Control column shall move forward.

(7) Move pilot's or copilot's Control Wheel Trim Switch to nose up. Control column shall move aft.

(8) With angle of attack vanes held down, set Left Stall Warning Switch on.

(9) Slowly raise angle of attack vane. Stick shaker action shall occur.
(10) Continue raising angle of attack vane until stick pusher activates causing control column to move forward of neutral. Return angle of attack vanes down.
(11) Set system Select and Test Switch to MACH and depress and hold Press-to-Test pushbutton.
(a) *On Aircraft 35-002 thru 35-505, except 35-408 and 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot"*, control column shall move aft with approximately 18 pounds of force and the aural warning shall sound.
(b) *On Aircraft 35-408, 35-506 and Subsequent , 36-054 and prior Aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot*," aural warning shall sound and stick puller shall actuate for 0.5 second, cease for 0.5 second, actuate for 0.5 second, cease for 0.5 second, and aural warning shall sound for approximately 0.5 second.
(12) Set all switches off.
(13) Perform Stick Puller Functional Check. (Refer to Chapter 34.)



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B8-72B-1

Autopilot Pitch Servo Actuator Installation
Figure 201

AUTOPILOT PITCH CAPSTAN SLIP CLUTCH - MAINTENANCE PRACTICES

1. REMOVAL/INSTALLATION

A. Remove Pitch Capstan Slip Clutch (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Remove vertical stabilizer access panels to gain access to pitch capstan slip clutch.
   (3) Disconnect electrical connectors from capstan slip clutch and pitch servo actuator.
   (4) Loosen servo cable sufficiently and unwrap cable from capstan slip clutch.
   (5) Remove attaching parts and remove pitch capstan slip clutch with servo actuator attached.
   (6) Remove attaching parts and capstan slip clutch from servo actuator.

B. Install Pitch Capstan Slip Clutch (See figure 201.)
   (1) If adjustment is required, adjust capstan slip clutch. (Refer to step 2.A.)
   (2) Lightly lubricate servo pinion gear and capstan gear (detail B) with Mobilgrease 28 (or equivalent MIL-G-81322 grease).
   (3) Clean cover plate and apply a fresh thin coat of Mobilgrease 28 (or MIL-G-81322 equivalent) to both sides of cover plate.
   (4) Position cover plate on servo actuator.
   (5) Install capstan on pitch servo actuator and secure with attaching parts.
   (6) Allow a small bead of grease to remain along edge of cover plate and remove excess grease.
   (7) Install pitch servo actuator with capstan attached and secure with attaching parts.
   (8) Wrap cable on capstan. Ensure that cable is wrapped properly. (See figure 201.)
   (9) Adjust servo cable tension to 60 (±5) pounds. (Refer to Chapter 27 for cable tension temperature-load chart.)
   (10) Connect electrical connectors to capstan and servo actuator.
   (11) Restore electrical power to aircraft.
   (12) Perform functional check of pitch servo actuator.
   (13) Install vertical stabilizer access panels.

2. ADJUSTMENT/TEST

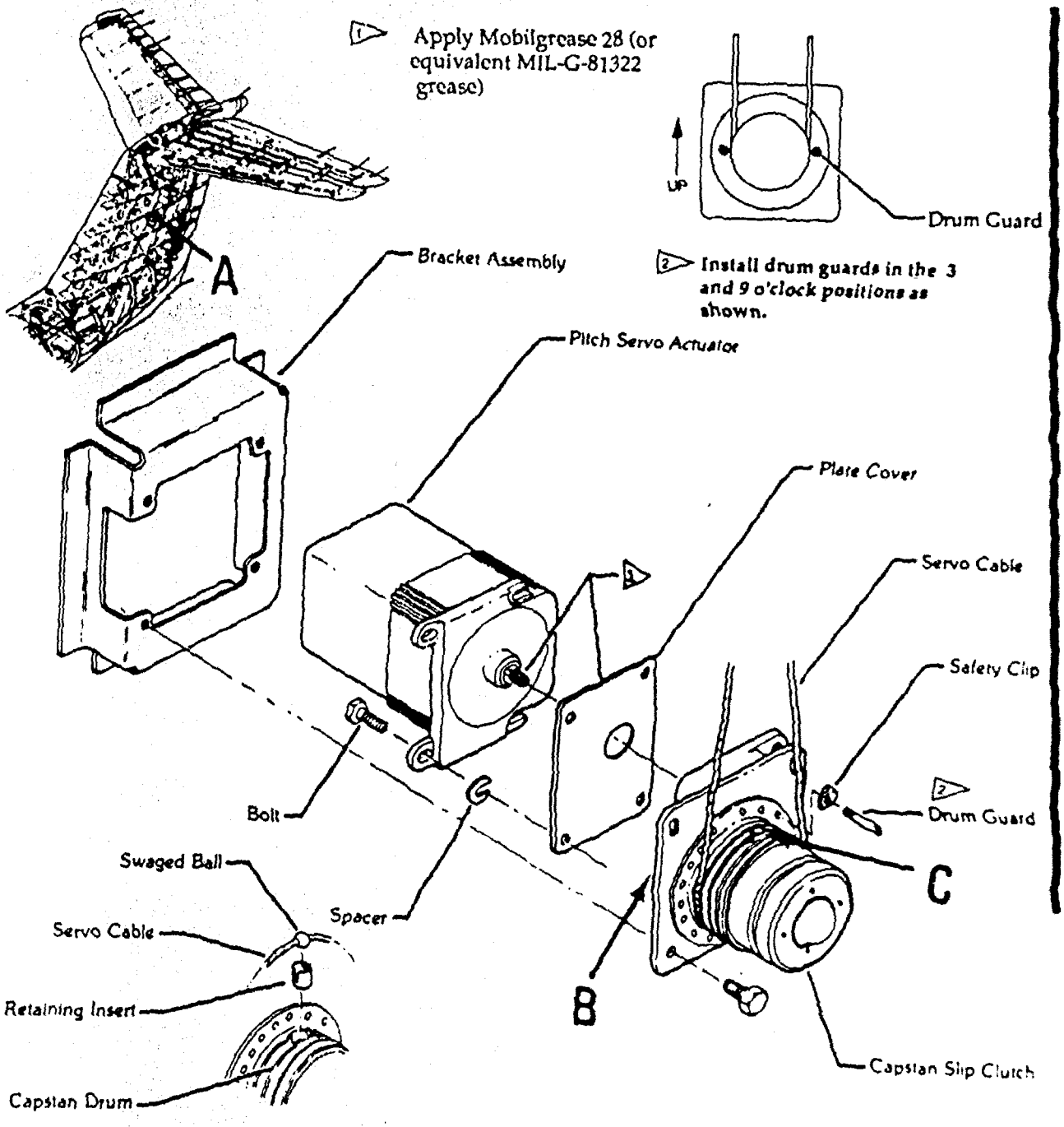
A. Adjust Capstan Slip Clutch (See figure 201.)
   (1) Remove capstan slip clutch from aircraft. (Refer to step 1.A.)
   (2) Secure capstan in a suitable mounting fixture such as a vise.
   (3) Install torque adapter (Bendix P/N 4006232-0501 or Learjet P/N 2370116-1) on capstan where servo was installed.
   (4) Install the two drum guards and safety clips.
   (5) Insert a pin or bolt into the hole in the drum surface to prevent the drum from turning when the pin seats against the drum guards.
   (6) Fabricate a wire bundle as shown in figure 201.
   (7) Connect a variable DC power supply to capstan using the wire bundle fabricated in step (6).
   (8) Adjust DC power supply to 23.5 vdc and close switch.
   (9) Attach a torque wrench to torquer adapter and check for clutch slippage of 210 to 260 inch-pounds.

NOTE:
- When using torque adapter (Bendix P/N 4006232-0501 or Learjet P/N 2370116-1), a 5.65:1 ratio occurs between the torque adapter drive gear and the slip clutch ring gear; therefore, with a torque wrench reading of 37.2 to 46 inch-pounds, the actual slip clutch torque will be 210 to 260 inch-pounds.
- Some Learjet torque adapters may be marked "RATIO 5.65:1". This ratio applies to pitch axis only.

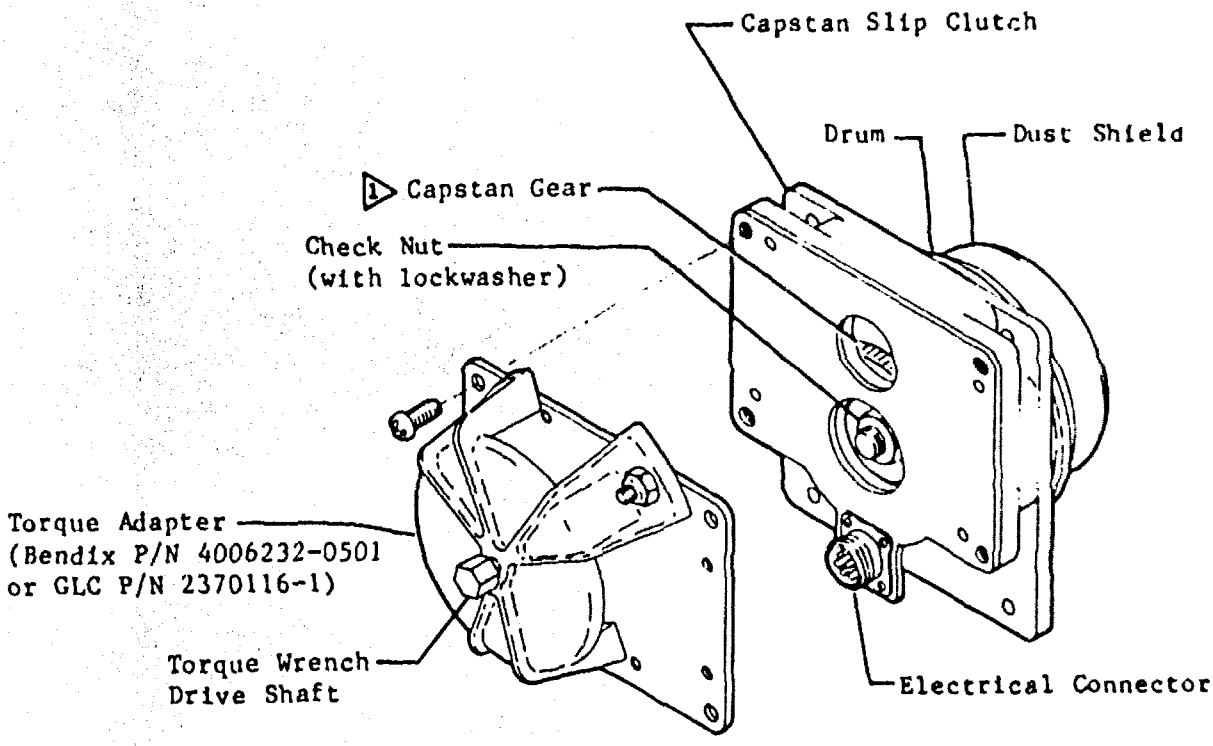
(10) Rotate torque wrench in opposite direction and check for clutch slippage.
(11) If torque values are not within the required range, bend tab of lock-washer back and tighten or loosen checknut as required to obtain correct torque. Secure checknut by bending lockwasher tab.
(12) With 23.5 vdc still applied to the capstan, repeatedly apply torque in one direction to the slip clutch. Repeat this procedure in the opposite direction. No cogging shall occur below 210 inch-pounds.

NOTE: Cogging occurs when the metal balls within the drum assembly jump from one ring seat groove to the next, causing the capstan drum to suddenly rotate approximately 15°.

(13) If cogging occurs below 210 inch-pounds while performing step (12), the capstan must be replaced.
(14) Remove torque wrench and adapter from capstan assembly and disconnect DC power supply.
(15) Remove drum guards and safety clips from capstan.
(16) Install capstan slip clutch in aircraft. (Refer to step 1.B.)

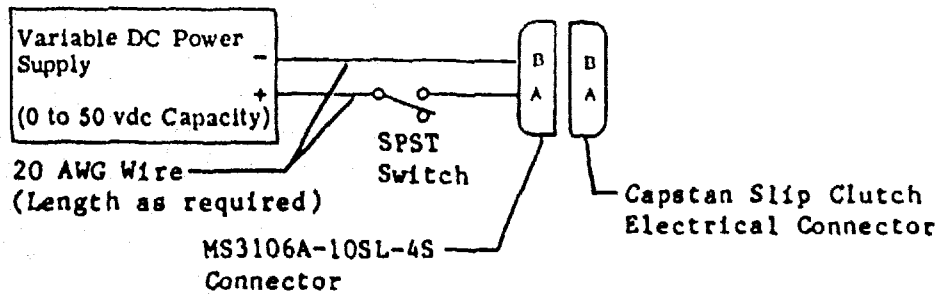


Capstan Slip Clutch Installation
Figure 201 (Sheet 1 of 2)



CAPSTAN SLIP CLUTCH AND ADAPTER ASSEMBLY

Detail B



CAPSTAN SLIP CLUTCH ELECTRICAL CONNECTION

Capstan Slip Clutch Adjustment
Figure 201 (Sheet 2 of 2)

AUTOPILOT ELEVATOR POSITION SENSOR - MAINTENANCE PRACTICES

1. REMOVAL/INSTALLATION

A. Remove Autopilot Elevator Position Sensor (See figure 201.)

(1) Remove electrical power from aircraft.
(2) Remove aft fuselage access covers to gain access to aft elevator sector.
(3) Ensure that elevator and horizontal stabilizer are properly rigged and in neutral position. Insert rigging pin in aft elevator sector.
(4) Remove attaching parts which secure position sensor shaft to position sensor arm.
(5) Remove attaching parts which secure position sensor retainer and position sensor. Remove position sensor retainer and position sensor from mounting bracket.
(6) Disconnect position sensor electrical wires from aircraft wire bundle at splices.

B. Install Autopilot Elevator Position Sensor (See figure 201.)

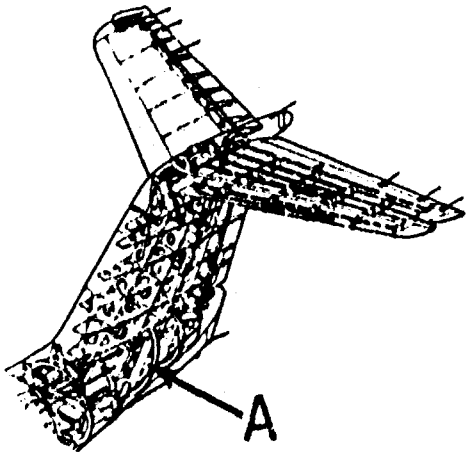
NOTE:
- The flat side of position sensor shaft shall be installed toward the split end of the position sensor arm.
- Ensure that the null mark on the shaft aligns with the null mark on position sensor body when installed.

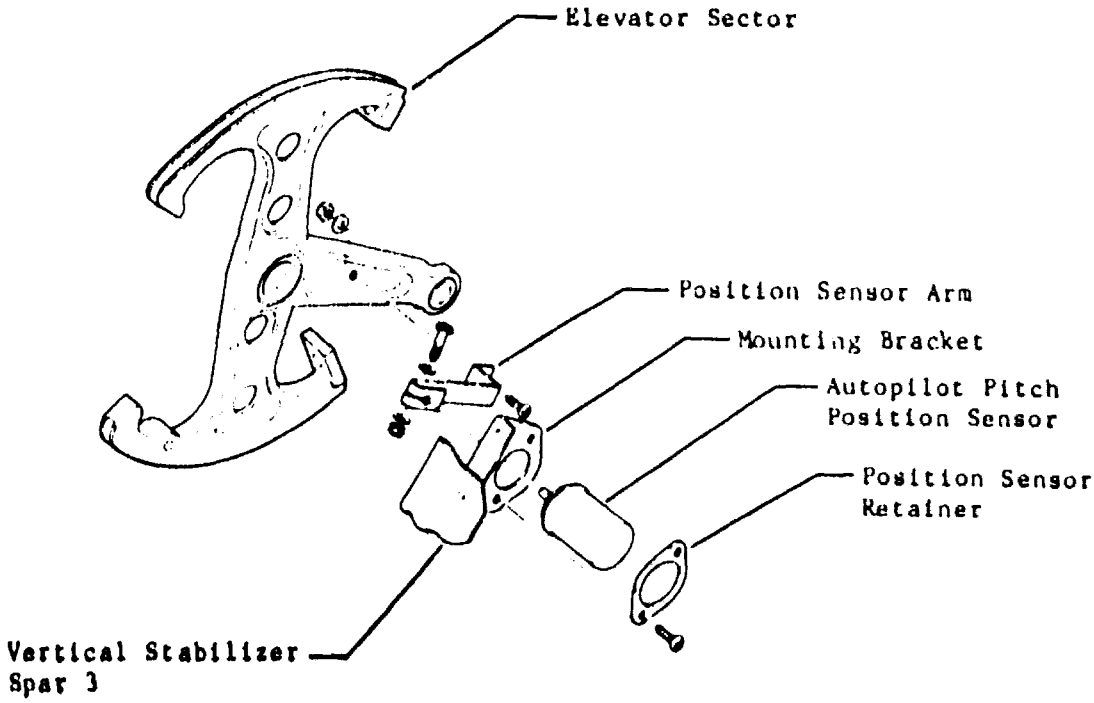
(1) Insert position sensor shaft through mounting bracket position sensor arm.
(2) Position retainer over position sensor body and secure with attaching parts.
(3) Secure position sensor shaft to position sensor arm with attaching parts.
(4) Connect position sensor electrical wires to aircraft wiring at splices. (Refer to Wiring Manual.)
(5) Restore electrical power to aircraft.
(6) Adjust autopilot elevator position sensor. (Refer to step 2.)
(7) Remove aft elevator sector rigging pin.
(8) Install aft fuselage access covers.

2. ADJUSTMENT/TEST

A. Adjust Autopilot Elevator Position Sensor

(1) Remove aft fuselage access panels to gain access to aft elevator sector.
(2) With elevator in neutral position, insert rigging pin in aft elevator sector.
(3) Disconnect position sensor wires (blue and yellow) from aircraft wiring.
(4) Connect a VTVM or equivalent to position sensor wire (blue and yellow).
(5) Set Battery Switches to BAT 1 and BAT 2.
(6) Set Inverter Switches on.
(7) Set Autopilot Master Switch to ON.
(8) Voltage reading on VTVM shall be 0.1 vac or less.
(9) If voltage is greater than 0.1 vac, loosen retainer attaching parts and rotate position sensor body until 0.1 vac or less is attained. Secure retainer attaching parts.
(10) Set Autopilot Master Switch, Inverter Switches, and Battery switches to OFF.
(11) Connect position sensor wires (blue and yellow) to aircraft wiring. (Refer to Wiring Manual.)
(12) Remove rigging pin from aft elevator sector.
(13) Install aft fuselage access panels.





Detail A

8-108

Autopilot Pitch Position Sensor Installation
Figure 201

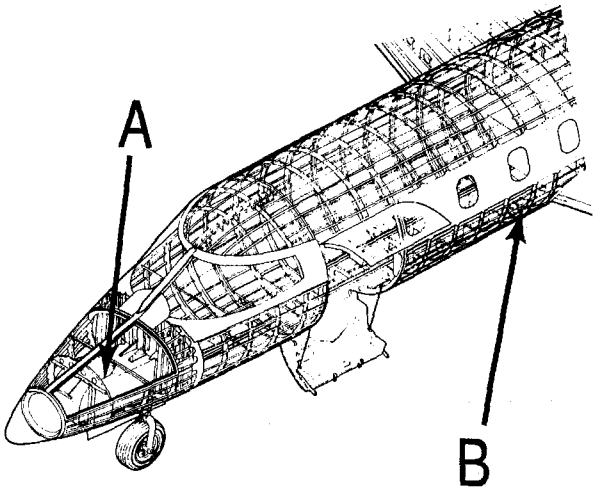
VERTICAL ACCELEROMETER - MAINTENANCE PRACTICES

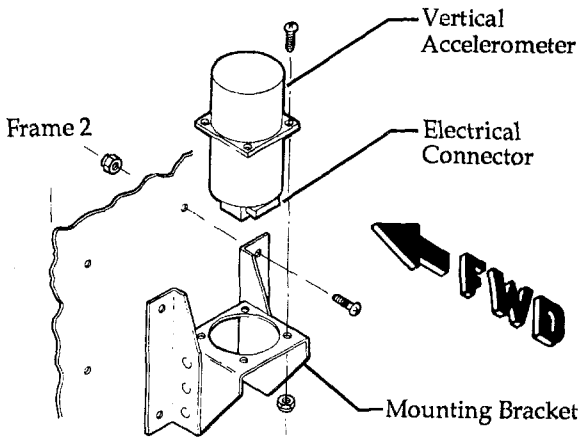
1. REMOVAL/INSTALLATION

NOTE: The vertical accelerometer may be installed on the aft side of frame 2 at LBL 8 or in the baggage compartment forward of frame 22.

A. Remove Vertical Accelerometer (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Gain access to vertical accelerometer.
   (3) Disconnect electrical connector from vertical accelerometer.
   (4) Remove attaching parts and remove vertical accelerometer from aircraft.

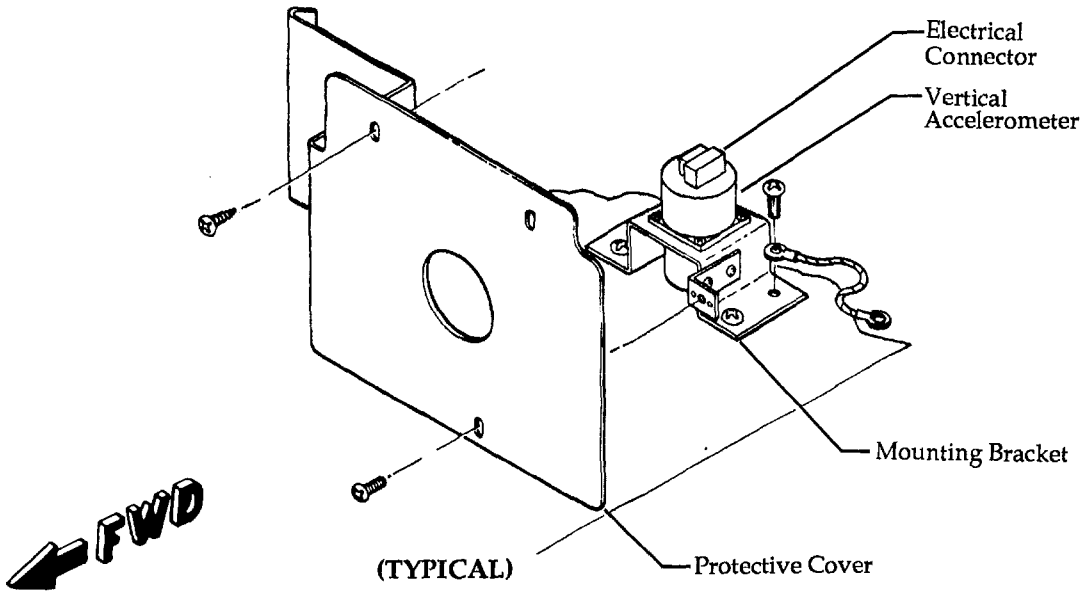
B. Install Vertical Accelerometer (See figure 201.)
   (1) Place vertical accelerometer in proper position and secure with attaching parts.
   (2) Connect electrical connector to vertical accelerometer.
   (3) On *Aircraft with vertical accelerometer installed in the nose compartment*, install nose compartment access doors. On *Aircraft with vertical accelerometer installed in the baggage compartment*, install protective cover and close baggage compartment doors.
   (4) Restore electrical power to aircraft.





(Aircraft with vertical accelerometer installed in nose compartment.)

Detail A



(Aircraft with vertical accelerometer installed in baggage compartment).

9-351A
9-448A

Detail B

Vertical Accelerometer Installation
Figure 201

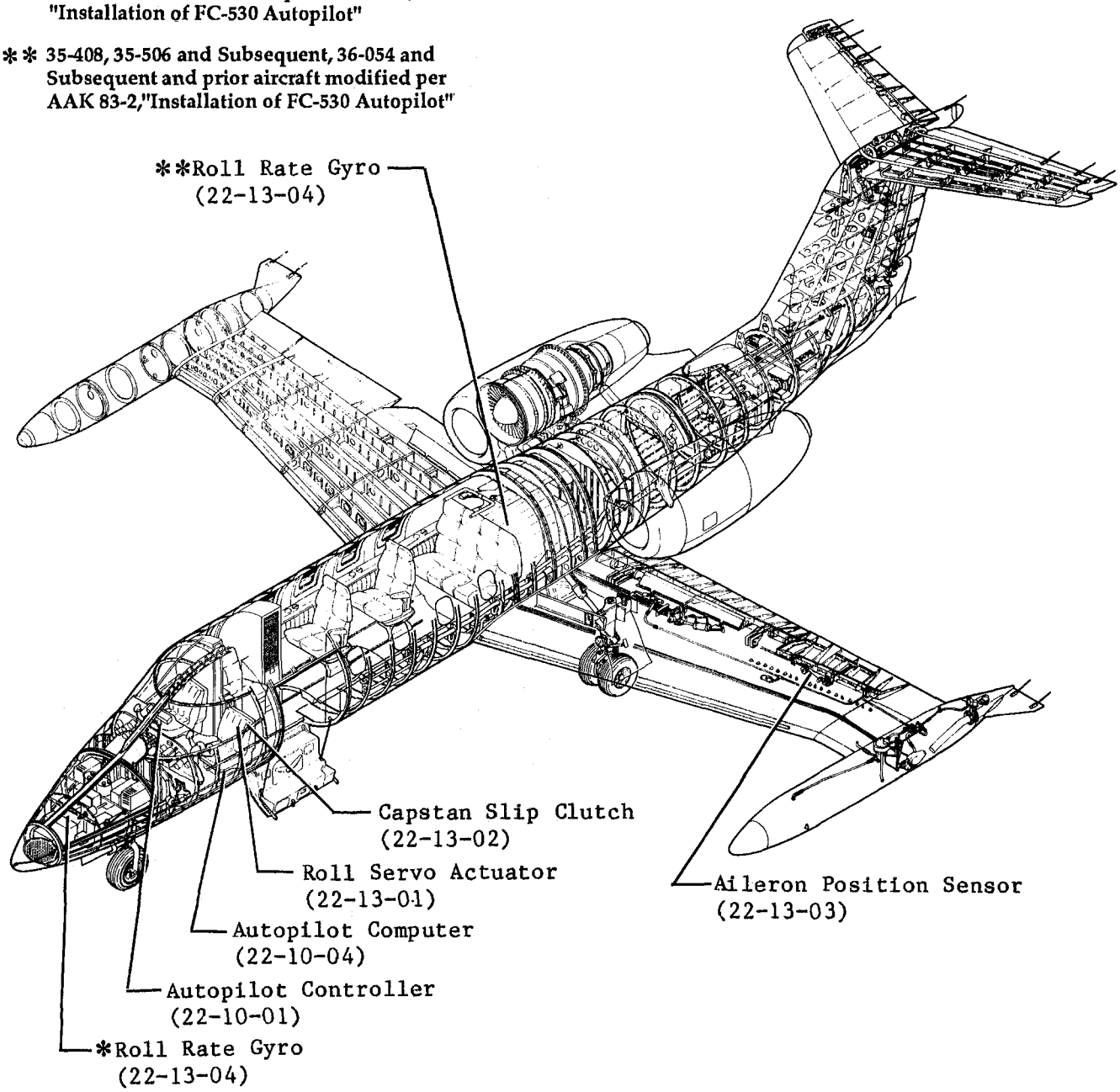
AUTOPILOT ROLL SYSTEM - DESCRIPTION AND OPERATION

1. DESCRIPTION (See figure 1.)
   A. The autopilot roll system consists of the autopilot controller (22-10-01), autopilot computer (22-10-04), roll servo actuator, capstan slip clutch, servo cables, aileron position sensor, and a roll rate gyro.
   B. Component Description
      (1) The autopilot controller is installed as part of the glareshield.
      (2) The autopilot computer is installed under the pilot's seat.
      (3) The roll servo actuator is installed forward of frame 9 at the center-line of the aircraft under the floorboards.
      (4) The capstan slip clutch is located adjacent to the roll servo actuator.
      (5) The servo cables attach the roll servo actuator and capstan slip clutch to the aileron cables aft of frame 9.
      (6) The roll position sensor is installed in the left wing forward of the aileron.
      (7) On *Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot,"* the roll rate gyro is mounted in the nose compartment at frame 1. On *Aircraft 35-408, 35-506 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* the roll rate gyro is installed on the underneath side of the aft baggage compartment floor forward of frame 17A. On *Aircraft 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* the roll rate gyro is installed on the seat floor forward of frame 17A.

2. OPERATION
   A. The autopilot roll system controls aileron position as required to attain heading, navigation, level, and roll command modes of operation.
      (1) Selecting one roll mode while operating another roll mode will disengage the existing mode except for NAV ARM and 1/2 BNK.
   B. Component Operation
      (1) The autopilot controller contains the pushbutton switches necessary to select the desired roll mode.
      (2) The autopilot computer contains the logic circuitry necessary to process the various selected modes, respond to various inputs, and electrically command the roll servo actuator to change aileron position as required to maintain or attain the desired mode.
      (3) The roll servo actuator is connected to the aileron cables by a servo cable attached aft of frame 9.
      (4) The servo cable is attached to the roll servo actuator through the capstan slip clutch.
      (5) The capstan slip clutch consists of a cable drum electrical disconnect clutch, and a mechanical slip clutch in an arrangement that couples torque to the aileron control cables. The capstan slip clutch permits the pilot to assume control of the aircraft when the autopilot is engaged by simply overpowering the autopilot system.
      (6) On *Aircraft equipped with 2380083-13 drum assembly*, the capstan slip clutch is set to slip at 150 to 165 inch-pounds.
      (7) On *Aircraft equipped with 2380083-15 drum assembly*, the capstan slip clutch is set to slip at 110 to 125 inch-pounds.
      (8) The aileron position sensor is mechanically linked to the left aileron to provide the autopilot an electrical response to the aileron position.
      (9) The roll rate gyro senses changes in aircraft roll position and sends this information as an electrical input to the autopilot computer.

* 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot"

** 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2,"Installation of FC-530 Autopilot"



Autopilot Roll System Component Location
Figure 1

AUTOPILOT ROLL SERVO ACTUATOR - MAINTENANCE PRACTICES

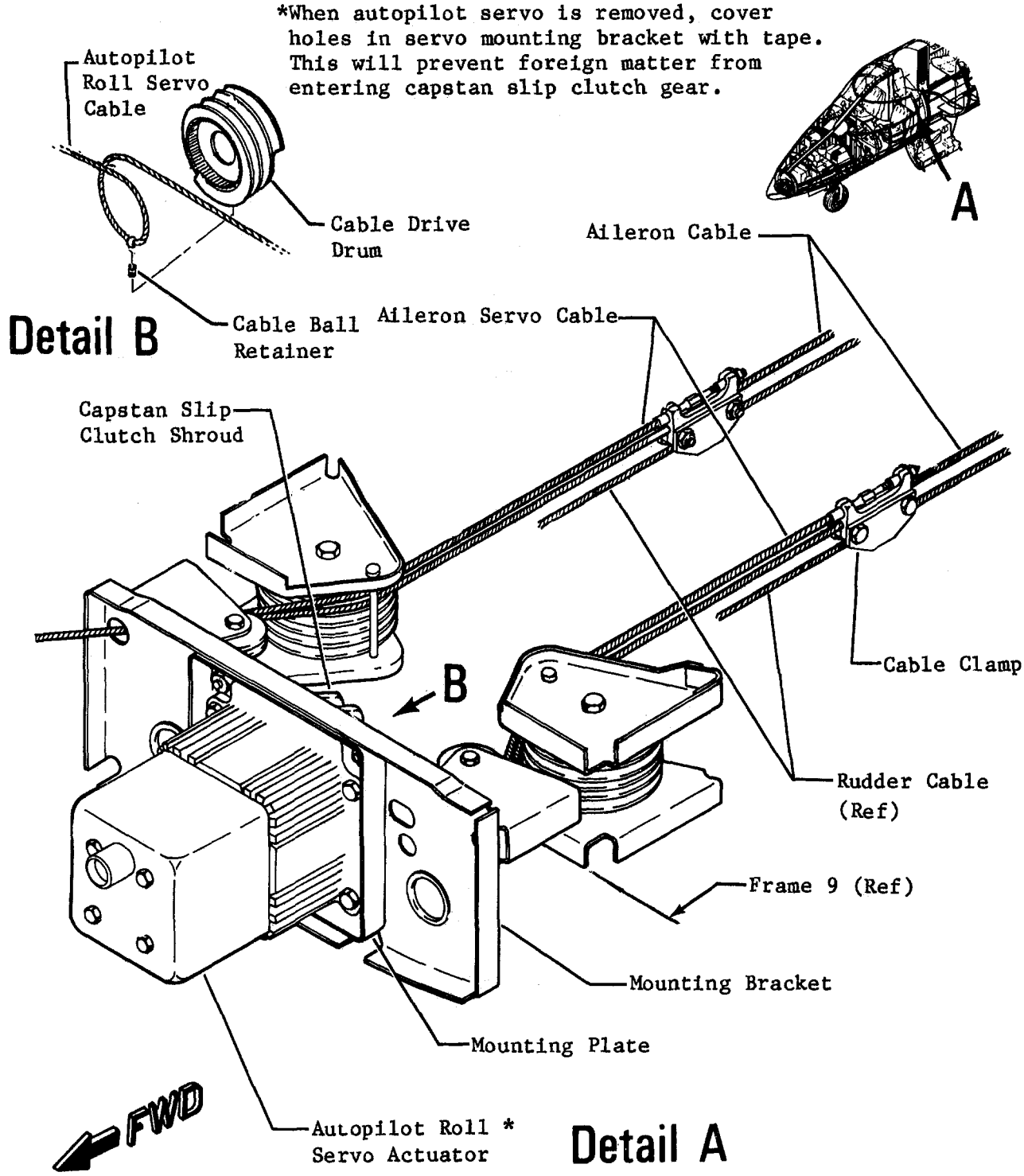
1. REMOVAL/INSTALLATION

A. Remove Roll Servo Actuator (See figure 201.)

(1) Remove electrical power from aircraft.
(2) Remove carpet and floorboards as required to gain access to roll servo actuator.
(3) Disconnect electrical connector from roll servo actuator.
(4) Remove attaching parts and roll servo actuator from aircraft.
(5) Cover holes in mounting bracket with tape. This will prevent foreign matter from entering capstan slip clutch.

B. Install Roll Servo Actuator (See figure 201.)

(1) Remove tape from mounting bracket holes.
(2) Lightly lubricate servo actuator pinion gear and slip clutch ring gear with Mobilgrease 28 (or equivalent MIL-G-81322 grease).
(3) Install roll servo actuator and secure with attaching parts.
(4) Install floorboards and carpet.



Roll Servo Actuator Installation
Figure 201

8-71C

AUTOPILOT ROLL CAPSTAN SLIP CLUTCH - MAINTENANCE PRACTICES

1. Removal/Installation

A. Tools and Equipment

NOTE: Equivalent substitutes may be used in lieu of the following:

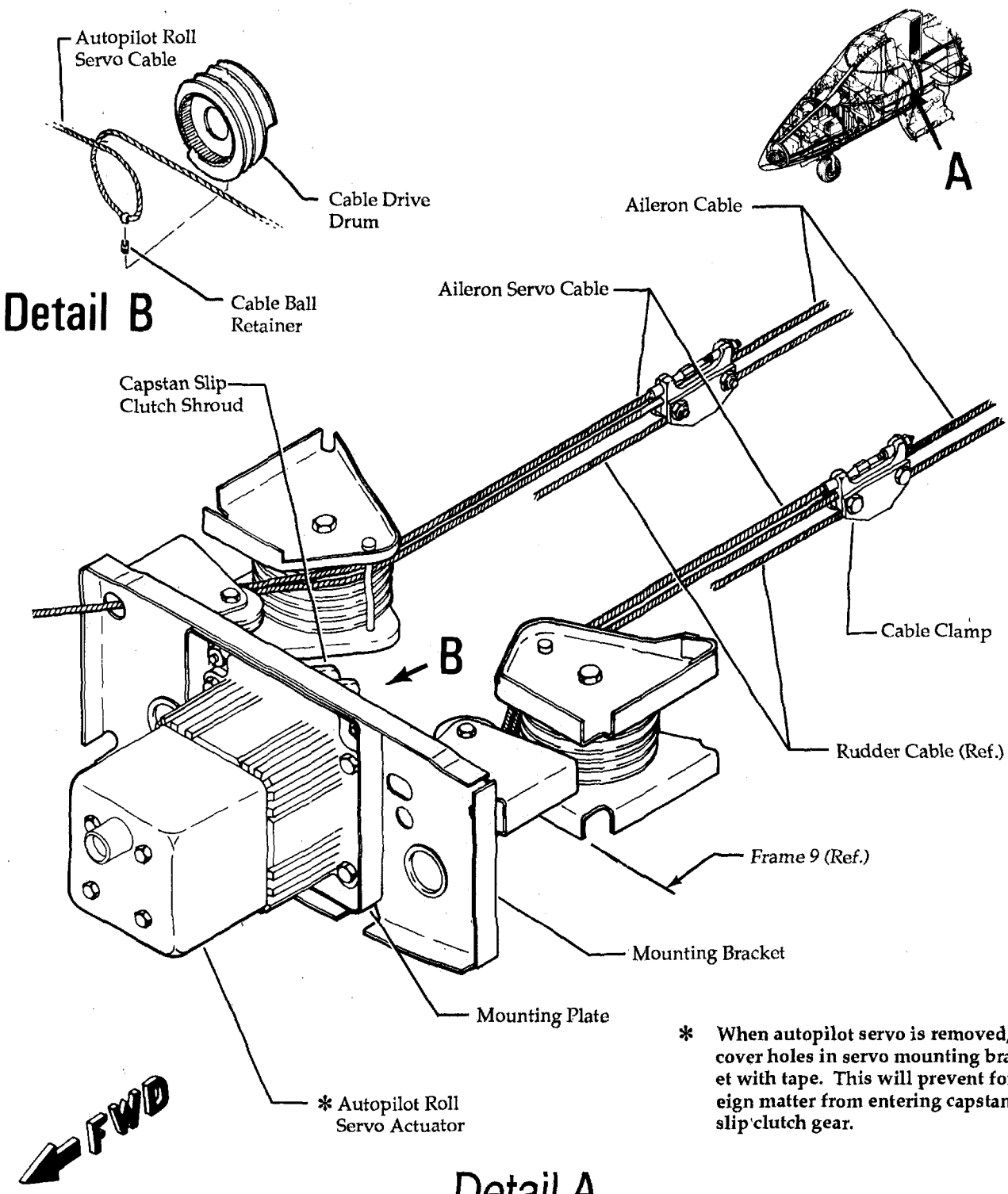
NAME	PART NUMBER	MANUFACTURER	USE
Torque Adapter	4006232-0501 or 2370116-1	Bendix Corp. Learjet Inc. Wichita, KS	Check capstan slip clutch
Adapter Block	95628	Lear Siegler, Inc.	Adjust clutch
Adapter Gear	95629	Lear Siegler, Inc.	Adjust clutch
Torque Wrench	dial indicator type	Commercially available	Adjust clutch
Grease	Mobilgrease No. 28 (MIL-G-81322)	Commercially available	Lubricate clutch parts
Grease	Molykote 33	Dow-Corning Midland, MI 48686-0994	Lubricate drum internal surface

B. Remove Roll Capstan Slip Clutch. (See Figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Remove carpet and floorboards as required to gain access to capstan slip clutch.
   (3) Remove attaching parts and roll servo actuator from mounting plate.
   (4) Remove attaching parts and shroud from capstan.
   (5) Loosen servo cable turnbuckle and unwrap cable from capstan.
   (6) Remove cable drum assembly from mounting plate stud.

   NOTE: Wiper disc, spring, and retainer ring will remain secured to mounting plate. Remove only if replacement is necessary.

   (7) Check capstan slip clutch. (Refer to step 3.A.) Adjust as required. (Refer to step 2.A.)

C. Install Roll Capstan Slip Clutch. (See Figure 201.)
   (1) Clean mounting plate center stud and lubricate with a thin coat of Mobilgrease 28.
   (2) Install cable drum assembly on mounting plate stud.
   (3) Install cable ball retainer into drum with cable slots facing out. (Retainer is held in place by cable and cable ball.) (See Figure 201, Detail B.)
   (4) Wrap servo cable around capstan, ensuring cable is wrapped as shown in Figure 201, Detail B.
   (5) Adjust servo cable tension to 25 (±5) pounds. (Refer to Chapter 27 for cable tension temperature-load correction table.)
   (6) Install shroud and secure with attaching parts.
   (7) Install roll servo actuator and secure with attaching parts.
   (8) Connect electrical connector to servo actuator.
   (9) Install floorboards and carpet.



* When autopilot servo is removed, cover holes in servo mounting bracket with tape. This will prevent foreign matter from entering capstan slip clutch gear.

8-71C

Roll Capstan Slip Clutch Installation
Figure 201

2. **Adjustment/Test**
   A. Adjust Capstan Slip Clutch (See Figure 202.)
      (1) Remove capstan slip clutch. (Refer to Removal/Installation, this section.)
      (2) Place adapter block in vise. Position cable drum assembly in adapter block and secure with adapter pin.
      (3) Attach torque wrench to adapter gear and place adapter gear into cable drum assembly.
      (4) After initial clutch breaking force occurs, move torque wrench to the left and right through the entire clutch travel range.
      (5) Clutch slippage should occur at 110 to 125 inch-pounds [12.4 to 14.1 Nm] for 2380083-15 drum assembly or 150 to 165 inch-pounds [16.9 to 18.6 Nm] for 2380083-13 drum assembly.
      (6) Adjust clutch by loosening or tightening locknut. Tighten locknut to increase clutch torque; loosen locknut to decrease clutch torque.

          NOTE: If the correct clutch torque settings cannot be obtained, disassemble the drum assembly, clean, and lubricate the internal surface (both sides) of drum with a light application of Dow Corning No. 33 grease. Reassemble drum assembly and adjust slip clutch by repeating steps (2) thru (6).

      (7) Install capstan slip clutch. (Refer to Removal/Installation, this section.)

3. **Inspection/Check**
   A. Capstan Slip Clutch Check (See Figure 202.)

      NOTE: Perform Capstan Slip Clutch Check in accordance with the current inspection interval specified in Chapter 5.

      (1) Set Battery Switch(es) off and disconnect aircraft batteries.
      (2) Remove carpet and floorboards as required to gain access to capstan slip clutch.
      (3) Remove electrical connector from roll servo actuator.
      (4) Remove attaching parts and roll servo actuator from mounting plate.
      (5) Bolt torque adapter to mounting plate, ensuring that torque adapter gear is properly mated to cable drum assembly.

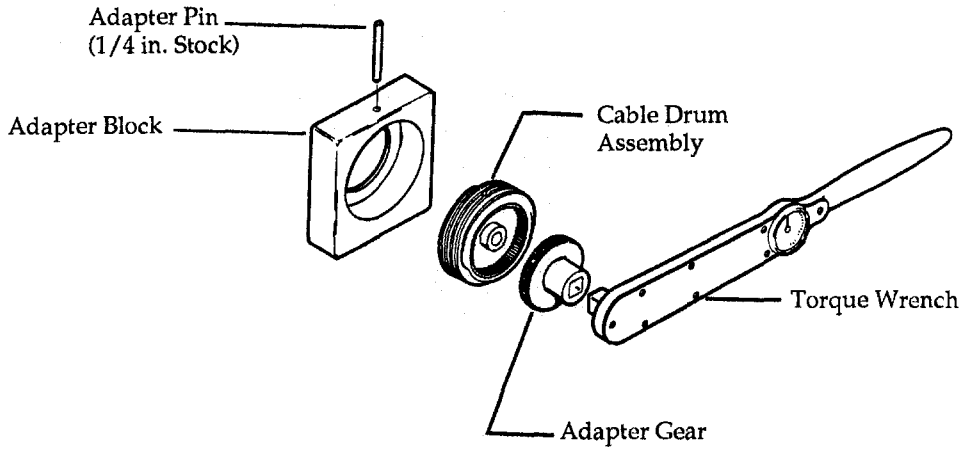
          NOTE: When using torque adapters, the clutch setting must be converted as follows:

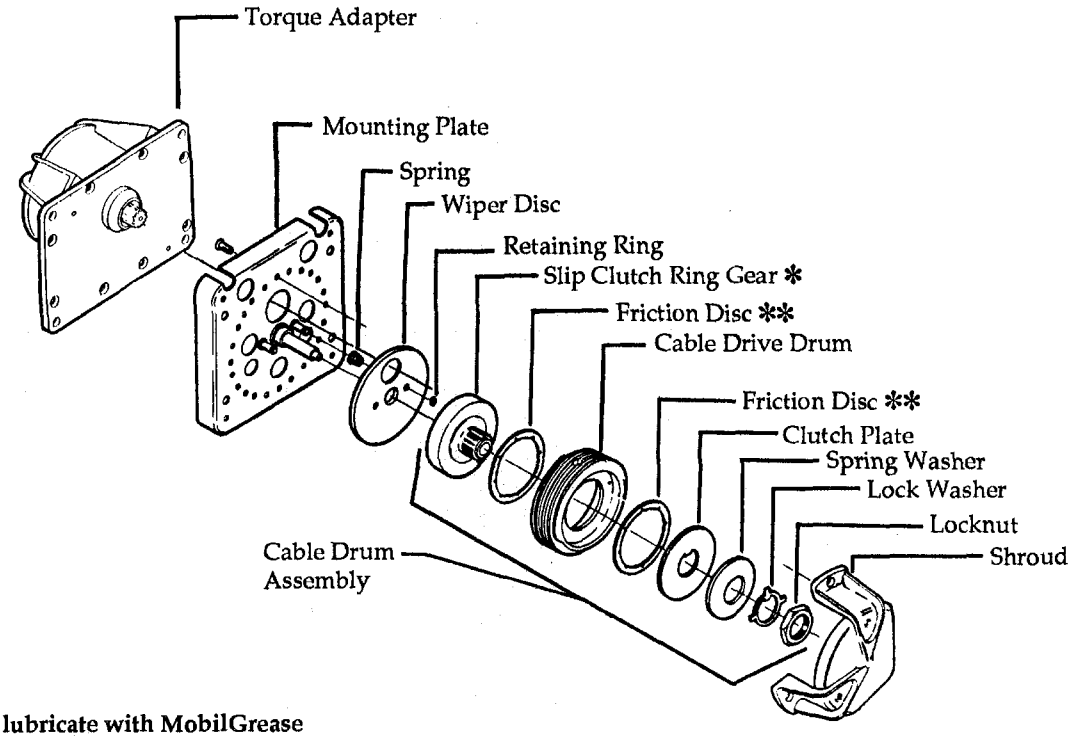
          When using torque adapter, a 5.0:1 ratio occurs between the torque adapter drive gear and the slip clutch ring gear; therefore, with a torque wrench reading of 22 to 25 inch-pounds [2.5 to 2.8 Nm], the actual slip clutch torque will be 110 to 125 inch-pounds [12.4 to 14.1 Nm]. A torque wrench reading of 30 to 33 inch-pounds [3.4 to 3.7 Nm] will be converted to an actual slip clutch torque of 150 to 165 inch-pounds [16.9 to 18.6 Nm].

          Some Learjet torque adapters may be marked "RATIO 5.65:1", this ratio is for pitch axis only.

      (6) Attach torque wrench to torque adapter and check for proper clutch slippage.
      (7) Hold torque wrench against one side of floorboard structure so that wrench does not move. Move control wheel fully to left and right several times until clutch slippage is reasonably smooth. Observe torque wrench dial and take reading while moving control wheel through its full travel range.
      (8) If clutch setting is not within tolerance, adjust capstan slip clutch. (Refer to Adjustment/Test, this section.)
      (9) Remove torque adapter from mounting plate.
      (10) Install roll servo actuator and secure with attaching parts.

(11) Connect electrical connector to servo actuator.
(12) Install floorboards and carpet.
(13) Connect electrical connectors to aircraft batteries.





* **Lightly lubricate with MobilGrease No. 28 (or MIL-G-81322 equivalent).**

** **Install rough side of friction disc toward cable drive drum.**

Capstan Slip Clutch Adjustment
Figure 202

AUTOPILOT ROLL POSITION SENSOR - MAINTENANCE PRACTICES

1. REMOVAL/INSTALLATION

NOTE: The autopilot roll position sensor is installed in the left wing. The position sensor also provides roll input information to both the primary yaw damper system and the autopilot roll system.

A. Remove Roll Position Sensor (*Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Assure that aileron system is properly rigged and insert rigging pin in copilot's control wheel.
   (3) Remove access panel from lower wing to gain access to position sensor installation.
   (4) Disconnect electrical connector from outboard position sensor.
   (5) Remove safety wire and loosen screws securing position sensor shaft to aileron pulley drive shaft.
   (6) Loosen and remove attaching parts and position sensor from aircraft.

B. Install Roll Position Sensor (*Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See figure 201.)
   (1) Align null dots on position sensor.
   (2) Carefully install position sensor by inserting position sensor shaft into pulley drive shaft and positioning position sensor on mounting bracket.
   (3) Secure position sensor to bracket with attaching parts.
   (4) Connect electrical connector to position sensor.
   (5) Restore electrical power to aircraft.
   (6) Adjust position sensor. (Refer to step 2.A., Adjustment/Test.)
   (7) Install access cover.

C. Remove Roll Position Sensor (*Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See figure 201.)
   (1) Remove electrical power from aircraft.
   (2) Assure that aileron system is properly rigged and insert rigging pin in copilot's control wheel.
   (3) Remove access panel from lower wing to gain access to position sensor installation.
   (4) Disconnect inboard position electrical wire at splices.
   (5) Loosen screw securing position sensor shaft to arm.
   (6) Remove attaching parts and remove position sensor retainer and roll position sensor.

D. Install Aileron Position Sensor (*Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See figure 201.)
   (1) Ensure that null dot on shaft aligns with null mark on position sensor body.

   NOTE: Position sensor is to be installed with the flat portion of the shaft up.

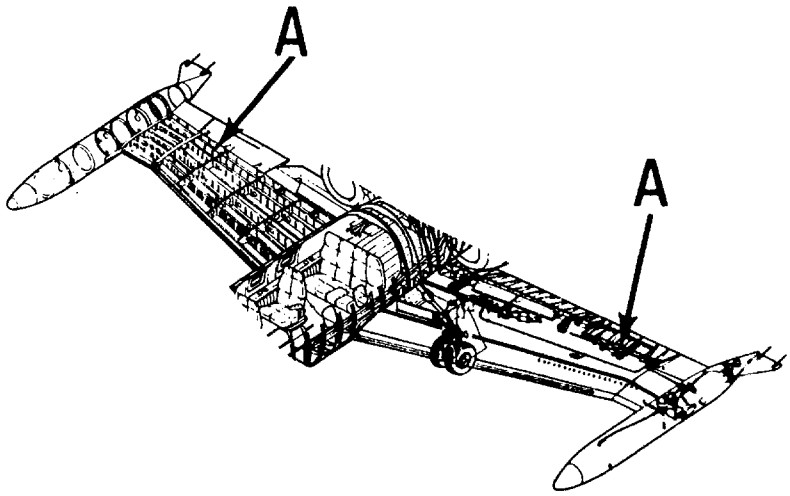
   (2) Position aileron position sensor body in mounting bracket, install retainer, and secure with attaching parts.
   (3) Secure position sensor shaft to arm with attaching parts.
   (4) Connect electrical wires of position sensor to aircraft wiring at splices. (Refer to Wiring Manual.)
   (5) Restore electrical power to aircraft.
   (6) Perform autopilot aileron position sensor adjustment. (Refer to step 2.B.)
   (7) Install wing access panel.

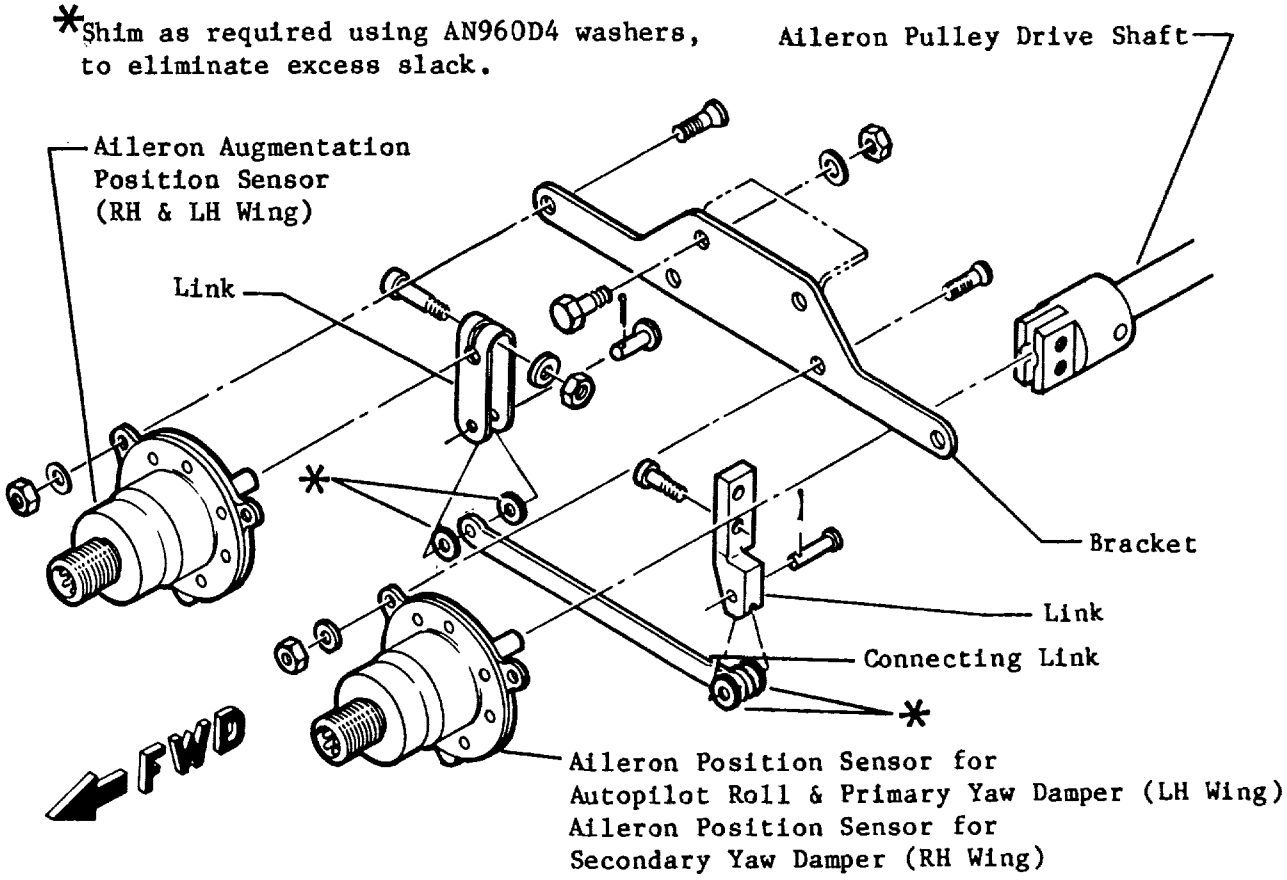
2. ADJUSTMENT/TEST

A. Autopilot Aileron Position Sensor Adjustment (*Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot"*)
   (1) Gain access to autopilot computer and connect a voltmeter (Hewlett Packard 3430A or equivalent) to test points TP1 and TP2 (located between electrical connectors).

(2) Set Battery Switches and Inverter Switches on. Adjust position sensor until voltmeter indicates zero voltage. Only a slight adjustment should be required.
(3) Remove rigging pin and engage autopilot. Turn control wheel for a left wing down and release; control wheel shall return to center.
(4) Set Battery Switches and Inverter Switches OFF. Remove voltmeter leads from test points.
(5) Install equipment removed to gain access to autopilot computer.

B. Autopilot Aileron Position Sensor Adjustment (*Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot"*)
(1) Remove access panel from lower wing to gain access to position sensor installation.
(2) Insert aileron rigging pin in copilot's control wheel.
(3) Set Battery and Inverter Switches on.
(4) Depress yaw damper PRI PWR pushbutton.
(5) Locate splice between aileron position sensor and aircraft wire harness.
(6) Using a VTVM or equivalent, measure AC voltage between yellow wire and blue wire. Voltage shall be less than 0.1 vac.
(7) If voltage is greater than 0.1 vac, loosen position sensor attaching parts and rotate aileron position sensor until AC voltage is less than 0.1 vac.
(8) Secure position sensor in place with attaching parts.
(9) Depress and release yaw damper PRI PWR pushbutton. Verify that primary yaw damper is disengaged.
(10) Set Battery and Inverter Switches OFF.
(11) Install access panels in lower wing.
(12) Remove aileron rigging pin from copilot's control wheel.

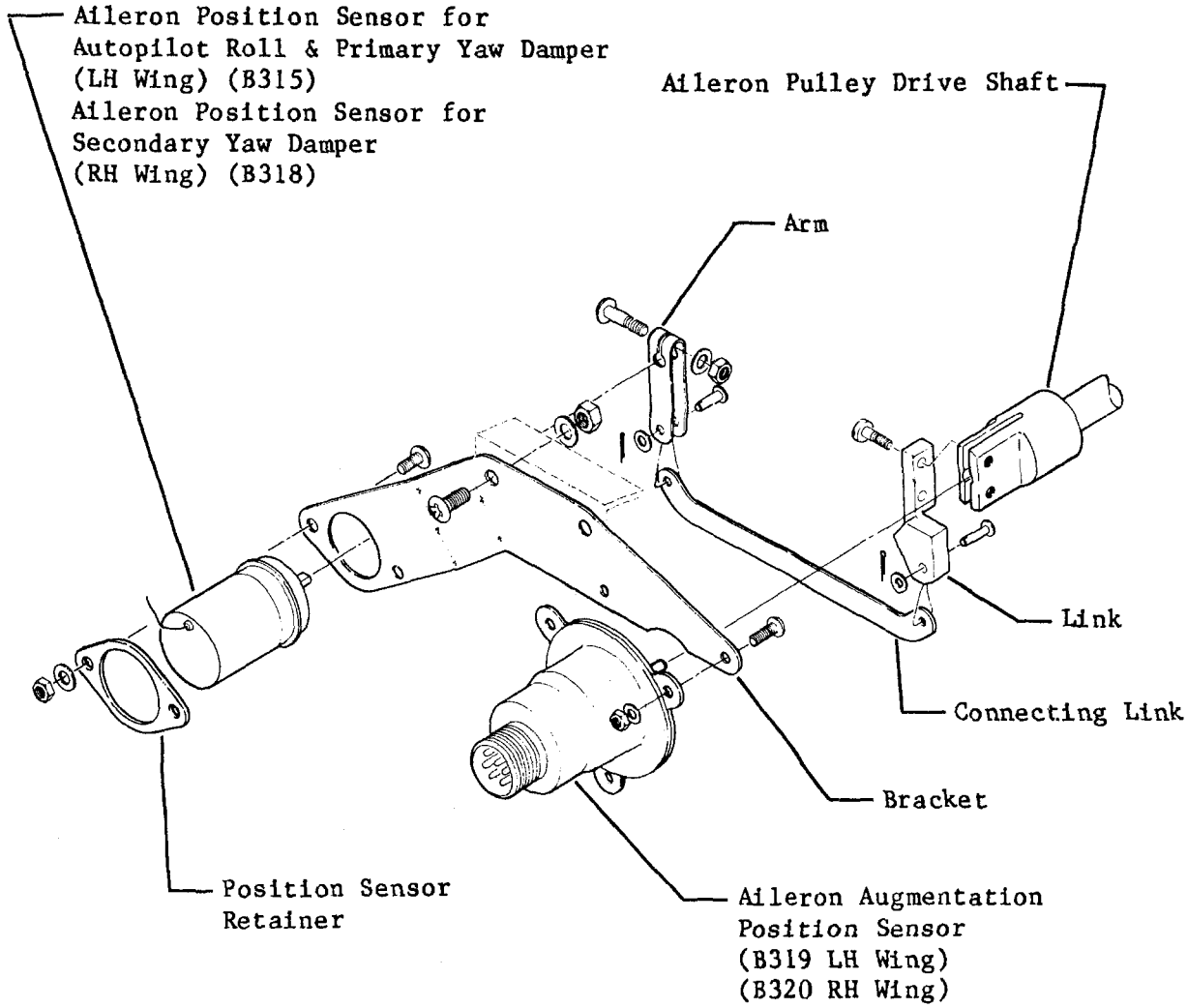




Detail A

Autopilot Aileron Position Sensor Installation
Figure 201 (Sheet 1 of 2)

EFFECTIVITY: 35-002 THRU 35-505 EXCEPT 35-408, 36-002 THRU 36-053 NOT MODIFIED PER AAK 83-2, "Installation of FC-530 Autopilot"



Detail A

Autopilot Aileron Position Sensor Installation
Figure 201 (Sheet 2 of 2)

ROLL RATE GYRO - MAINTENANCE PRACTICES

1. REMOVAL/INSTALLATION

A. Remove Roll Rate Gyro (*Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See figure 201.)

NOTE: Roll rate gyro is installed in the nose avionics compartment at frame 1 at the centerline of the aircraft.

(1) Remove electrical power from aircraft.
(2) Gain access to roll rate gyro through nose avionics compartment door.
(3) Disconnect electrical connector from roll rate gyro.
(4) Remove electrical connector from roll rate gyro.
(5) Remove attaching parts and remove roll rate gyro.

B. Install Roll Rate Gyro (*Aircraft 35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See figure 201.)
(1) Position roll rate gyro on mounting bracket and secure with attaching parts.
(2) Connect electrical connector to roll rate gyro.
(3) Restore electrical power to aircraft.
(4) Perform autopilot functional test. (Refer to 22-10-00.)
(5) Close and secure nose avionics compartment doors.

C. Remove Roll Rate Gyro (*Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See figure 201.)

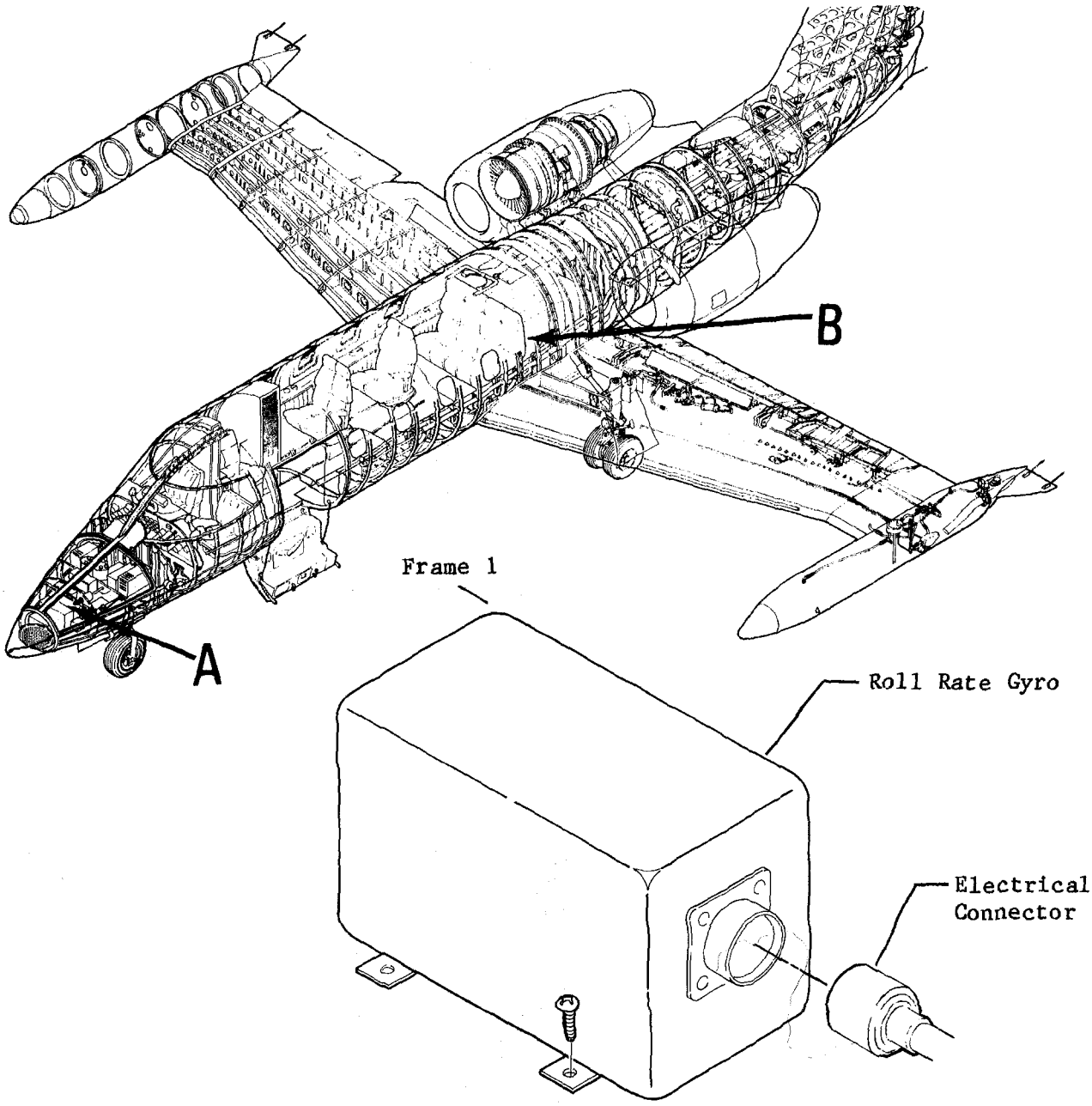
NOTE: On *Aircraft 35-408, 35-506 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* the roll rate gyro is installed on the underneath side of the aft baggage compartment floor forward of frame 17A. On *Aircraft 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot,"* the roll rate gyro is installed on the seat floor forward of frame 17A.

(1) Remove electrical power from aircraft.
(2) Gain access to roll rate gyro.
(3) Disconnect electrical connector from roll rate gyro.

CAUTION: ***AIRCRAFT 35-408, 35-506 AND SUBSEQUENT AND PRIOR AIRCRAFT MODIFIED PER AAK 83-2, "INSTALLATION OF FC-530 AUTOPILOT,"*** **SUPPORT ROLL RATE GYRO WHILE REMOVING ATTACHING PARTS. THIS WILL PREVENT DAMAGE DUE TO THE ROLL RATE GYRO FALLING.**

(4) Remove attaching parts and remove roll rate gyro.

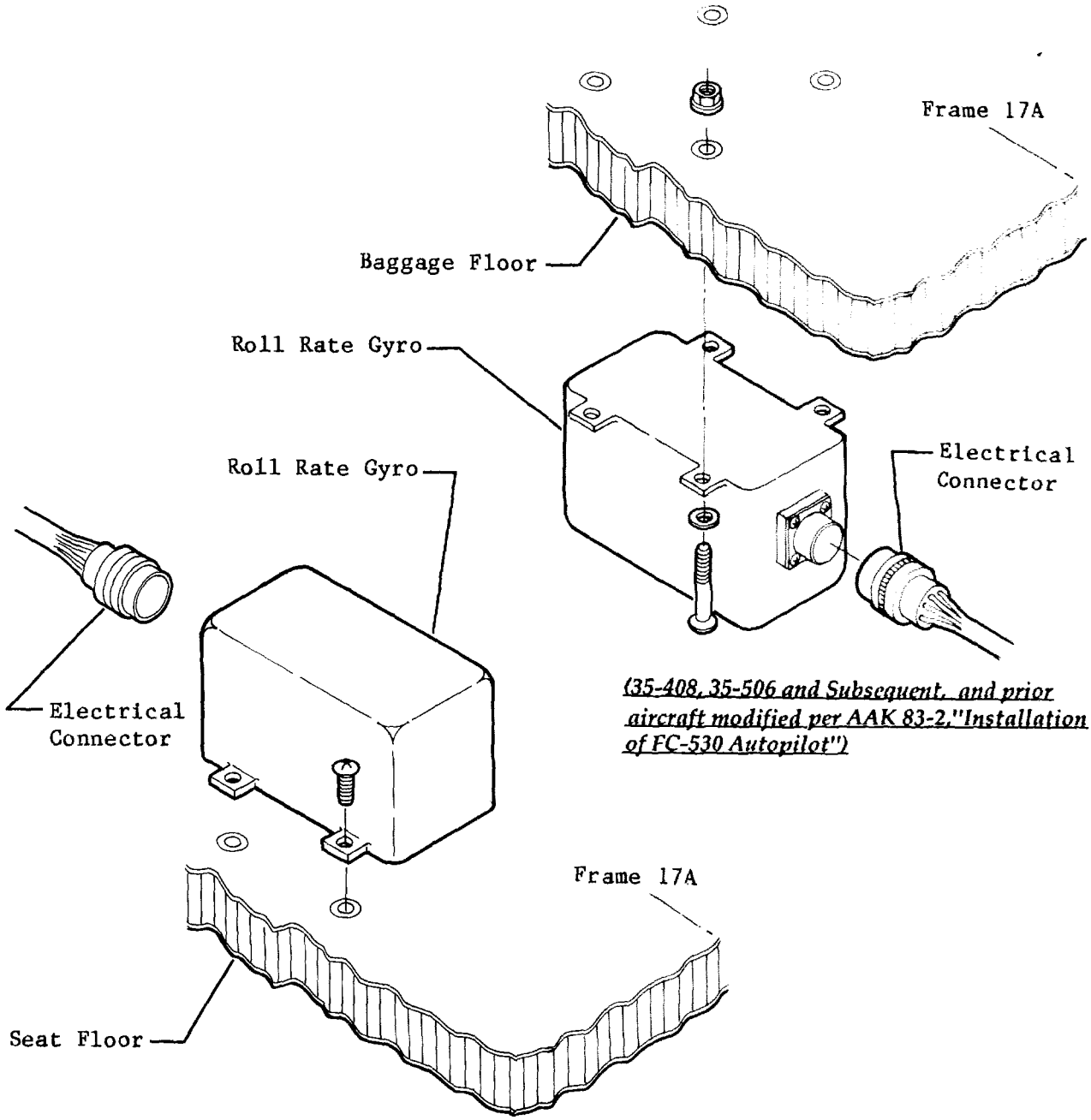
D. Install Roll Rate Gyro (*Aircraft 35-408, 35-506 and Subsequent, 36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot"*) (See figure 201.)
(1) Position roll rate gyro in mounting position and secure with attaching parts.
(2) Connect electrical connector to roll rate gyro.
(3) Restore electrical power to aircraft.
(4) Perform autopilot functional test. (Refer to 22-10-00.)
(5 Install equipment and furnishings removed to gain access to roll rate gyro.



(35-002 thru 35-505 except 35-408, 36-002 thru 36-053 not modified per AAK 83-2, "Installation of FC-530 Autopilot")

Detail A

Roll Rate Gyro Installation
Figure 201 (Sheet 1 of 2)



(35-408, 35-506 and Subsequent, and prior aircraft modified per AAK 83-2,"Installation of FC-530 Autopilot")

(36-054 and Subsequent and prior aircraft modified per AAK 83-2, "Installation of FC-530 Autopilot")

Detail B

9-173A-1

Roll Rate Gyro Installation
Figure 201 (Sheet 2 of 2)

MACH TRIM - DESCRIPTION AND OPERATION

1. Description
   A. The mach trim system functions basically as a pitch trim system at 0.74 Mach (MI) or above when the autopilot is disengaged or inoperative.
   B. The system provides automatic speed stability for the aircraft by controlling the nose up or down attitude.
   C. The system incorporates a monitor circuit that detects a malfunction, automatically disengages the mach trim system, and alerts the pilot through visual and aural warning. Corrective action can then be taken to either engage the autopilot or reduce the aircraft speed below 0.74 Mach (MI).
   D. The system consists of the mach trim computer, mach air data sensor, a followup, test switch, and mach trim warning light.
   E. The system utilizes the pitch trim actuator (motor M1) for nose up and nose down attitudes. It also utilizes the aural warning system and a warning light to alert the pilot in case of a system malfunction.
   F. For further information on the pitch trim actuator (motor M1), refer to Chapter 27.

2. Operation
   A. The air data sensor senses a change in the mach number and applies a signal to the mach trim computer. The computer determines the change in mach number and applies a signal either nose up or nose down to the pitch trim actuator motor (M1). When the horizontal stabilizer position changes, a followup applies a feedback signal to the computer. When the feedback signal has cancelled the signal from the air data sensor, the trimming action of the pitch trim actuator stops and the horizontal stabilizer remains in the new position.
   B. Mach Trim Test Switch
      (1) When the Selector Switch on the Test Switch panel is set to MACH TRIM and the pushbutton is depressed, two relays are energized. One relay applies a ground signal to the "Aural Warning Disable 0.78 Mach" circuit in the mach trim computer. This ground signal simulates the ground signal applied through the 0.74 mach switch if the aircraft were actually in flight. The second relay completes a circuit to the mach trim computer which signals a movement or trimming of the horizontal stabilizer actuator. Since there is no mach number change, the movement of the horizontal stabilizer actuator induces an increasing error signal into the mach trim monitor circuit. When the error signal reaches a predetermined limit, the monitor circuit sees this as a malfunction and disengages the mach trim system. The aural and visual warning are engaged until the aircraft speed is reduced below 0.74 mach or the autopilot is engaged.

MACH TRIM SYSTEM - MAINTENANCE PRACTICES

1. Adjustment/Test

A. Tools and Equipment

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
2 Each Multimeter (100K ohm or greater input impedance)	8010A	Fluke Mfg., Inc. Everett, WA	Check position sensor and Mach signal simulator output.
Mach Trim Test Set (JET-38A)	510-1024-01	J.E.T. Electronics and Technology Grand Rapids, MI	Check Mach trim system.

B. Functional Test of Mach Trim System *(LES-FT-1109)* (See Figure 201.)

NOTE: When any component of the Mach Trim System is replaced, a Functional Test shall be performed.

Two (2) service personnel will be required to perform this Functional Test.

(1) Connect external electrical power source to aircraft.
(2) Remove applicable floorboard to gain access to Mach trim computer.
(3) Set Battery and Primary and Secondary Inverter Switches on.
(4) Depress AIR DATA SEN, MACH TRIM, PITCH TRIM, WARN LT, SQUAT SWITCH (with aircraft sitting on wheels - not jacks) and all autopilot system circuit breakers.
(5) Connect voltmeter (preselect DC voltage mode) to Mach signal simulator (as indicated on face of Mach signal simulator). Use DC voltage indications of voltmeter instead of Mach signal simulator dial settings if a difference of more than ±0.003 vdc exists between voltage and dial setting. A dial setting of 500 shall be 5.00 (±0.003 vdc).
(6) Connect voltmeter (preselect AC voltage mode) to ground and set sensor (followup) test jack on Mach trim computer.
(7) Set Pitch Trim Switch to PRI (primary).

NOTE: The pitch trim indicator shall be calibrated before performing this Functional Test.

(8) Mach trim position sensor (followup) system null is as follows:
  (a) Depress control wheel trim switch and trim horizontal stabilizer so that pointer is on center of trim position indicator. AC voltmeter shall indicate less than 0.1 vac.
  (b) If voltage is in excess of 0.1 vac, set horizontal stabilizer trim so that 0.1 vac or less is obtained within one full needle width above or below center (neutral) position on trim position indicator.
  (c) If 0.1 vac or less cannot be obtained, Mach trim position sensor shall be zeroed or nulled. (Refer to 22-20-02.)
  (d) Verify that control wheel trim and trim arming switches will trim horizontal stabilizer to neutral and zeros or nulls AC voltmeter indication.

(9) Set Battery Switches off. Disconnect electrical connector from air data sensor and reconnect to Mach signal simulator. Set Mach signal simulator dial to 500 and set Battery Switches on.

(10) Mach trim engage system test is as follows:

(a) Slowly increase Mach signal simulator dial setting until engage relay in Mach trim computer clicks. DC voltmeter shall indicate only a slight increase or movement. Mach signal simulator dial setting shall indicate 692 to 696. If not, continue to step (10)(b).

NOTE: This test is to determine Mach trim system engagement threshold. No horizontal stabilizer movement shall occur.

(b) Set Mach signal simulator dial to 694 and adjust ENG potentiometer on Mach trim computer until engage relay in Mach trim computer clicks. Repeat step (a). If Mach signal simulator dial indication is not 692 to 696 when engage relay clicks, replace Mach trim computer.

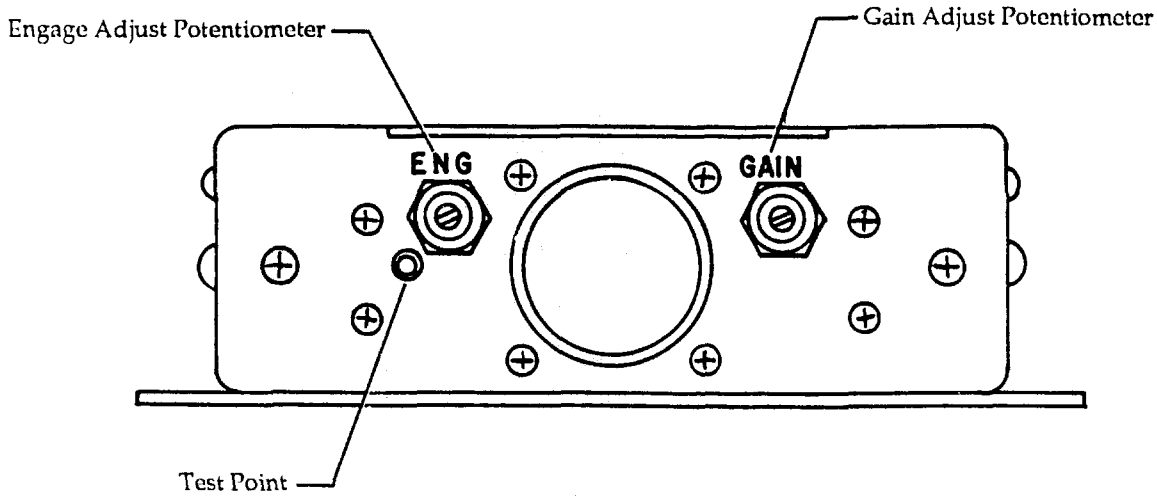
NOTE: ENG adjustments are sensitive and step (10) may have to be repeated several times to ensure accurate adjustment.

(11) Gain adjustment test is as follows:

NOTE: Use the Mach signal simulator dial settings as reference only. Correlate true voltage input from DC voltmeter. For example, a Mach signal simulator dial setting of 730 shall equal 7.30 vdc, 740 shall equal 7.40 vdc, etc.

CAUTION: DO NOT PASS BY (OVERSHOOT) ANTICIPATED MACH SIGNAL SIMULATOR DIAL SETTING (DC VOLTAGE INPUT) AND THEN BACK UP TO IT. THIS ACTION CAN CAUSE UNDESIRED HORIZONTAL STABILIZER TRAVEL AND ERRONEOUS INDICATIONS FOR REMAINING DIAL SETTINGS.

(a) Turn Mach signal simulator dial setting to 730 and depress control wheel trim switch to null AC voltmeter (Mach trim position sensor).



Mach Trim Computer
Figure 201

(b) Make note of AC voltmeter indication (Mach trim position sensor neutral - null voltage) and mark it on the Mach Trim Computer Gain Adjustment Chart for reference. (See Figure 202.)

(c) Turn Mach signal simulator dial slowly (and compare to DC voltmeter indication) for each of required settings shown in Mach Trim Computer Gain Adjustment Chart. Note AC voltmeter indications in space given on chart.

(d) Subtract null voltage from AC voltmeter indications for each Mach signal simulator dial setting. Compare this net indication to voltage range shown in chart. For example: Suppose null voltage determined in step (a) was 0.001 vac. Suppose an AC voltmeter indication for dial setting 760 was 0.079 vac. Subtracting 0.001 vac from 0.079 vac, produces a net of 0.078 vac which falls within the acceptable range per the chart.

(12) Monitor reset test is as follows:

(a) Set Mach signal simulator dial to 800, then turn dial very quickly to 875. MACH TRIM caution annunciator shall illuminate. This indicates that Mach trim monitor has disengaged Mach trim system.

(b) *Aircraft 35-002 thru 35-246, 36-002 thru 36-044 not modified per SB 35/36-22-4*, depress Control Wheel Trim Switch. The Mach trim monitor shall resynchronize and Mach Trim (red) warning light shall extinguish.

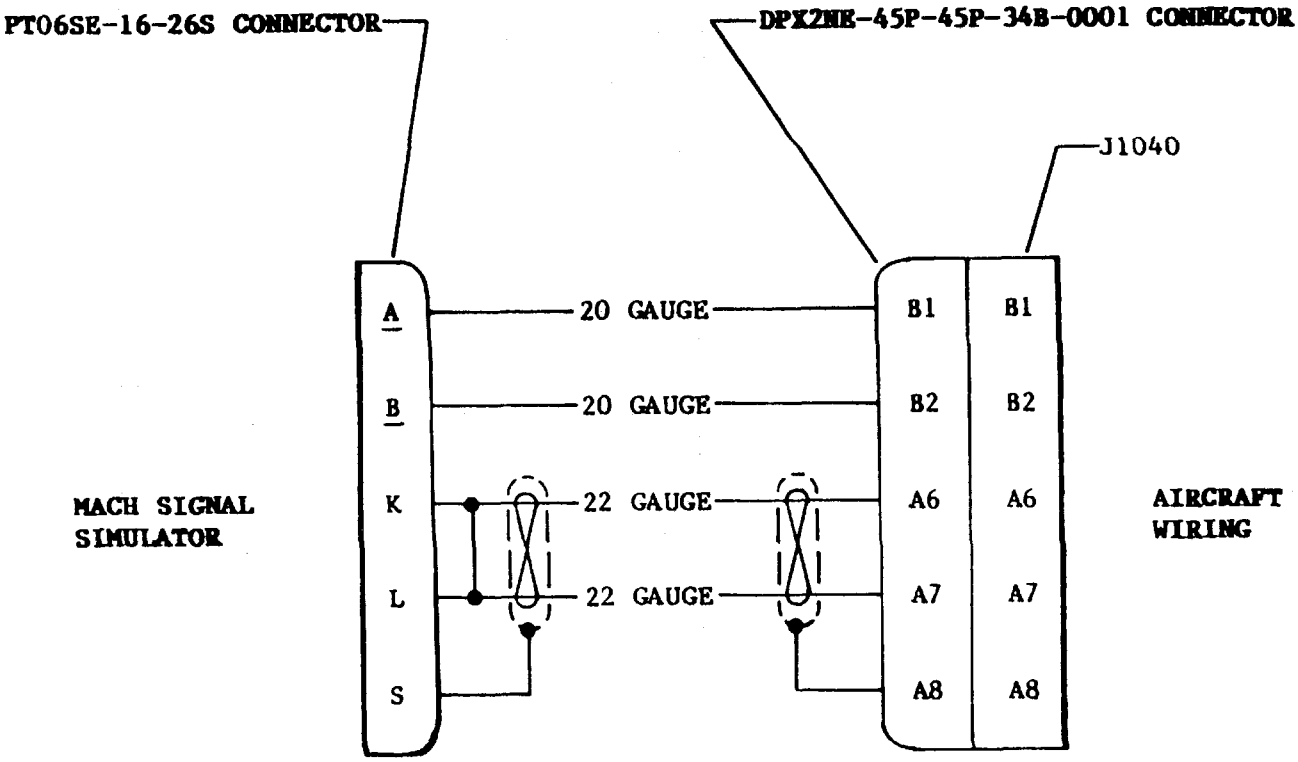
(c) *Aircraft 35-247 and Subsequent, 36-045 and Subsequent and prior Aircraft modified per SB 35/36-22-4*, disengage SQUAT SW circuit breaker, resynchronize computer by actuating Control Wheel Trim Switch. Set System Select and Test Switch to MACH TRIM and depress and release Press-to-Test pushbutton. Mach Trim (red) warning light shall extinguish.

Mach Signal Simulator Dial Setting	AC Null Indication	AC Voltmeter Indication	Net AC Difference	AC Voltage Indications IF 730 Dial Setting Was Almost Zero Voltage
730				0.000 to 0.015
740				0.010 to 0.046
750				0.045 to 0.086
760				0.075 to 0.118
770				0.112 to 0.171
780				0.170 to 0.226
790				0.260 to 0.336
800				0.400 to 0.506
810				0.560 to 0.711
820				0.735 to 0.906

NOTE: Adjust the GAIN potentiometer on the Mach Trim computer as necessary to achieve the results shown in the chart.

Mach Trim Computer Gain Adjustment Chart
Figure 202

(13) Self-test function is as follows:
  (a) Set Battery Switches off.
  (b) Disconnect air data sensor electrical connector from Mach signal simulator and reconnect to air data sensor.
  (c) Set Battery Switches on.
  (d) Turn System Select and Test Switch to MACH TRIM. Depress Press-to-Test button. Verify that horizontal stabilizer moves in a nose up direction (increasing AC voltmeter indication). Stabilizer shall stop within ten (10) seconds of actuation.
  (e) MACH TRIM annunciator shall illuminate and Mach Trim/Overspeed Warning horn shall sound.
(14) Polarity test is as follows:
  (a) Depress control wheel trim switch to trim horizontal stabilizer in a nose down direction.
  (b) Verify that AC voltmeter indication decreases.
(15) Pull all affected system circuit breakers.
(16) Set Battery Switches and Inverter Switches off.
(17) Disconnect and remove both DC and AC voltmeters and Mach signal simulator.
(18) Disconnect external electrical power source from aircraft.
(19) Install floorboard with Mach trim computer attached.



NOTE: *Aircraft equipped with P/N AD-101A Air Data Unit (I.E.T.)* does not require a cable adapter. The AP 214 connector connects directly to the mach signal simulator.

Cable Adapter Fabrication
Figure 203

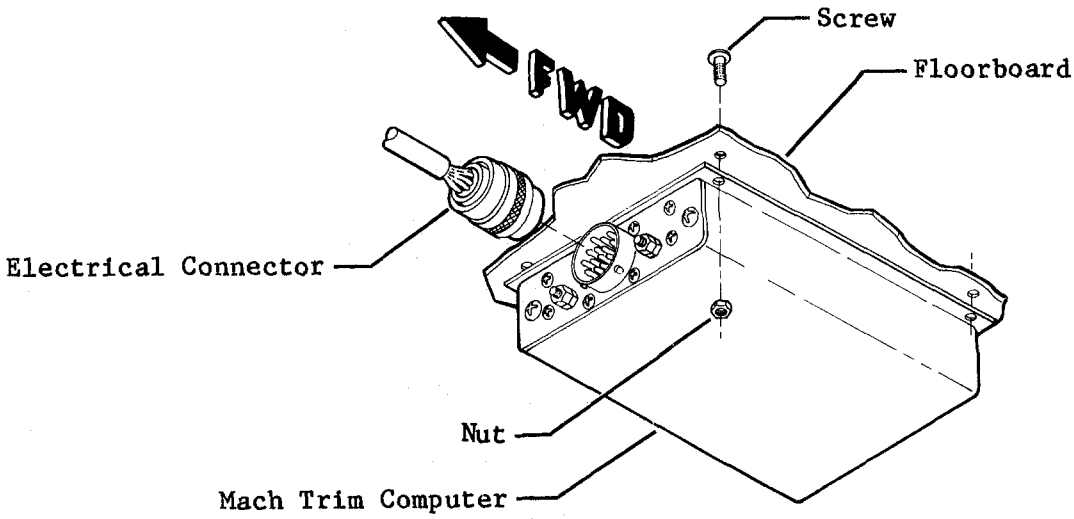
MACH TRIM COMPUTER - MAINTENANCE PRACTICES

1. **REMOVAL/INSTALLATION**
   A. **Remove Computer** (See figure 20.)
      (1) Gain access to computer installation under floorboard.

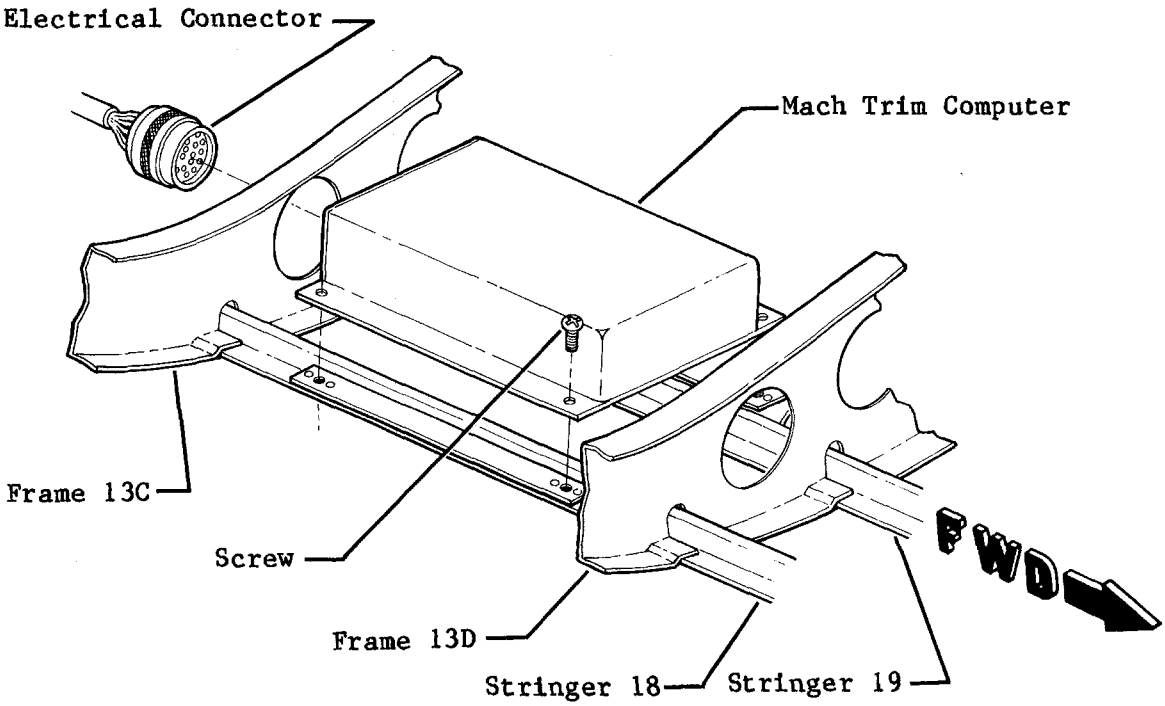
      NOTE: ° On Aircraft 35-002 thru 35-049 and 35-051 thru 35-065 and 36-002 thru 36-017, the mach trim computer is installed on the underneath side of the floorboards between frames 13A and 14 at LBL 6 to LBL 18.

      ° On Aircraft 35-050, 35-066 and Subsequent and 36-018 and Subsequent, the mach trim computer is installed below the RH floorboard between frames 13D and 13C.

      (2) Disconnect electrical connector from computer.
      (3) Remove attaching parts and computer from aircraft.
   B. **Install Computer** (See figure 201.)
      (1) Install computer and secure with attaching parts.
      (2) Connect electrical connector to computer.
      (3) Perform functional check of mach trim system. (Refer to 22-20-00.)



Aircraft 35-002 thru 35-049,
35-051 thru 35-065, and 36-002 thru 36-017



Aircraft 35-050, 35-066 and Subsequent,
36-018 and Subsequent

9-219B-1

Mach Trim Computer Installation
Figure 201

MACH TRIM POSITION SENSOR - MAINTENANCE PRACTICES

1. Removal/Installation

NOTE:
- The mach trim position sensor is located in the upper portion of the vertical stabilizer and is connected by linkage to the horizontal stabilizer.
- Access to the position sensor is gained by removing the upper vertical stabilizer fairings.

A. Remove Position Sensor. (See Figure 201.)
   (1) Remove vertical stabilizer fairing to gain access to position sensor installation.
   (2) Disconnect electrical connector from position sensor.
   (3) Loosen attaching parts securing arm to position sensor shaft.
   (4) Remove arm from position sensor shaft.
   (5) Remove attaching parts and position sensor from bracket.

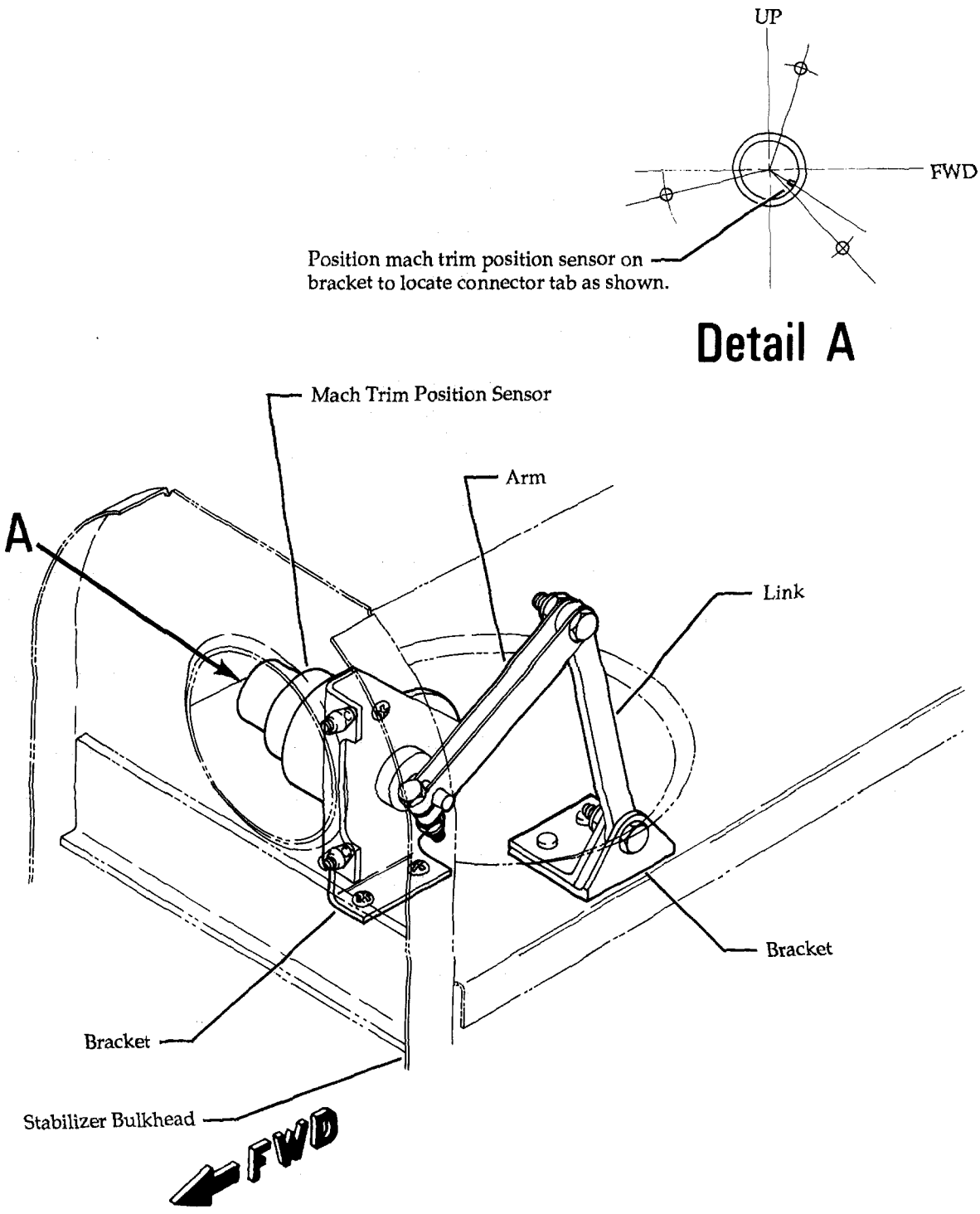
B. Install Position Sensor. (See Figure 201.)
   (1) Position mach trim position sensor on bracket as shown.
   (2) Secure position sensor to bracket with attaching parts.
   (3) Connect electrical connector to position sensor.
   (4) Set horizontal stabilizer in the mid range (pitch trim position indicator needle in the center or mid range).
   (5) Install arm on position sensor shaft. Do not tighten at this time.

CAUTION: THE POSITION SENSOR INCORPORATES INTERNAL STOPS. DO NOT ATTEMPT TO FORCE POSITION SENSOR ROTATION WHEN STOPS ARE CONTACTED.

   (6) Align red dot on position sensor shaft with red dot on position sensor to ensure correct phasing of position sensor signal.
      (a) Gain access to mach trim computer.
      (b) Connect A.C. voltmeter to ground and to test point on front of mach trim computer. (Refer to 22-20-00.)
      (c) Null mach trim position sensor as close to zero (0.000) vac as possible by carefully rotating shaft.

NOTE: If unable to null below 0.025 vac, replace position sensor.

   (7) Tighten arm attaching parts.
   (8) Install vertical stabilizer fairing.
   (9) Perform functional test of mach trim system. (Refer to 22-20-00.)



8-67B

Mach Trim Position Sensor Installation
Figure 201

AIR DATA UNIT - DESCRIPTION AND OPERATION

1. DESCRIPTION

A. The air data unit is installed in the nose compartment.

B. The air data unit provides air data information to the autopilot pitch computer and mach trim computer.

C. The air data unit receives a static input from the right static 1 and left static 2 ports of the pitot/static masts. The air data unit receives a pitot input from the right pitot system.

D. For further information on electrical operation of the pitot/static heated mast, refer to Chapter 30.

AIR DATA UNIT - MAINTENANCE PRACTICES

1. **Removal/Installation**
   A. Remove Air Data Unit (See Figure 201.)
      (1) Gain access to air data unit through nose compartment access doors. Air data unit is located aft of frame 3 at WL 9, LBL 6.
      (2) Remove electrical power from aircraft.
      (3) Disconnect pitot and static lines from air data unit. Install plugs in lines and air data unit openings to prevent contamination of the system.

      CAUTION: TO AVOID DAMAGE TO ELECTRICAL CONNECTOR, CAREFULLY PULL AIR DATA UNIT STRAIGHT OUT OF RACK.

      (4) Loosen knurled nuts and remove air data unit from aircraft.
   B. Install Air Data Unit (See Figure 201.)

      CAUTION: TO AVOID DAMAGE TO ELECTRICAL CONNECTOR, CAREFULLY SLIDE AIR DATA UNIT STRAIGHT INTO RACK.

      (1) Position air data unit in equipment rack and secure with attaching parts.

      NOTE: An O-ring is incorporated into each pitot/static plumbing connection. Each time a connection is broken, a new O-ring must be installed.

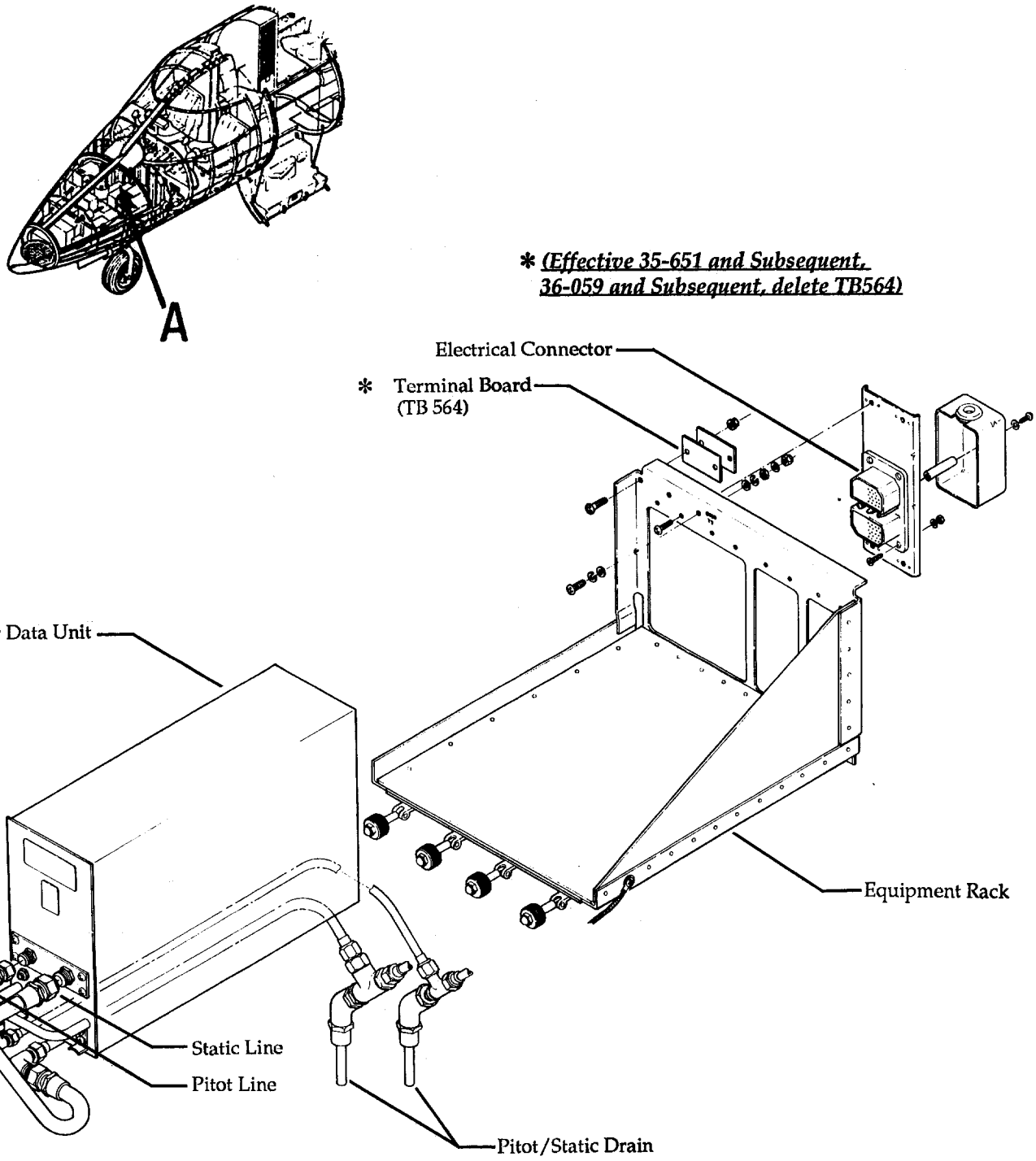
      (2) Install new O-rings at each place pitot/static plumbing is disconnected.
      (3) Remove pitot/static line plugs and air data unit plugs. Connect pitot and static lines to air data unit. On pitot line (1/4-inch diameter), torque nuts 40 to 65 inch-pounds. On static lines (3/8-inch diameter), torque nuts 75 to 125 inch-pounds.
      (4) Perform pitot/static plumbing leak check. (Refer to Chapter 34, Adjustment/Test.)
      (5) Perform Air Data Warning Test, this section.
      (6) Close and secure nose compartment access doors.

2. **Adjustment/Test**
   A. Tools and Equipment

      NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Pitot/Static Tester	Barfield 1811F	Barfield Inst. Co. Miami, FL	Apply pressure and vacuum.
Pitot/Static Test Adapter Kit	L50-612*	Learjet Inc.	Attach tester to pitot/static tube.
Spring Scale	Model DDP-50 or CATL80D	John Chatillion Co. New York, NY	Check force on control column.

* Adapters (2 each) PSS50476-3-4-4 must be modified with kits (2 each) SSR476 to test Model 35/36 Aircraft equipped with FC-530 Autopilot. The modified adapter part number is PSS50476M1-3-4-4.



Detail A

10-100C

Air Data Unit Installation
Figure 201

B. Functional Test of Air Data Warning System

WARNING: PULL L PITOT HT AND R PITOT HT CIRCUIT BREAKERS ON PILOT'S AND COPILOT'S C/B PANELS BEFORE PERFORMING THE FOLLOWING PROCEDURES TO PREVENT DAMAGE TO EQUIPMENT AND POSSIBLE INJURY.

(1) Ensure that all pitot line connections in aircraft are secure.
(2) Install test set adapters on pitot/static probes.

NOTE: Using lubricant supplied with pitot/static system test set, lubricate internal glands of test set adapters sparingly prior to installation of adapters on pitot/static probes.

(3) Attach pressure hose from pitot/static tester to pitot ports on both test set adapters.
(4) Attach static hose from pitot/static tester to static ports on one test set adapter, and leave other adapter capped off.
(5) Ensure that all pitot/static drain valves are closed.
(6) Perform pitot/static leak test. (Refer to Chapter 34.)

NOTE: Check throughout leak test to ensure that lines from pitot/static tester to aircraft do not collapse.

(7) Disconnect electrical connector from pilot's airspeed indicator.

NOTE: This test shall be performed first utilizing the copilot's altimeter and airspeed indicator.

(8) Connect external electrical power source to aircraft.
(9) Set Battery, Primary and Secondary Inverter Switches on.
(10) Check airspeed indicator for accuracy.

CAUTION: TO AVOID DAMAGE TO AIRCRAFT INSTRUMENTS, DO NOT EXCEED 5000 FEET PER MINUTE RATE-OF-CLIMB OR RATE-OF-DESCENT. DO NOT ALLOW AIRSPEED TO GO BELOW ZERO.

(a) Close pitot/static tester source valves and vent valves and open crossbleed valve.
(b) Open static source valve and slowly apply vacuum to static system until copilot's altimeter indicates 10,000 feet.
(c) Close crossbleed valve and slowly open pressure vent valve and vent atmospheric pressure into pitot system until tester indicates 120 knots airspeed. Verify that copilot's airspeed indicator indicates 120 (±3.0) knots.
(d) Increase tester indicated airspeed to 240 knots. Verify that copilot's airspeed indicator indicates 240 (±4.5) knots.
(e) Increase tester indicated airspeed to 360 knots. Verify that airspeed indicator indicates 360 (±6.0) knots.

NOTE: If airspeed indicator does not meet requirements of steps (c), (d), and (e), repair or replace airspeed indicator and repeat test.

(11) Check mach speed indication on airspeed indicator.

CAUTION: TO AVOID DAMAGE TO AIRCRAFT INSTRUMENTS, DO NOT EXCEED 5000 FEET PER MINUTE RATE-OF-CLIMB OR RATE-OF-DESCENT. DO NOT ALLOW AIRSPEED TO GO BELOW ZERO.

(a) Open crossbleed valve and static source valve. Slowly apply vacuum until copilot's altimeter indicates 25,000 feet. Close crossbleed valve and slowly open pressure vent valve until tester indicates 292 knots airspeed. Verify that copilot's airspeed indicator indicates 0.70 (±0.01) M.
(b) Increase tester indicated airspeed to 338 knots. Verify that copilot's airspeed indicator indicates 0.80 (±0.01) M.
(c) Increase tester indicated airspeed to 204 knots and increase altitude to 41,000 feet. Verify that copilot's airspeed indicator indicates 0.70 (±0.01) M.
(d) Increase tester indicated airspeed to 243 knots. Verify that copilot's airspeed indicator indicates 0.82 (±0.01) M.

NOTE: If airspeed indicator does not meet requirements of steps (a), (b), (c), and (d), repair or replace airspeed indicator and repeat test.

(e) Open crossbleed valve and slowly operate pressure vent valve to lower altitude to ambient and airspeed to zero.

(12) Check Barber Pole (Vmo/Mmo) pointer as follows:

NOTE: If aircraft is not equipped with electrically heated windshields, skip step (a) and proceed to step (b).

(a) On *Aircraft equipped with electrically heated windshields*, with crossbleed valve open, open static valve and set pitot/static tester to an altitude of 7,000 feet. Vmo/Mmo indicator pointer shall indicate 350 (±3) knots.
(b) With crossbleed valve open, open static valve and set pitot/static tester to an altitude of 20,000 feet. Vmo/Mmo indicator pointer shall indicate 350 (±3) knots.
(c) Increase altitude to 41,000 feet. Vmo/Mmo indicator pointer shall indicate 0.81 (±0.005) M.
(d) Increase altitude to 45,000 feet. Vmo/Mmo indicator pointer shall indicate 0.81 (±0.005) M.

NOTE: If airspeed indicator does not meet requirements of steps (a), (b), (c) and (d) , repair or replace airspeed indicator and repeat test.

(13) Check Mach System Warning as follows:
(a) Ensure that squat switch is in ground mode.
(b) Set L Stall Warning Switch on.
(c) Set System Select and Test Switch on test switch panel to MACH. Depress and hold press-to-test pushbutton.
1) Overspeed aural warning sounds and stick puller actuates for approximately 1/2 second.
2) Aural warning and stick puller ceases for approximately 1/2 second.
3) Overspeed aural warning sounds and stick puller actuates for approximately 1/2 second.
4) Aural warning and stick puller ceases for approximately 1/2 second.
5) Overspeed aural warning sounds for approximately 1/2 second.
(d) Release press-to-test pushbutton.

NOTE: The results obtained while performing steps 2.B.(14)(e) thru 2.B.(16)(j) shall be recorded on the Mach/Overspeed Warning System data sheet (Refer to Figure 202.)

(14) Check airspeed warning horn as follows:
(a) Pull SQUAT SW circuit breaker on pilot's C/B panel.
(b) Ensure that Autopilot and Mach Trim Systems are off.

NOTE: The MACH TRIM circuit breaker must be pulled to disengage the Mach Trim System.

(c) Ensure that Static Source Switch is set to BOTH position.
(d) Close pitot/static tester source valves and vent valves and open crossbleed valve.

CAUTION: TO AVOID DAMAGE TO AIRCRAFT INSTRUMENTS, DO NOT EXCEED 5000 FEET PER MINUTE RATE-OF-CLIMB OR RATE-OF-DESCENT. DO NOT ALLOW AIRSPEED TO GO BELOW ZERO.

(e) Open static source valve and slowly apply vacuum to static system until copilot's altimeter indicates 7000 (±50) feet (corrected for altimeter error).
(f) Close static source valve and crossbleed valve.

CAUTION: TO AVOID DAMAGE TO AIRCRAFT INSTRUMENTS, DO NOT EXCEED 20 KNOTS PER SECOND WHEN VENTING ATMOSPHERIC PRESSURE INTO PITOT SYSTEM.

(g) With crossbleed valve closed, slowly open pitot vent valve and vent atmospheric pressure into pitot system until overspeed aural warning sounds.
(h) Overspeed aural warning shall sound at 300 (+3; -0) KIAS. On *Aircraft equipped with electrically heated windshields,* overspeed aural warning shall sound at 350 (+3; -0) KIAS.
(i) *On Aircraft with not equipped with electrically heated windshields*, while maintaining airspeed indication between 300 and 350 KIAS, open static source valve and slowly increase altitude until overspeed warning silences. Warning shall silence at 8,400 (±400) feet altitude.

(15) Check Mach warning horn as follows:

CAUTION: TO AVOID DAMAGE TO AIRCRAFT INSTRUMENTS, DO NOT EXCEED 5000 FEET PER MINUTE RATE-OF-CLIMB OR RATE-OF-DESCENT. DO NOT ALLOW AIRSPEED TO GO BELOW ZERO.

(a) Open pitot/static tester crossbleed valve and slowly decrease airspeed to 150 knots.
(b) With crossbleed valve open, open static source valve and slowly increase altitude until copilot's altimeter indicates 22,500 feet (corrected for altimeter error).

CAUTION: TO AVOID DAMAGE TO AIRCRAFT INSTRUMENTS, DO NOT EXCEED 20 KNOTS PER SECOND WHEN VENTING ATMOSPHERIC PRESSURE INTO PITOT SYSTEM.

(c) Close pitot/static tester crossbleed valve and vent atmospheric pressure slowly into pitot system until overspeed aural warning sounds.
(d) Overspeed aural warning shall sound at 0.74 (±0.01) M.
(e) Depress Mach Trim circuit breaker or engage autopilot system. Aural warning shall cease.

(16) Check overspeed aural warning and stick puller as follows:
(a) Set L Stall Warning Switch and Autopilot Master Switch on.
(b) Reset MACH TRIM circuit breaker and engage autopilot.

CAUTION: TO AVOID DAMAGE TO AIRCRAFT INSTRUMENTS, DO NOT EXCEED 5000 FEET PER MINUTE RATE-OF-CLIMB OR RATE-OF-DESCENT. DO NOT ALLOW AIRSPEED TO GO BELOW ZERO.

NOTE: If aircraft is not equipped with electrically heated windshields, skip step (c) and proceed to step (d).

(c) *On Aircraft with electrically heated windshields*, adjust pitot/static tester to 7,000 feet altitude and approximately 340 knots airspeed.
(d) Adjust pitot/static tester to 20,000 feet altitude and approximately 340 knots airspeed.
(e) Slowly increase airspeed. Verify that copilot's airspeed pointer picks up barber pole at 350 (±4) knots, overspeed aural warning occurs after barber pole pick-up at 350 (+4; -0) knots, and that stick puller occurs after aural warning (over 354 knots).
(f) Decrease airspeed below 350 knots and verify that stick puller and overspeed aural warning ceases.
(g) Increase pitot/static tester altitude to 41,000 feet. Slowly open pitot vent valve and increase airspeed. Verify that airspeed pointer picks up barber pole at 0.81 (±0.01) M, aural warning occurs after barber pole pick up (0.81 to 0.82 M), and that stick puller actuates after aural warning (0.005 M after overspeed to 0.83 M).
(h) Decrease airspeed below 0.81 M and verify that stick puller and overspeed aural warning ceases.
(i) Increase tester altitude to 45,000 feet. Slowly open pitot vent valve and increase airspeed. Verify that airspeed pointer picks up barber pole at 0.81 (±0.01) M, aural warning occurs after barber pole pick up (0.81 to 0.82 M), and that stick puller actuates after aural warning (0.005 M after overspeed to 0.83 M).
(j) Decrease airspeed below 0.81 M and verify that stick puller and overspeed aural warning ceases.
(k) Repeat step (16)(c) thru (j) with L Stall Warning Switch off and R Stall Warning Switch on. Stick puller shall not occur. All aural warnings shall sound.

(17) Check control column overpower force as follows:
(a) Use manual pitch trim to position stabilizer for a neutral feel on the control column. Use spring scale to verify.
(b) Set L Stall Warning Switch on and R Stall Warning Switch off.
(c) Hold spring scale firmly against center of control wheel to prevent control from moving aft.

CAUTION: TO AVOID DAMAGE TO AIRCRAFT INSTRUMENTS, DO NOT EXCEED 5000 FEET PER MINUTE RATE-OF-CLIMB OR RATE-OF-DESCENT. DO NOT ALLOW AIRSPEED TO GO BELOW ZERO.

(d) Adjust pitot/static tester to 26,000 feet altitude and 0.83 M airspeed.
(e) Control column shall move aft and overspeed aural warning shall sound. Note spring scale reading at which control wheel aft movement stops. Spring scale reading shall be 15 to 18 pounds.
(f) Set R Stall Warning Switch on and L Stall Warning Switch off. Aural warning shall sound. There shall not be any column force.

CAUTION: TO AVOID DAMAGE TO AIRCRAFT INSTRUMENTS, DO NOT EXCEED 5000 FEET PER MINUTE RATE-OF-CLIMB OR RATE-OF-DESCENT. DO NOT ALLOW AIRSPEED TO GO BELOW ZERO.

(g) Slowly bring altitude to field elevation and airspeed to zero.

(18) Check Fast/Slow Indicator (if installed).
  (a) Set pitot/static tester to an airspeed of 140 knots.
  (b) Set Flight Director command (internal fiducial marker of airspeed/Mach indicator) for 140 knots. Verify on HSI that Fast/Slow flag is out of view and Fast/Slow indicator is centered.
  (c) Set pitot/static tester to simulate an airspeed of 130 knots. Verify that Fast/Slow indicator needle deflects in Slow direction. Fast/Slow flag is in view.
  (d) Slowly adjust pitot/static tester to simulate an airspeed of 150 knots. Verify that Fast/Slow indicator needle deflects in Fast direction. Fast/Slow flag is in view.
  (e) Slowly adjust simulated airspeed to 140 knots. Verify that Fast/ Slow indicator needle deflection is smooth and slowly moves to center position. Fast/Slow flag disappears from view.
  (f) Disengage Flight Director command.
  (g) Slowly bring airspeed to zero.
(19) Set Battery, Primary, and Secondary Inverter Switches off.
(20) Disconnect electrical connector from copilot's airspeed indicator and connect electrical connector to pilot's airspeed indicator.
(21) Perform steps (11)(a) thru (18)(g) using pilot's airspeed indicator.
(22) Set Battery, Primary and Secondary Inverter Switches off.
(23) Connect electrical connector to copilot's airspeed indicator.
(24) Check aural gear up warning.
  (a) Place aircraft on jacks and cycle landing gear up.

NOTE: If it is not practical to jack the aircraft and cycle the gear, gear up may be simulated by removing hydraulic power and manually depressing one of the gear up switches located near the gear trunnions and positioning the landing gear control handle to UP.

CAUTION: IF THE GEAR UP SWITCHES ARE HELD CLOSED FOR TESTING, INSPECT THE TRUNNION AREA AND GEAR UP SWITCH TO ENSURE ALL TEST DEVICES AND TOOLS ARE REMOVED AT COMPLETION OF TEST.

TO AVOID DAMAGE TO AIRCRAFT INSTRUMENTS, DO NOT EXCEED 5000 FEET PER MINUTE RATE-OF-CLIMB OR RATE-OF-DESCENT. DO NOT ALLOW AIRSPEED TO GO BELOW ZERO.

  (b) Open static source valve and slowly increase altitude above 25,000 feet while maintaining airspeed at approximately 0.74 M.
  (c) Open crossbleed valve slowly and decrease airspeed to 150 knots.
  (d) Leaving crossbleed valve open, slowly bring copilot's altimeter to 14,500 (±500) feet (corrected for altimeter error).
  (e) Close pitot/static tester crossbleed valve. Vent atmospheric pressure slowly into pitot system until airspeed reaches 200 knots.
  (f) Ensure that landing gear is up or simulated up.
  (g) Place throttles in IDLE position.
  (h) Open pitot/static tester crossbleed valve slowly to bring airspeed down until aural gear up warning sounds.
  (i) Aural gear up warning shall sound at 170 (±5) KIAS at an altitude of 14,500 (±500) feet.
(25) Disconnect external electrical power source from aircraft.
(26) Remove pitot/static tester from pitot/static adapters.
(27) Remove pitot/static adapters from pitot/static probes.
(28) Restore aircraft to normal.

REF	ALTITUDE		AIRSPEED		AURAL WARNING		MACH TRIM		AUTO-PILOT		STICK PULLER	
	ACTUAL	REQUIRED	ACTUAL	REQUIRED	ON	OFF	ON	OFF	ON	OFF	ON	OFF
2.B.(14) (e) thru (h)	_____	7,000 ft.	_____	300 (+3,-0) KIAS	X			X		X		X
1	_____	7,000 ft.	_____	350 (+3,-0) KIAS								
2.B.(14) (i)	_____	8,400 (±400) ft.	_____	300 to 350 KIAS		X		X		X		X
1	_____	7,000 (±50) ft.	_____	300 to 350 KIAS								
2.B.(15) (b),(c), (d)	_____	22,500 ft.	_____	.74 (±0.01) MI	X			X		X		X
2.B.(15) (e)	_____	22,500 ft.	_____	.74 (±0.01) MI		X	X		X			X
2.B.(16) (c),(d), (e)	_____	20,000 ft.	_____	350 (+4,-0) KIAS	X		X			X		X
1	_____	7,000 ft.	_____	350 (+4,-0) KIAS								
2.B.(16) (f)	_____	41,000 ft.	_____	.81 (+0.01,-0) MI	X		X		X			X
	_____	41,000 ft.	_____	.82 (+0.01,-0) MI	X		X		X		X	
2.B.(16) (g)	_____	41,000 ft.	_____	Below .82 MI	X		X		X			X
	_____	41,000 ft.	_____	Below .81 MI		X	X		X			X
2.B.(16) (h),(i),(j)	_____	45,000 ft.	_____	.81 (+0.01,-0) MI	X		X		X			X
	_____	45,000 ft.	_____	.82 (+0.01,-0) MI	X		X		X		X	

1 Effective on aircraft with electrically heated windshields.

Mach/Overspeed Warning System Data Sheet
Figure 202