Factual Report – Addendum 1

FC-200 Autopilot System

OPERATIONAL FACTORS

CEN17MA183

RUDDER TRIM INDICATOR

Rudder trim tab position indication is provided by the RUDDER TRIM indicator located in the trim indicator panel on the pedestal. A semi-circular scale and pointer indicates the direction (L or R) of yaw trim. The scale markings represent increments of rudder trim tab travel. The indicator receives rudder trim tab position inputs from a potentiometer in the rudder trim actuator. The indicator operates on 28 VDC supplied through the 2-amp TAB & FLAP POSN or TRIM-FLAP IND circuit breaker on the copilot's circuit breaker panel.

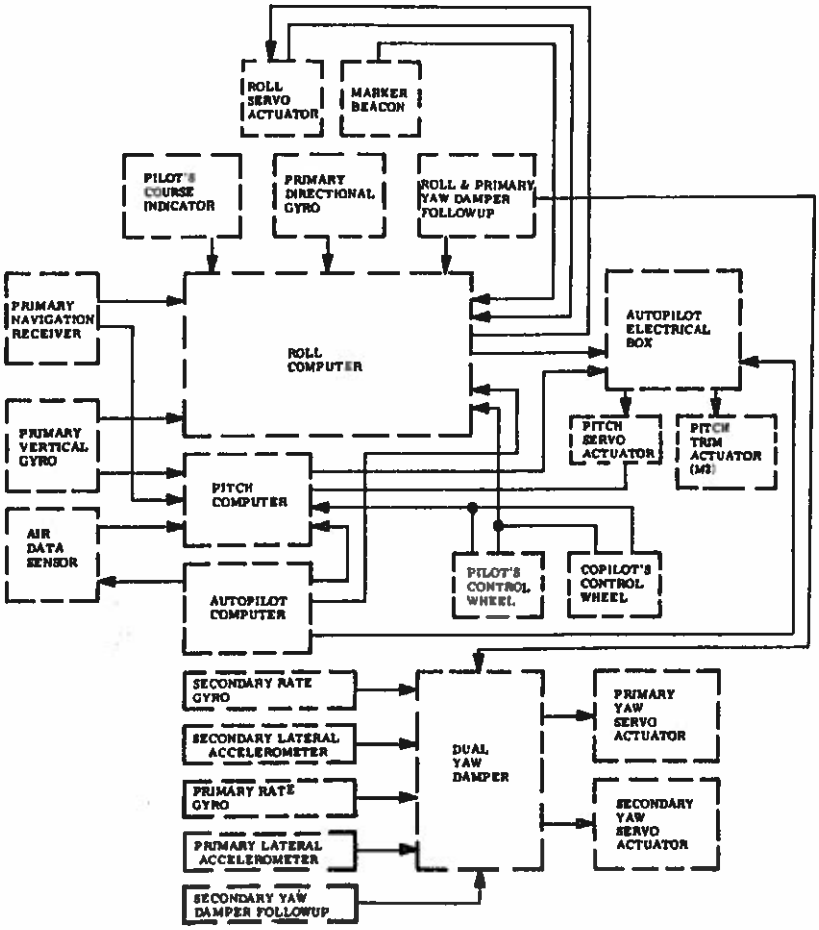
AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

The following description covers the J.E.T. FC-200 or FC-530 Automatic Flight Control System (AFCS) in a general manner and is intended for familiarization only. Refer to J.E.T. FC-200 or J.E.T. FC-530 Automatic Flight Control System Pilot's Guide and the applicable FAA Approved Airplane Flight Manuals for additional information on the operation of the AFCS.

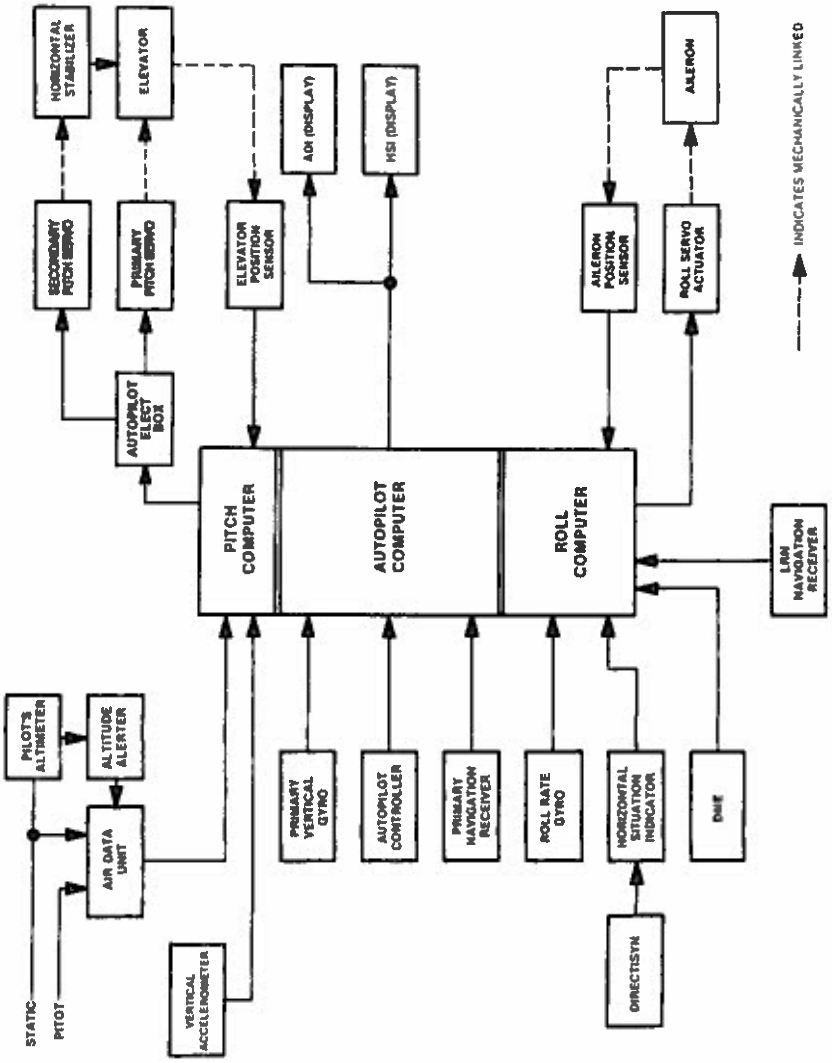
The J.E.T. FC-200 or FC-530 AFCS is installed to provide flight guidance (flight director) and/or automatic flight control (autopilot) in the pitch and roll axes. A separate yaw damper system provides yaw axis control. Pitch and roll axis change, when commanded by the autopilot, is effected through elevator and aileron servos. An autopilot controller immediately below the glareshield annunciator panel provides for autopilot engagement, test, mode selection, and status mode annunciation. Commands to the autopilot are accomplished through control wheel switches and the HSI course and heading controls. The flight director and autopilot operate on 28 VDC supplied through the 15-amp PRI AFCS, 3-amp or 5-amp AFCS PITCH, 7.5-amp AFCS ROLL circuit breakers on the pilot's circuit breaker panel.

When the autopilot is engaged, pitch and roll axis change is effected through the elevator and aileron servos. The autopilot also provides pitch trim commands to the secondary trim system motor of the horizontal stabilizer pitch trim actuator. Pitch authority is limited to 10° nose down and 20° nose up (*FC-530*) or 25° pitch attitude change (*FC-200*). Roll authority is limited to 30° left or right bank.

The pitch servo actuator positions the elevators in response to autopilot commands when the autopilot has been engaged. The pitch servo actuator acts as a stick pusher in the stall system. A "G" limiter is installed to sense negative g-forces in the pitch axis. If the negative g-



FC-200 AUTOPILOT/FLIGHT DIRECTOR BLOCK DIAGRAM
Figure 5-8



FC-530 AUTOPILOT/FLIGHT DIRECTOR BLOCK DIAGRAM
Figure 5-9

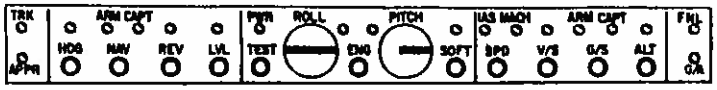
force exceeds -0.25g's, the limiter will interrupt the +28VDC engage voltage to the pitch servo actuator and, after three seconds of delay, will illuminate the right and left stall warning lights. Most modes in the roll axis are mutually exclusive and, with the exceptions of NAV plus REV (FC-200)/BC (FC-530) and NAV-ARM, cannot be simultaneously engaged. Most modes in the pitch axis are mutually exclusive and, with the exception of G/S-ARM, only one can be engaged at one time. Autopilot switching logic provides that the last mode actuated will disengage (with the exceptions noted) previously engaged modes for that axis.

Aircraft with FC-530 AFCS. Two roll monitors are installed which will disengage the autopilot roll axis if the bank angle exceeds 35° to 40° or if the roll rate exceeds 13.6° per second for more than one-half second. A pitch g-level monitor is installed which will cause the elevator to streamline (null servo force) whenever the g level reaches 1.6 g or 0.6 g. When the pitch g-level monitor streamlines the elevator, the pitch axis does not disengage but will maintain the elevator streamlined until the aircraft g level is within limits. Selected pitch modes are not disengaged by the pitch g-level monitor. An attitude gyro flag monitor circuit will disengage the autopilot pitch and roll axes when the vertical gyro flag on the ADI comes into view. A directional gyro flag monitor will disengage the autopilot roll axis if the HSI flag comes into view. The autopilot pitch axis and control circuits for the stick nudger and stick puller are interfaced to preclude conflicting signals to the elevator servo. If the autopilot is engaged and the stick nudger or puller actuates, any selected pitch mode will disengage and the autopilot will maintain a synchronous standby mode until the stick nudger or puller releases. When the stick nudger or puller releases, the autopilot will assume attitude hold and maintain the existing pitch attitude. If the autopilot is engaged in the glideslope mode with the glideslope captured, and the nudger actuates, the G/S ARM annunciator will flash and the autopilot will maintain a synchronous standby mode. The glideslope may automatically be recaptured after the nudger releases or may be recaptured using a pitch command.

AUTOPILOT CONTROLLER (FC-200)

The autopilot controller contains all the AFCS mode annunciator lights and all the mode actuating switches except go-around. The autopilot controller is located in the center of the glareshield and is accessible from either crew position. All mode switches on the Autopilot Controller except ENG and TEST are push-on, push-off

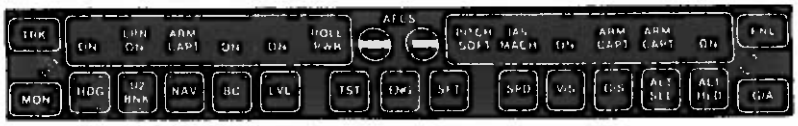
functioning switches. Engaged autopilot and flight director modes may be disengaged by depressing the mode button a second time or selecting an incompatible mode. Roll modes (HDG, NAV CAPT, LVL, and roll command) will cancel each other. NAV ARM is not affected by this mode switching. Pitch modes (IAS, MACH, V/S, G/S CAPT, ALT, pitch command and pitch sync) will cancel each other. G/S ARM is not affected by mode switching.



AUTOPILOT CONTROLLER FC-200
Figure 5-10

AUTOPILOT CONTROLLER (FC-530)

The autopilot controller provides the autopilot engage and self-test functions, as well as autopilot and pilot's flight director mode selection and annunciation. The autopilot controller is located in the glareshield and is easily accessible from either crew position. The controller annunciators are automatically dimmed. Autopilot and flight director modes are engaged by depressing the applicable mode selector button on the autopilot controller. Flight director only mode selection is accomplished by depressing the applicable mode selector without the autopilot engaged.



or

AUTOPILOT CONTROLLER FC-530
Figure 5-11

AUTOPILOT/FLIGHT DIRECTOR FUNCTIONS

Autopilot and flight director functions are engaged by depressing the applicable mode selector button on the autopilot controller. Flight director only mode selection is accomplished by depressing the applicable mode selector without the autopilot engaged.

On Aircraft with FC-200 autopilot, engaged autopilot flight director modes may be cancelled by depressing the selector button a second time or depressing the manual trim switch to disengage pitch and roll axes only. Press A/P REL-NOSE STEER switch to disengage AFCS in all three axes. To disengage yaw axis only, press applicable Dual Yaw Damper OFF switch. Single axis disengagement may be obtained by pulling applicable circuit breakers. Roll and pitch axes may be disengaged by placing the AUTOPILOT switch in the off position.

On Aircraft with FC-530 autopilot, engaged autopilot and flight director modes may be cancelled by depressing the selector button a second time (except for SPD mode) or selecting an incompatible mode. Incompatible lateral modes are HDG, NAV CAPT, LVL, and roll command (autopilot only). 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) will cancel each other. G/S ARM and ALT SEL ARM are not affected by mode switching.

The following functions are provided:

FC-200 FUNCTIONS	FC-530 FUNCTIONS
Autopilot Attitude Hold	Autopilot Attitude Hold
SFT	SFT
HDG	HDG
NAV	1/2 BANK
TRK	NAV
REV	LRN
LVL	BC
SPD	TRK
V/S	LVL
G/S	SPD
ALT	V/S
FNL	G/S
G/A (Flight Director Only)	ALT HLD
	FNL
	G/A (Flight Director Only)

CONTROL WHEEL MASTER SWITCHES — AUTOPILOT FUNCTION

The Control Wheel Master Switches (MSW), located on the outboard horn of the pilot's and copilot's control wheels, may be used to disengage the autopilot. Depressing either the pilot's or copilot's Control Wheel Master Switch (MSW) will apply a signal which cancels the autopilot engage signal. When the autopilot disengages, the autopilot PITCH and ROLL annunciators will extinguish and the autopilot disengage tone will sound (*aircraft with FC-530 autopilot*). When the autopilot is disengaged using the Control Wheel Master Switches (MSW), the pilot's flight director will remain active and will display steering information from the autopilot computer, if a pitch or roll mode is selected.

PITCH TRIM SELECTOR SWITCH — AUTOPILOT FUNCTION

When the autopilot is engaged, the autopilot maintains aircraft pitch trim through the secondary motor of the horizontal stabilizer pitch trim actuator if the PITCH TRIM selector switch on the pedestal is in the PRI or SEC position. The autopilot will not engage or will disengage if the PITCH TRIM selector switch is moved to the OFF position.

CONTROL WHEEL TRIM SWITCHES — AUTOPILOT FUNCTION

The control wheel trim switches, located on the outboard horn of each control wheel, may be used to disengage the autopilot, to make trim adjustments with the autopilot pitch and roll axes inhibited, or to make pitch and roll inputs while in attitude hold modes. When either control wheel trim switch (arming button depressed) is moved to any of the four positions (LWD, RWD, NOSE UP, or NOSE DOWN) the autopilot will disengage, the P (pitch) and R (roll) annunciators will extinguish and on *aircraft equipped with FC-530 autopilot,* the autopilot disengage tone will sound. When the autopilot is disengaged using the control wheel trim switches, the selected flight director will remain active and will display steering information from the autopilot computer. When the autopilot is engaged, either control wheel trim switch (arming button not depressed), may be used to insert autopilot roll and pitch attitude changes. *On aircraft equipped with FC-200,* when a pitch attitude change is commanded, selected vertical modes (except G/S ARM) will be cancelled and the autopilot will revert to the pitch attitude hold mode. *On aircraft equipped with FC-530,* when a pitch attitude change is commanded, selected vertical modes (except G/S ARM and ALT SEL ARM) will be cancelled and the autopilot will revert to the pitch attitude hold mode. When a roll attitude change is commanded, selected lateral modes (except NAV ARM) will be cancelled and the autopilot will revert to roll attitude hold.

When the autopilot pitch and roll axes are inhibited using the control wheel MANUV R/P switches, pitch and roll trim changes can be made by using the control wheel trim switches.

PEDESTAL NOSE DN-OFF-NOSE UP SWITCH — AUTOPILOT FUNCTION

The NOSE DN-OFF-NOSE UP switch, located on the pedestal trim control panel, may be used to disengage the autopilot or to make trim adjustments with the autopilot pitch and roll axes inhibited. With the PITCH TRIM selector switch in the SEC position, actuation of secondary pitch trim through the NOSE DN-OFF-NOSE UP switch will disengage the autopilot, extinguish the PITCH and ROLL annunciators, and sound the autopilot disengage tone (*aircraft equipped with FC-530 autopilot*). When the autopilot is disengaged through the NOSE DN-OFF-NOSE UP switch, the pilot's flight director will remain active and display steering information from the autopilot computer. When the autopilot pitch and roll axes are inhibited using the control wheel MANUV R/P switches, pitch trim changes can be made by using the NOSE DN-OFF-NOSE UP switch as discussed in PITCH TRIM SYSTEM.

CONTROL WHEEL MANEUVER SWITCHES *(Aircraft with FC-200 Autopilot)*

The maneuver switch is a momentary switch. Temporarily depressing the MANEUVER switch disengages the roll and pitch axes of the AFCS and allows the aircraft to be manually flown with the control wheel. When a new attitude is established manually and the maneuver switch is then released, the roll and pitch axes of the AFCS automatically re-engage, synchronized to the new attitude, and will maintain that attitude within the limits of the autopilot control. If maneuver limits are exceeded and the switch then released, the autopilot will smoothly return the aircraft to an attitude within the maneuver limits. Previously engaged roll and pitch axis modes will be disengaged.

CONTROL WHEEL MANEUVER SWITCHES *(Aircraft with FC-530 Autopilot)*

Depressing either the pilot's or copilot's control wheel MANUV R/P switch, with the autopilot engaged, will temporarily inhibit the autopilot pitch and roll axes and extinguish the PITCH and ROLL annunciators. Manual pitch, roll, and trim commands can be made while the switch is depressed. Selected roll and pitch modes will remain engaged when the switch is depressed. When the switch is released, the

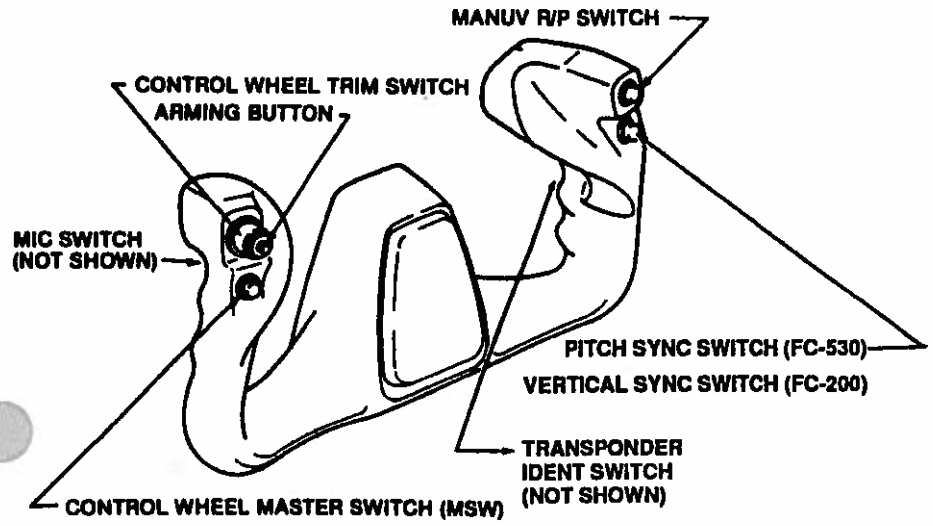
autopilot will resynchronize to and hold the existing (new) values in SPD (IAS or M), V/S, ALT HLD, or Attitude Hold modes. If MANUV R/P switch is released beyond autopilot roll monitor limits, the roll axis will disengage, the ROLL annunciator will go out, the autopilot will disengage, and the disengage tone will sound. Either MANUV R/P switch may be used to stow the pilot's flight director command bars during flight director only operation.

Vertical Sync Switch (FC-200 Autopilot)

Depressing the pilot's VERTICAL SYNC switch will disengage any engaged pitch modes while leaving engaged lateral modes functional. While the pitch axis is disengaged, the aircraft can be manually flown to a new pitch attitude. Commands will be generated on the pilot's flight director to maintain the pitch attitude existing when the vertical sync switch is released. If engaged, the autopilot will maintain this pitch attitude. Previously engaged pitch axis modes will be disengaged.

PITCH SYNC Switch (FC-530 Autopilot)

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 system will generate commands on the pilot's flight director to maintain the pitch attitude existing when the PITCH SYNC switch is released.



CONTROL WHEEL SWITCHES
(PILOT'S SHOWN, COPILOT'S OPPOSITE)
Figure 5-12

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

NOTE

This Supplement supersedes FC-200 Autopilot — J.E.T. Supplement dated 4-4-80.

When the J.E.T. Model FC-200 Automatic Flight Control System (Autopilot) is installed in the Gates Learjet Model 35A/36A, this Supplement shall be applicable and must be placed in the SUPPLEMENTS section of the FAA Approved Airplane Flight Manual.

The information contained herein supplements the information in the basic Airplane Flight Manual. For limitations, operating procedures, and performance information not contained in this Supplement, consult the applicable basic Airplane Flight Manual.

FAA APPROVED [redacted] DATE 2/25/81

for CHIEF, AIRCRAFT CERTIFICATION PROGRAM
FAA CENTRAL REGION
WICHITA, KANSAS

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

TABLE OF CONTENTS

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION I — LIMITATIONS

1. Maximum Operating Speed V_{MO}/M_{MO}.
2. When using autopilot, the pilot or copilot must be in the respective seat and the seat belt fastened.
3. Autopilot pitch and roll axis must **not** be used for takeoff or landing.
4. **Do not** extend spoilers with autopilot engaged.
5. If heavy precipitation or severe turbulence is encountered, disengage SPD, V/S, ALT, and G/S modes and engage Yaw Damper, LVL and SOFT modes.
6. The autopilot may **not** be used unless the pitch and roll monitors have been checked and are operational.
7. If, upon retraction of flaps after takeoff, the APPR Light stays on, or illuminates in the clean configuration, **do not** use the roll or pitch modes of the autopilot. In maneuvers which involve the flaps beyond 13°, (ILS), the complete autopilot may be used.

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II – NORMAL PROCEDURES

CAUTION Before performing engaged preflight tests of the autopilot, ensure that aircraft flight controls are unlocked and full control movement is unrestricted.

AUTOPILOT OPERATIONAL CHECK

1. All Autopilot Circuit Breakers (Pilot's and Copilot's Ess Bus) — Check, in.
2. BAT Switches — On.
3. INVERTER Switch(es) — On.
4. Pitch Trim — T.O.
5. AUTOPILOT Switch — ON. The PWR light on the Autopilot Controller will illuminate.
6. TEST Button — Depress. All lights on the Autopilot Controller must illuminate.
7. Attitude Director Indicator (ADI) flags and Horizontal Situation Indicator (HSI) flags — Check to see that flags have disappeared. This indicates that vertical and directional gyros have been energized long enough to time-out erection cycles (approx. 90 seconds).
8. ENG Button — Depress. The ROLL, PITCH and LVL lights will illuminate. The autopilot will oppose movement of the elevator and aileron.
9. TEST Button — Depress and hold.
10. Control Wheel Trim Switch — Move to the left without depressing the arming button. ROLL light will extinguish and autopilot disconnect horn will sound within 5 seconds.
11. Release TEST Button and Control Wheel Trim Switch.
12. Repeat steps 8, 9, 10, and 11 except move Control Wheel Trim Switch to the right.
13. Repeat steps 8 and 9.
14. Control Wheel Trim Switch — Move to the nose down position without depressing the arming button. PITCH light will go out and the autopilot disconnect horn will sound within 6 seconds. Normally the roll axis will disengage also, but if such disengagement does not occur, it may be disregarded since roll axis disengagement is not required.
15. ENG Button — Depress.

TEMPORARY FLIGHT MANUAL SUPPLEMENT CHANGE

Publication Affected: Gates Learjet Model 35A/36A AFM Supplement for J.E.T. FC-200 Automatic Flight Control System (Autopilot/Flight Director).

Description of Change: Revise autopilot pitch monitor check.

Filing Instructions: Insert this page adjacent to page 4 of 16 in the affected AFM Supplement and retain until further notice.

Under AUTOPILOT OPERATIONAL CHECK, revise step 14 to read as follows:

14. Control Wheel Trim Switch - Without depressing arming button, move switch to NOSE DN position while holding moderate pull force on control column. PITCH light will go out and the autopilot disconnect horn will sound within 6 seconds.

NOTE

Normally, the roll axis will disengage along with the pitch axis. If such disengagement does not occur, it may be disregarded since roll axis disengagement is not required.

FAA APPROVED [redacted] DATE 3/31/81

for CHIEF, AIRCRAFT CERTIFICATION PROGRAM
FAA CENTRAL REGION
WICHITA, KANSAS

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II — NORMAL PROCEDURES (CONT)

16. Hold moderate pressure (less than overpower values) on control wheel and column simultaneously. Then depress pilot's Control Wheel Master Switch. Autopilot opposition must disappear from both axes and the ROLL and PITCH ENG lights must go out and autopilot disconnect horn will sound. Release control wheel and column.
17. ENG Button — Depress.
18. Hold moderate pressure on control wheel and column simultaneously. Then depress copilot's Control Wheel Master Switch. Autopilot opposition must disappear from both axes and the ROLL and PITCH ENG lights must go out and autopilot disconnect horn will sound. Release control wheel and column.
19. ENG Button — Depress.
20. Hold moderate pressure on control wheel and column simultaneously. Then depress pilot's Maneuver Control Switch. Autopilot opposition must disappear in roll and pitch axis only.
21. Pilot's Maneuver Control Switch — Release. Autopilot opposition will reappear.
22. Repeat steps 20 and 21 using copilot's Maneuver Control Switch.
23. Continue moderate two-axis force and depress Vertical Sync Switch on pilot's control wheel. Autopilot opposition will disappear in the pitch axis only.
24. Pilot's Vertical Sync Switch — Release. Autopilot opposition will reappear.
25. Pilot's Control Wheel Trim Switch — Move in each of the four directions without depressing the button on top of the switch. The control wheel and column will respond by moving in the direction commanded by the trim switch.
26. Repeat step 25 using the copilot's Control Wheel Trim Switch.

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II — NORMAL PROCEDURES (CONT)

27. Overpower the autopilot in both pitch directions and both roll directions. It must be possible to move the control wheel and column in both directions in opposition of the autopilot. ROLL and PITCH Force Indicators on the Autopilot Controller will deflect to indicate the 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. Autopilot opposition will then be centered about the 'new' position of the control column.

28. Depress the Trim Arming Button on top of the pilot's Control Wheel Trim Switch and move the Trim Switch in any of the four directions. ROLL and PITCH ENG Lights will go out and opposition to control movement will disappear in the roll and pitch axis and the autopilot disconnect horn will sound.
29. ENG Button — Depress.
30. Repeat steps 28 and 29 using the copilot's Control Wheel Trim Switch.
31. Autopilot ENG Button — Depress.
32. Set the heading bug on the pilot's HSI to the aircraft present heading.
33. Autopilot HDG Button — Depress. The HDG Light will illuminate.
34. Move the heading bug to the left and then right of aircraft heading. Roll axis will correspond to heading changes.
35. Autopilot LVL Button — Depress. LVL Light will illuminate and HDG Light will go out.
36. ALT Button — Depress. ALT Light will illuminate.
37. SOFT Button — Depress. SOFT Light will illuminate. **Do not** have an ILS frequency tuned on the primary NAV for this check.
38. Depress either Maneuver Control Switch on the control wheel. The LVL and ALT Lights will go out. SOFT Light will remain illuminated.
39. Turn on navigation receiver and tune to VOR frequency. Set HSI heading bug to the present aircraft heading.
40. Autopilot HDG Button — Depress.

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II — NORMAL PROCEDURES (CONT)

41. Turn HSI course select pointer until the course bar is fully displaced from center in front of HSI aircraft symbol and has just begun movement toward center.
42. Autopilot NAV Button — Depress. NAV ARM Light will illuminate.
43. Gradually move HSI course select pointer to cause the course bar to move toward HSI aircraft symbol. The NAV ARM and HDG lights will go out and the NAV CAPT light will illuminate. The autopilot roll axis will respond by moving the control wheel as though to start a turn toward alignment with the course bar.
44. With the course bar centered, move HSI course select pointer quickly right and left to cause rapid course bar deflections. The NAV CAPT light will go out and the NAV ARM Light will flash while the course bar is being moved. NAV CAPT will engage approximately 20 seconds after the course bar is allowed to stabilize near center.
45. SPD Button — Depress. The IAS Light will illuminate.
46. V/S Button — Depress. The IAS Light will go out and the V/S Light will illuminate.
47. FLAP — Extend beyond approximately 13°. APPR Light will illuminate.
48. Control Wheel Master Switch — Depress to disengage all autopilot functions.

TO ENGAGE AUTOPILOT

1. AUTOPILOT Switch — On.
2. Force Indicators — Bars Centered.
3. ENG Button (on Autopilot Controller) — Depress.

TO DISENGAGE AUTOPILOT

1. Force Indicators — Bars centered.
2. Control Wheel Trim Switch, when depressed and moved in any of the four directions, disengages pitch and roll axis.
3. Control Wheel Master Switch, when depressed, disengages pitch, roll and yaw axis.
4. AUTOPILOT Switch, when set to OFF, disengages pitch and roll axis.
5. Individual axis may be disengaged by pulling the applicable circuit breaker.

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II — NORMAL PROCEDURES (CONT)

AUTOPILOT MODES

PWR (Power) — This light illuminates when power is available to the pitch and roll axis of the autopilot and to the flight director. It is an indication that the associated AC and DC circuit breakers have been depressed and the AUTOPILOT Switch has been set to On. Autopilot synchronizing circuits are active.

TEST (Test) — When depressed, provides automatic test of all autopilot and flight director systems in the pitch and roll axis. With power on, the PWR light illuminated, depressing the TEST Button will illuminate all lights on the autopilot controller and cause the ROLL and PITCH Force Indicators to oscillate. Failure of any light to illuminate during TEST indicates a malfunction in the autopilot or light is burned-out. TEST may be used before takeoff or anytime while airborne. If TEST is depressed with autopilot engaged, it will not provide any indication on the Force Indicators. With the autopilot engaged on the ground, pitch and roll monitors are armed and are checked by holding TEST and commanding pitch and roll with Control Wheel Trim Switches.

ENG (Engage) — When depressed, the autopilot is engaged. If some condition exists which is indicated by an out-of-null on the PITCH or ROLL Force Indicators, the associated axis will not engage. If only one ROLL or PITCH light illuminates (but both respond to TEST) it is an indication of a problem in the unlighted axis.

SOFT (Soft) — When depressed, the autopilot provides softer responses in the pitch and roll axes for flying through turbulence. The SOFT mode is locked out when primary NAV is on Localizer frequency. The SOFT light illuminates when the SOFT mode is engaged.

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II — NORMAL PROCEDURES (CONT)

HDG (Heading)	When depressed, commands the autopilot and/or flight director to turn the airplane as necessary and fly a heading selected by position of the heading "bug" on the (HSI) Horizontal Situation Indicator. A light above the HDG Button will illuminate when heading select is engaged.
NAV (Navigation)	When depressed, activates the autopilot and/or flight director function which captures and tracks VOR and LOC. For NAV mode function, the aircraft receiver must be tuned to the frequency of the navigation aid and 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, LVL, or Attitude Hold mode.** Activation of the NAV mode will start automatic procedures and the NAV-ARM light will illuminate. When the aircraft turns on the desired track, the NAV-ARM light will go out and the NAV-CAPT light will illuminate. An engaged heading select or level mode will automatically disengage as NAV-CAPT engages.
TRK (Track)	In the NAV-CAPT mode, this light illuminates to indicate that the autopilot and/or flight director have acquired the center of the VOR or LOC beam (TRK illuminated). Crosswind compensation begins when TRK light is illuminated.
REV (Reverse)	The NAV mode must be engaged and the primary NAV must be tuned to a Localizer Frequency for this mode to be operative. When the REV Button is depressed, the light illuminates, the course information to the autopilot and/or flight director is reversed and the glideslope signal is locked out. This function should be used for localizer backcourse approaches only. Disengaging the NAV mode also disengages REV.

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II — NORMAL PROCEDURES (CONT)

LVL (Level)

When the autopilot is first engaged it automatically enters the level mode if the aircraft is not banking more than five degrees. When LVL Button is depressed, the light illuminates, the autopilot levels the aircraft in roll and maintains the existing heading. This mode may be used to cancel any other roll modes. If, however, the aircraft is in a bank **greater** than five degrees with either NAV or HDG mode on the flight director engaged, when the autopilot is first engaged the aircraft will roll level and the LVL light will not illuminate.

SPD (Speed)

When depressed, the autopilot and/or flight director pitch axis is coupled to an Air Data Sensor output to maintain speed existing at the time of engagement. At altitudes below 29,000 feet the IAS light will illuminate and airspeed is maintained. Above 29,000 feet the MACH light will illuminate and Mach number is maintained. Speed is maintained by the autopilot by changing pitch attitude as necessary, power must be set by the pilot.

V/S (Vertical Speed)

When depressed, this switch engages autopilot and/or flight director function (within autopilot limits) to hold an established rate-of-climb or rate-of-descent. Before engaging this mode, maintain the desired rate long enough for the rate sensor lag to diminish. The V/S light illuminates when V/S is selected.

G/S (Glideslope)

May be depressed with an active glideslope being received. If the aircraft is not on glideslope when G/S is depressed the amber G/S-ARM light will illuminate and the engaged pitch mode will be maintained. The autopilot and/or flight director will capture and track the glideslope when the beam center is intercepted, the pitch mode will disengage and the G/S-CAPT light will illuminate. If G/S is depressed when the aircraft is on the glideslope, G/S-CAPT is immediate. Glideslope may be armed with no vertical modes engaged and flown to the beam with the Pitch Command Switch.

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II — NORMAL PROCEDURES (CONT)

ALT (Altitude Hold) — When depressed, the autopilot and/or flight director will maintain the existing pressure altitude. The ALT light illuminates when ALT is selected.

APPR (Approach) — The APPR light is illuminated when the flaps are lowered 13° or more and signals an increase in autopilot and/or flight director gains which compensate for lower airspeed. If the APPR light does not illuminate upon extension of flaps beyond 13°, subsequent performance of the autopilot, with flaps down, will be degraded.

FNL (Final) — The FNL light will illuminate during an ILS approach if the APPR light is illuminated (flaps are down), and the TRK light is illuminated when the outer marker is passed. If no outer marker is available (localizer backcourse as an example) or the TRK or APPR modes are not engaged until after outer marker passage, the FNL mode can be entered by momentarily pressing the primary NAV test button. (This will momentarily light the outer marker light.) It signals an automatic change in autopilot and flight director gains to compensate for increased sensitivity of the ILS signal.

G/A (Go Around) — With the autopilot engaged, the Go Around mode is inoperative. Once the autopilot is disengaged the Go Around mode is available to the flight director by depressing the Go Around button on the thrust lever knob.

AUTOPILOT MANEUVER CONTROLS

Control Wheel Trim Switch — When moved in any of its four directions, without depressing the arming button on top of the switch, will command the autopilot to change attitude of the aircraft. Depressing the arming button and moving the switch in any of its four directions will disconnect the autopilot pitch and roll axes. G/S-ARM will not disconnect when an armed pitch command is given. NAV ARM will not disconnect when an armed roll command is given.

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II — NORMAL PROCEDURES (CONT)

Maneuver Control Switch	Depressing this switch on the control wheel will temporarily disconnect the autopilot pitch and roll axis. Manual commands can be made while this switch is depressed. The selected roll and pitch modes will disengage when this switch is depressed. Autopilot will reengage in the attitude hold mode when this switch is released.

TYPICAL NORMAL FLIGHT WITH AUTOPILOT

The following is a recommended procedure for using the Autopilot. This procedure is for a 'typical flight' and deviation from this procedure will be necessary as conditions dictate.

AFTER TAKEOFF

1. APPR Light (after flap retraction) — Out.
2. Engage autopilot when climb attitude and heading have been established.
3. Set the next desired heading on HSI with heading knob or VOR radial with the course knob. Engage HDG and/or NAV whenever the heading has been established. Maneuvers may be made as described in AUTOPILOT MANEUVER CONTROLS. Heading and course changes may be made with the heading and course knobs on the HSI.

CLIMB

1. Establish desired climb speed and then engage SPD for constant speed climb.

CRUISE

1. Engage ALT when desired altitude is reached. For smoothest 'leveling off' when ALT hold is selected, the rate of climb or rate of descent should be less than 1000 feet per minute. Adjust thrust levers to achieve the desired speed.

NOTE

Static error may cause a false indication of climb or descent during airspeed change, with ALT engaged.

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II — NORMAL PROCEDURES (CONT)

2. When HDG is engaged, heading changes may be made by rotating the heading knob on the HSI to set the heading 'bug' or marker to the desired setting.
3. When NAV is engaged, the autopilot will fly chosen VOR radials. An erratic or noisy radio beam, such as exists in cone of confusion over a VOR station, will cause temporary disengagement of NAV CAPT. During such temporary disengagement, the autopilot reverts to heading hold (LVL) and the NAV ARM (flashing) mode as applicable until satisfactory signal is regained. The autopilot automatically returns to beam guidance with the return of a usable signal.

DESCENT

1. Normal descent may be made with autopilot engaged by changing aircraft attitude with Control Wheel Trim Switch, Vertical Sync Switch or Maneuver Control Switch.

VOR APPROACH

1. VOR approach with the autopilot engaged may be accomplished with the HDG and/or NAV modes, as the pilot desires, up to over-the-station passage inbound to the airport.
2. Departure from the VOR inbound should be accomplished in the HDG mode, using the HDG bug to return the aircraft to the desired radial. As the CDI centers, a return to the NAV mode, or a continuation of the approach in the HDG mode are the pilot's options.

ILS APPROACH

1. ILS approach with autopilot engaged must **not** be made at speeds less than normal approach speeds in the Airplane Flight Manual.
2. The localizer beam should be intercepted at an angle less than 90°. The inbound localizer course should be established outside the outer marker. Intercept angle to localizer will be done in the HDG, LVL or attitude hold mode.
3. When NAV is engaged, the autopilot will automatically capture the localizer upon intercept of it if the NAV is channeled to the localizer frequency and the localizer course is set on the course selector.

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II — NORMAL PROCEDURES (CONT)

4. ALT should be engaged at the proper altitude beneath the glide path for glideslope interception. When possible, this should be done prior to localizer interception.
5. G/S may be engaged when a good glideslope signal is received and must be engaged prior to glideslope intercept if on altitude hold. Altitude hold will disengage when the glideslope needle centers.
6. Prior to intercepting the glide path, extend flaps to desired position and adjust power to obtain the appropriate speed. The APPR light should illuminate as the flaps pass approximately 13°. For the smoothest approach, the flap setting should not be changed or should be changed slowly while flying the glideslope.
7. When the glideslope needle centers, the autopilot will automatically intercept the glide path and the ALT annunciator will go out. When practical, the gear should be lowered prior to the glideslope intercept point. This helps minimize glide path overshoot.

FLIGHT DIRECTOR INTEGRATION

NOTE

Refer to applicable Flight Director Supplement for specific information regarding the installed Flight Director Indicator.

The Autopilot and Flight Director system functions have been integrated to eliminate Flight Director functions that duplicate Autopilot functions. The AUTOPILOT Switch must be On to power the Flight Director and the PWR light must be illuminated. The Flight Director also acts as a monitor for the autopilot.

Operation:

1. The autopilot, while disengaged, provides flight director signals.
2. The autopilot controller provides mode switching and annunciation for the flight director while the autopilot is disengaged.
3. Flight director modes will not change and flight director information will be retained when the autopilot is disengaged using the Control Wheel Master Switch only. The yaw damper will also disengage.
4. Glideslope deviation, glideslope flag, VOR-LOC Deviation and Heading displays do not depend on the autopilot.
5. Anytime the autopilot is Engaged, the Flight Director is energized. At initial autopilot engagement, the Flight Director system reverts to attitude hold mode. Command bars on the Flight Director Indicator will be centered, indicating proper autopilot operation.

TEMPORARY FLIGHT MANUAL SUPPLEMENT CHANGE

Publication Affected:	Learjet 35A/36A FAA approved AFM Supplement entitled *J.E.T. FC-200 Automatic Flight Control System (Autopilot/Flight Director)* dated 2-25-81.
Description of Change:	Revises the description of the flight director GO AROUND mode on aircraft modified by Learjet SB 35/36-22-8.
Filing Instructions:	This Temporary Flight Manual Supplement Change supersedes and replaces TFM 2004-10. Remove the TFM and insert this Temporary Flight Manual Supplement Change adjacent to page 15 in the affected AFM Supplement and retain until further notice.

Replace item 6 under FLIGHT DIRECTOR INTEGRATION with the following:

6. With the autopilot engaged, the Go-Around feature is inoperative. However, with the autopilot disengaged, the Go-Around feature of the Flight Director is functional as follows:
   a. *On aircraft 35-068 through 35-249 and 36-018 through 36-044 not modified by Learjet SB 35/36-22-8*, the Go-Around attitude indication starts when the Go-Around button is depressed and the flaps are lowered beyond 13°.
   b. *On aircraft 35-250 and Subsequent and 36-045 and Subsequent, or aircraft modified by SB 35/36-22-8*, the Go-Around attitude indication starts when the Go-Around button is depressed.

NOTE

To select Flight Director Go -Around mode:

1. Autopilot — Disengage.
2. Flaps — Check beyond 13° *(35-068 through 35-249 and 36-018 through 36-044, except aircraft modified by Learjet SB 35/36-22-8).*
3. Go-Around button (on thrust lever knob) — Depress.

FAA APPROVED [redacted] **DATE** 11/10/04

for RONALD K. RATHGEBER, MANAGER
AIRCRAFT CERTIFICATION OFFICE
FEDERAL AVIATION ADMINISTRATION
WICHITA, KANSAS

TEMPORARY FLIGHT MANUAL SUPPLEMENT CHANGE

Publication Affected: Gates Learjet Model 35A/36A Supplement for J.E.T. FC-200 Automatic Flight Control System (Autopilot/Flight Director).

Description of Change: Revise ILS Approach procedure to add disengagement requirement.

Filing Instructions: Insert this page adjacent to page 14 of 16 in the affected AFM Supplement and retain until further notice.

Under ILS APPROACH, add step 8 as follows:

8. Autopilot must be disengaged at or above 190 feet AGL.

FAA APPROVED [redacted] **DATE** 7/8/81

for CHIEF, AIRCRAFT CERTIFICATION PROGRAM
FAA CENTRAL REGION
WICHITA, KANSAS

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

SECTION II — NORMAL PROCEDURES (CONT)

6. With the autopilot engaged, the Go-Around feature is inoperative. However, with the Autopilot disengaged, the Go-Around feature of the Flight Director is functional as follows:
   a. *On aircraft 35-068 through 35-249 and 36-018 through 36-044*, the Go-Around attitude indication starts when the Go-Around button is depressed and the flaps are lowered beyond 13°.
   b. *On aircraft 35-250 and Subsequent and 36-045 and Subsequent*, the Go-Around attitude indication starts when the Go-Around button is depressed.

NOTE

To select Flight Director Go-Around mode:
1. Autopilot — Disengage.
2. Flaps — Check beyond 13° *(35-068 through 35-249 and 36-018 through 36-044 only)*.
3. Go-Around Button (on thrust lever knob) — Depress.

SECTION III — EMERGENCY PROCEDURES — No change from FAA Approved Airplane Flight Manual.

SECTION IV — ABNORMAL PROCEDURES

AUTOPILOT MALFUNCTION

1. Flight Controls — As required to maintain aircraft control.

NOTE

Do not continue to overpower the autopilot without disengaging autopilot. If autopilot is not disengaged, autopilot pitch trim will continue to operate.

2. Control Wheel Master Switch (pilot's or copilot's) — Depress to disengage autopilot.
3. AUTOPILOT Switch — OFF.
4. AFCS PITCH and AFCS ROLL Circuit Breakers (Pilot's AC BUS) — Pull.

J.E.T. FC-200 AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT/FLIGHT DIRECTOR)

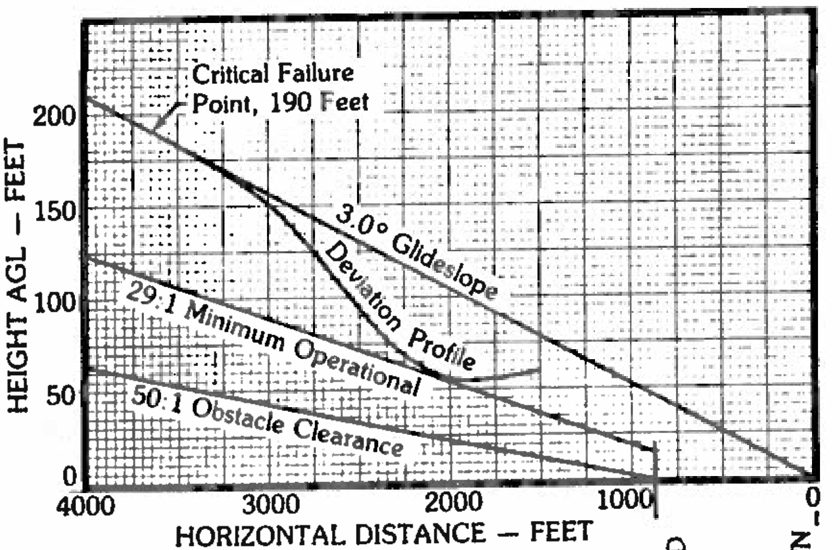
SECTION IV — ABNORMAL PROCEDURES (CONT)

5. AFCS PITCH and AFCS ROLL Circuit Breakers (Pilot's ESS BUS) — Pull.

NOTE
- Maximum altitude losses during autopilot malfunction are:
  - a. Cruise: 460 feet at 41,000 feet.
  - b. ILS (both engines operating): 50 feet.
  - c. ILS (one engine operating): 40 feet.
- Refer to Figure 1 for Glideslope Deviation Profile.

ENGINE FAILURE ON COUPLED APPROACH

1. Control Wheel Master Switch — Depress.
2. Retrim aircraft.
3. Refer to ENGINE SHUTDOWN IN FLIGHT, AFM Section III.
4. Autopilot — Engage if desired.



Glideslope Deviation Profile
Figure 1

SECTION V — PERFORMANCE — No change from FAA Approved Airplane Flight Manual.