

**LEARJET 35/35A/36/36A
MAINTENANCE MANUAL**

SPOILER SYSTEM - MAINTENANCE PRACTICES

1. Tools and Equipment

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

NAME	PART NUMBER	MANUFACTURER	USE
Vernier Clinometer	TB107	Learjet Inc. Wichita, KS	To measure angles of control surfaces
Digital Protractor (DP-45) (Alternate)	02475-01	Lucas & Schaebitz Pennsauken, NJ	To measure angles of control surfaces
Hydraulic Ground Power Cart (1500 psi max. and flow of 5 gpm)		Commercially Available	Hydraulic power
Electrical Power Unit (28 vdc)		Commercially Available	Electrical power
Spoiler Cage	61341	Learjet Inc. Wichita, KS	Safety equipment
Phase Detector/Test Box	2671007-6	Learjet Inc. Wichita, KS	Test spoiler phase
AC Voltmeter (VTVM)		Commercially Available	Voltage measurement
Rigging Pin		Local Manufacture	Rigging

2. Adjustment/Test

A. Rig Spoilers ([See Figure 201.](#))

NOTE: Spoiler rigging is to be accomplished after spoiler or spoiler actuator replacement, limit and down-and-locked switch replacement or any time spoiler actuator rod end adjustment is required.

Spoiler rigging consists of adjusting the spoilers to streamline, synchronizing both spoilers, adjusting spoiler follow-ups, aileron follow-ups, down-and-locked switch, limit switch and adjusting spoiler computer potentiometers.

Prior to rigging the spoilers, ensure that ailerons are properly rigged. ([Refer to 27-10-00, Adjustment/Test.](#))

Slam down is a quick spoiler retraction (less than one second). It is markedly different from the normal retraction time.

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WARNING: PLACE CAGES OVER SPOILERS WHEN RIGGING. DURING PROCEDURES THE SPOILERS CAN SLAM DOWN CAUSING BODILY INJURY.

- (1) Ensure that spoiler actuator is secured to wing attach bracket and that actuator rod end is screwed well out of actuator to avoid spoiler or wing damage.
- (2) Lower tailcone access door and connect hydraulic power unit to aircraft hydraulic quick-disconnects.
- (3) Apply 28 vdc to the aircraft and turn on inverter.
- (4) Cycle spoilers using Spoiler Switch. Check that spoilers fair to wing when retracted. If necessary, loosen jamnut on actuator rod end and remove attaching bolt on the actuator control arm assembly and adjust actuator rod end until spoiler becomes faired with wing.
- (5) Pull SQUAT SW circuit breaker to simulate flight condition.
- (6) Check spoiler extension and retraction time. On Aircraft 35-002 thru 35-505, 36-002 thru 36-053, maximum time shall be 3.8 seconds or less.
- (7) On Aircraft 35-002 thru 35-505, 36-002 thru 36-053, modified per AAK 82-3, 35-506 and Subsequent, 36-054 and Subsequent, maximum time shall be 5 to 7 seconds. Extension time can be adjusted using SLO UP potentiometer on front of spoiler computer.
- (8) Place clinometer on spoiler surface and set clinometer to zero.
- (9) Cycle spoilers and check for full extension of 47 (+0/-7)°. Spoilers must be synchronized within a maximum travel differential of 3°.
- (10) Extend spoilers. Remove safety wire and loosen jamnuts on spoiler down-and-locked switches. Adjust jamnuts until LH and RH switches actuate against spoiler rub block and spoiler warning light will extinguish. Adjust jamnuts one revolution beyond point of actuation. Secure and safety-wire jamnuts.
- (11) Turn off inverter and remove electrical and hydraulic power from the aircraft.
- (12) Remove actuator attach bolt from spoiler control arm and remove actuator from control arm.

NOTE: Rigging pin is fabricated from 3/16 inch (5 millimeter) round steel stock. Make 90° bend, approximately 8-1/2 inches (215 millimeters) from end of 12 inch (305 millimeter) piece of stock. Paint short end of piece red (for visibility).

- (13) Center the ailerons to neutral. Insert rigging pin in aileron sector.
- (14) Extend flaps beyond 25°.
- (15) Gain access to the spoiler computer, disconnect spoiler computer connector (P25) and connect phase detector/test box (P/N 2671007-6) between aircraft wiring and spoiler computer.
- (16) Apply 28 vdc to the aircraft and turn on inverter. Do not apply hydraulic power.
- (17) Ground AC voltmeter between right spoiler VOLTS terminal and GROUND terminal on the test box.
- (18) Loosen screws and rotate right spoiler follow-up until 0.8 volts is obtained and the green RIGHT SPOILER FU light illuminates.
- (19) Manually lift right spoiler. The green RIGHT SPOILER FU light will extinguish and the red light will illuminate. If lights illuminate otherwise, the follow-up must be rotated 180°.
- (20) Secure right spoiler follow-up.
- (21) Disconnect AC voltmeter from right spoiler VOLTS terminal and plug into right aileron VOLTS terminal.

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CAUTION: THE AILERON FOLLOW-UP HAS A MECHANICAL STOP. DO NOT FORCE FOLLOW-UP ROTATION THROUGH STOP.

- (22) With aileron in neutral, loosen screws and rotate right aileron follow-up (B320) until a minimum voltage null is obtained.
- (23) Remove rigging pin from aileron sector and raise right aileron. The green RIGHT AILERON FU light shall illuminate. If the red light illuminates, the follow-up must be rotated 180°.
- (24) Secure right aileron follow-up (B320).
- (25) Disconnect AC voltmeter from right aileron VOLTS terminal and plug into left spoiler VOLTS terminal.
- (26) Loosen screws and rotate left spoiler follow-up until 0.8 volts is obtained and the green LEFT SPOILER FU light illuminates.
- (27) Manually lift left spoiler. The green LEFT SPOILER FU light will remain illuminated. If lights illuminate otherwise, the follow-up must be rotated 180°. Do not force follow-up rotation through stop.
- (28) Secure left spoiler follow-up.
- (29) Disconnect AC voltmeter from left spoiler VOLTS terminal and plug into left aileron VOLTS terminal.

CAUTION: THE AILERON FOLLOW-UP HAS A MECHANICAL STOP. DO NOT FORCE FOLLOW-UP ROTATION THROUGH STOP.

- (30) With aileron in neutral (rigging pin in aileron sector), loosen screws and rotate left aileron follow-up (B319) until a minimum voltage is obtained.
- (31) Remove rigging pin from aileron sector and raise left aileron. Green LEFT AILERON FU light shall illuminate. If the red light illuminates, the follow-up must be rotated 180°. Do not force follow-up rotation through stop.
- (32) Secure left aileron follow-up (B319).
- (33) Disconnect voltmeter from test box. Leave remainder of test hook-up.
- (34) Attach clinometer to right spoiler. Raise the spoiler to 16°, loosen jamnuts, and adjust spoiler limit switch so that LIMIT SWITCH light (amber) on test box will go out when spoiler is extended beyond 16°. Secure jamnuts. Lower spoiler and again lift it to ensure that LIMIT SWITCH light goes out at 16 (+1/-0)° extension.
- (35) Attach clinometer to left spoiler. Raise the spoiler to 16°, loosen jamnut, and adjust spoiler limit switch so that LIMIT SWITCH light (amber) on test box will go out when spoiler is extended beyond 16°. Secure jamnuts. Lower spoiler and again lift it to ensure that LIMIT SWITCH light goes out at 16 (+1/-0)° extension.
- (36) Turn off inverter and remove 28 vdc from aircraft. Remove test box and connect spoiler computer.
- (37) Position spoiler actuator in spoiler control arm and secure with bolt.

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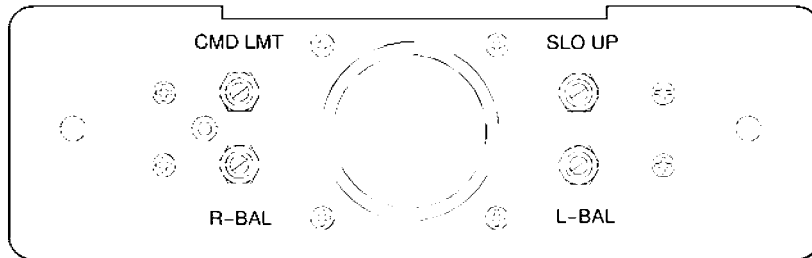
WARNING: PLACE CAGES OVER SPOILERS WHEN RIGGING. THE SPOILERS CAN SLAM DOWN WHEN HYDRAULIC POWER IS APPLIED.

(38) Apply hydraulic power and 28 vdc to aircraft. Turn on inverter.

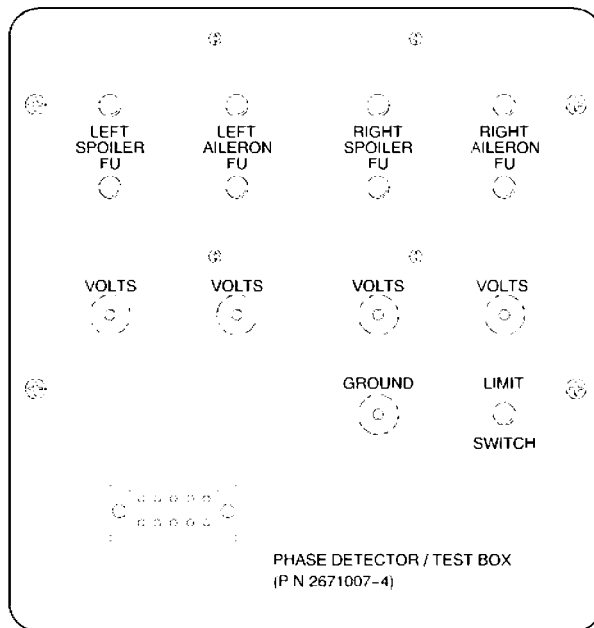
NOTE: Slam down is a quick spoiler retraction (less than one second). It is markedly different from the normal retraction time.

- (39) Center ailerons. Adjust R-BAL potentiometer (R2) on the connector end of the spoiler computer until right spoiler rises approximately 3°. Adjust potentiometer (R2) back until spoiler is in the down (flush with wing) position. Back off potentiometer (R2) slightly below bias down.
- (40) With ailerons centered, adjust L-BAL potentiometer (R3) on the connector end of the spoiler computer until left spoiler rises approximately 3°. Adjust potentiometer (R3) until spoiler is in the down (flush with wing) position. Back off the potentiometer (R3) slightly below bias down.
- (41) Attach clinometer to left spoiler. Apply full left aileron and adjust the CMD LMT potentiometer (R1) on the connector end of the spoiler computer to obtain 14.5 (± 0.5)° spoiler extension.
- (42) Attach clinometer to right aileron. Move right aileron to full up then back to 8°. The left spoiler will remain down. The right spoiler will extend 8 (± 1)°. If necessary, readjust R-BAL potentiometer (R2) to obtain a 1:1 ratio of aileron and spoiler.
- (43) Attach clinometer to left aileron. Move left aileron to full up then back to 8°. The right spoiler will remain down. The left spoiler will extend 8 (± 1)°. If necessary, readjust L-BAL potentiometer (R3) to obtain a 1:1 ratio of aileron and spoiler.
- (44) Perform Operational Check of Spoilers. ([Refer to 27-60-00.](#))

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SPOILER COMPUTER



M3536-276000-201-01

Spoiler System Rigging
Figure 201

EFFECTIVITY: ALL

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3. Inspection/Check

WARNING: PLACE CAGES OVER SPOILERS DURING OPERATIONAL CHECK. THE SPOILERS MAY SLAM DOWN WITHOUT WARNING DURING OPERATIONAL CHECK.

A. Perform Operational Check of Spoilers *(LESFT 1087J AMEND 001)*

NOTE: Slam down is a quick retraction (less than one second). It is markedly different from normal retraction time.

- (1) Lower tailcone access door and connect auxiliary hydraulic power unit to aircraft hydraulic quick-disconnect.
- (2) Apply 28 vdc to aircraft and turn on inverter
- (3) Retract flaps and pull SQUAT SW circuit breaker to simulate flight mode.
- (4) Set Spoiler Switch to EXT. Spoiler will extend symmetrically within 3°. On Aircraft 35-002 thru 35-505, 36-002 thru 36-053 extend time shall be 3.8 seconds or less.
- (5) On Aircraft 35-002 thru 35-505, 36-002 thru 36-053 modified per AAK 83-2, 35-506 and Subsequent, 36-054 and Subsequent extend time shall be 5 to 7 seconds. Spoiler light will illuminate and spoiler extension will be 47 (+0/-7)°. Check spoiler extension with a clinometer.
- (6) Set Spoiler Switch to RET. On Aircraft 35-002 thru 35-505, 36-002 thru 36-053 spoiler will retract in 3.8 seconds or less.
- (7) On Aircraft 35-002 thru 35-505, 36-002 thru 36-053 modified per AAK 82-3, 35-506 and Subsequent, 36-054 and Subsequent, spoilers will retract in 5 to 7 seconds. Spoilers will be flush with wings. Spoiler lights will extinguish.
- (8) Extend flaps below 13°. Set Spoiler Switch to EXT. Spoilers shall extend and spoiler light shall illuminate and flash.
- (9) Retract flaps. The spoiler light will cease to flash and remain illuminated. Set Spoiler Switch to RET. Spoiler light will extinguish when spoilers are fully retracted.
- (10) Raise RH aileron a few degrees. Begin flap extension while observing the right spoiler. Stop flap extension when the right spoiler begins to move. Check flap extension. Flaps shall be extended 25 (+5/-0)°.
- (11) Attach clinometer to RH aileron. Move the right aileron to full up then back to 8°. The left spoiler will remain down and the right spoiler will extend 8 (±1)°.
- (12) Attach clinometer to left aileron. Move the left aileron to full up then back to 8°. The right spoiler will remain down and the left spoiler will extend 8 (±1)°.
- (13) Move the left aileron to full up. The left spoiler shall be extended 14.5 (±0.5)°. The right spoiler shall not extend.
- (14) Move the right aileron to full up. The right spoiler shall be extended 14.5 (±0.5)°. The left spoiler shall not extend.
- (15) Alternately and quickly apply full left and full right aileron (turn control wheel as quickly as possible). AUG AIL light shall not illuminate.
- (16) Raise and hold the SPOILER ON RESET Switch. Rotate control wheel to raise the right aileron. Raise the aileron until AUG AIL light illuminates. Check aileron extension with a clinometer. Extension shall be 4° minimum and 6.5° maximum. Release test switch and return ailerons to neutral.

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- (17) Raise and hold SPOILER ON RESET Switch. Rotate control wheel to raise left aileron. Raise aileron until AUG AIL light illuminates. Check aileron extension with a clinometer. Extension shall be 4° minimum and 6.5° maximum. Release test switch and return ailerons to neutral.

WARNING: PLACE CAGES OVER SPOILERS WHEN RIGGING. DURING PROCEDURES THE SPOILERS CAN SLAM DOWN CAUSING BODILY INJURY.

- (18) Move the left aileron to full up. The left spoiler will extend. Pull the DC SPOILER circuit breaker. The left spoiler will slam down. Return aileron to neutral and reset SPOILER circuit breaker.

NOTE: Slam down is a quick spoiler retraction (less than one second). It is markedly different from normal retraction time.

- (19) Move the right aileron to full up. The right spoiler will extend. Pull the DC SPOILER circuit breaker. The right spoiler will slam down. Return aileron to neutral and reset SPOILER circuit breaker.
- (20) Move the left aileron to full up. The left spoiler will extend. Pull the AC SPOILER ON circuit breaker. The left spoiler will slam down. Return aileron to neutral and reset SPOILER ON circuit breaker.
- (21) Move the right aileron to full up. The right spoiler will extend. Pull the AC SPOILER ON circuit breaker. The right spoiler will slam down. Return aileron to neutral and reset SPOILER ON circuit breaker.
- (22) Pull AC SPOILER ON circuit breaker and depress SQUAT SW circuit breaker. Set SPOILER Switch to EXT. Spoilers shall extend in less than 1.0 second. SPOILER light will be flashing. Retract flaps. Check that SPOILER light burns steadily as flaps retract above approximately 13°.
- (23) Set SPOILER Switch to RET. Spoiler shall retract in less than 1.0 second.
- (24) Reset AC SPOILER ON circuit breaker.