

# *Royal Air, Inc.*

## **Learjet Biannual Recertification In Accordance with 14 CFR §91.411**

The 7 forms attached were all required for initial certification of the aircraft at the time of original installation of the Royal Air RVSM Package i.a.w. STC ST01904CH (the installation STC) and ST02016CH (the RVSM group approval STC).

Form 5, Airspeed Indicator Test Form, is NOT required for Recertification. The other 6 forms must be filled out in their entirety for the approved recertification i.a.w. 14 CFR §91.411.

Each individual Repair Station should use their own approved forms for transponder recertification i.a.w. 14 CFR §91.413 along with an appropriate Log book Entry.

**ALSO REQUIRED** every 2 years (convenient to do this simultaneously with the 91.411 recertification) is the Biannual Autopilot Altitude Hold Flight Test. The approved form for this flight test is on the last page of the ICA. It is also attached to the end of this document for your convenience.

Note: The aircraft still uses the old existing Left & Right flush mounted static ports for the Airspeed indicators, Vertical speed indicators, Mach warning, Standby altimeter, as well as other misc. systems. The static ports on the Rosemount Probes are connected **ONLY** to the new IS&S Altimeters (Air Data Display Units {ADDUs})

**CAUTION:** You must connect all 4 static systems as well as both Pitot Tubes to your Air Data Test Set.

**WARNING:** If you connect only to the Rosemount Probes, you **WILL DESTROY** the Air Speed Indicators and the Mach Warning System when you take only the Rosemount Probes to altitude without also connecting to the existing flush mounted static ports.

PITOT / STATIC SYSTEM TEST INFORMATION  
LEARJET 20/30 SERIES AIRCRAFT

A/C REG. # \_\_\_\_\_

DATE: \_\_\_\_\_

1. Ensure freedom from entrapped moisture and restrictions.  
INSP: \_\_\_\_\_

2. Determine that leakage is within the following tolerances:

A. FLUSH STATIC PORTS Evacuate the static system until a pressure differential equivalent to the maximum cabin differential for which the aircraft is certified is achieved. Without additional pumping for a period of 1 minute, the loss of indicated altitude may not exceed 100 feet.

Example: Leak Rate: \_\_\_\_\_  
Cabin Max Diff. = 10.0 psi. (28,700 ft.)  
Test at 28,700 ft. + Field Pressure Altitude INSP. \_\_\_\_\_

B. ROSEMOUNT STATIC PORTS Evacuate the static system until a pressure differential equivalent to the maximum cabin differential for which the aircraft is certified is achieved. Without additional pumping for a period of 1 minute, the loss of indicated altitude may not exceed 100 feet.

Example: Leak Rate: \_\_\_\_\_  
Cabin Max Diff. = 10.0 psi. (28,700 ft.)  
Test at 28,700 ft. + Field Pressure Altitude. INSP: \_\_\_\_\_

C. At field elevation increase the airspeed to 300 Kts. (do not exceed 20 Kts/Sec) Verify that leakage rate does not exceed 5 Kts in 1 Minute.

Leak Rate: \_\_\_\_\_

INSP. \_\_\_\_\_

3. Determine that the pitot/static tube heaters are operative.

INSP. \_\_\_\_\_

4. Ensure no alterations or deformations of the airframe surface have been made which would affect the relationship between air pressure in the static system and true ambient static air pressure for any flight condition.  
INSP. \_\_\_\_\_

THE PITOT SYSTEMS HAVE BEEN TESTED PER LEARJET SERVICE MANUAL AND THE STATIC SYSTEMS HAVE BEEN TESTED AND INSPECTED AS REQUIRED BY 14 CFR 91.411 (a) (1) I.A.W. 14 CFR PART 43 APPENDIX E (a).

Agency performing test \_\_\_\_\_ WO No. \_\_\_\_\_

\_\_\_\_\_  
Inspector

LEARJET 20/30 SERIES PILOT'S (#1) IS&S ALTIMETER TEST INFORMATION

Make: Innovative Solutions & Support A/C Reg.# \_\_\_\_\_  
 Model: ADDU Work Order# \_\_\_\_\_  
 Part: 9D- Date: \_\_\_\_\_  
 Serial # \_\_\_\_\_ Position: #1(ADDU MASTER TO #1)

\*BAROMETRIC SCALE ERROR TEST:

Barometer Setting (ft)	Altitude Difference (ft)	Altimeter Difference (+10 ft)
28.10	-1727	_____
28.50	-1340	_____
29.00	-863	_____
29.50	-392	_____
29.92	0	<u>0</u>
30.50	+531	_____
30.90	+893	_____
30.99	+974	_____

\*AFTER EFFECT TEST:

Altitude Prior to Test (ft) \_\_\_\_\_  
 Altitude After Test (ft): \_\_\_\_\_  
 After Effect (0ft): \_\_\_\_\_

HYSTERESIS TEST:

Altitude (ft)	Up/Down Reading (0ft)
40% <u>21,200 ft.</u>	_____ / _____
50% <u>26,500 ft.</u>	_____ / _____

\*SCALE ERROR TEST:

Alt (ft)	Altimeter Error (ft)	TOL (ft)	Friction Error (ft)	Altitude Reporting Correlation Check +125
-1000	_____	+15		<u>-1000</u>
0	_____	+15	TOL:	<u>0</u>
500	_____	+15		<u>500</u>
1000	_____	+20	0ft.	<u>1000</u>
1500	_____	+15		<u>1500</u>
2000	_____	+15	0ft.	<u>2000</u>
3000	_____	+20	0ft	<u>3000</u>
4000	_____	+20		<u>4000</u>
5000	_____	--	0ft.	<u>5000</u>
6000	_____	+20		<u>6000</u>
8000	_____	+20		<u>8000</u>
10000	_____	+20	0ft.	<u>10000</u>
12000	_____	+20		<u>12000</u>
14000	_____	+20		<u>14000</u>
15000	_____	--	0ft.	<u>15000</u>
16000	_____	+20		<u>16000</u>
18000	_____	+20		<u>18000</u>
20000	_____	+20	0ft.	<u>20000</u>
22000	_____	+30		<u>22000</u>
25000	_____	+30	0ft.	<u>25000</u>
30000	_____	+40	0ft.	<u>30000</u>
35000	_____	+40	0ft.	<u>35000</u>
40000	_____	+60	0ft.	<u>40000</u>
45000	_____	+60		<u>45000</u>
50000	_____	+60	0ft.	<u>50000</u>
53000	_____	+80		<u>53000</u>

The Altimeter has been tested and inspected as required by 14CFR par 91.411 (a & b) I.A.W. 14CFR part 43 Appendix E paragraphs (a,b(2),c,& d) and manufacturers specifications to 53,000 feet by:

Agency performing test: \_\_\_\_\_ Inspector: \_\_\_\_\_

LEARJET 20/30 SERIES COPILOT'S (#2) IS&S ALTIMETER TEST INFORMATION

Make: Innovative Solutions & Support A/C Reg.# \_\_\_\_\_  
 Model: ADDU Work Order# \_\_\_\_\_  
 Part: 9D- Date: \_\_\_\_\_  
 Serial # \_\_\_\_\_ Position: #2 (ADDU MASTER TO #2)

\*BAROMETRIC SCALE ERROR TEST:

Barometer Setting (ft)	Altitude Difference (ft)	Altimeter Difference (+10 ft)
28.10	-1727	_____
28.50	-1340	_____
29.00	-863	_____
29.50	-392	_____
29.92	0	<u>0</u>
30.50	+531	_____
30.90	+893	_____
30.99	+974	_____

\*AFTER EFFECT TEST:

Altitude Prior to Test (ft): \_\_\_\_\_  
 Altitude After Test (ft): \_\_\_\_\_  
 After Effect (0ft): \_\_\_\_\_

HYSTERESIS TEST:

Altitude (ft)	Up/Down Reading (0ft)
40% <u>21,200 ft.</u>	_____/_____
50% <u>26,500 ft.</u>	_____/_____

\*SCALE ERROR TEST:

Alt (ft)	Altimeter Error (ft)	TOL (ft)	Friction Error (ft)	Altitude Reporting Correlation Check +125
-1000	_____	+15		<u>-1000</u>
0	_____	+15	TOL:	<u>0</u>
500	_____	+15		<u>500</u>
1000	_____	+20	0ft.	<u>1000</u>
1500	_____	+15		<u>1500</u>
2000	_____	+15	0ft.	<u>2000</u>
3000	_____	+20	0ft	<u>3000</u>
4000	_____	+20		<u>4000</u>
5000	_____	--	0ft.	<u>5000</u>
6000	_____	+20		<u>6000</u>
8000	_____	+20		<u>8000</u>
10000	_____	+20	0ft.	<u>10000</u>
12000	_____	+20		<u>12000</u>
14000	_____	+20		<u>14000</u>
15000	_____	--	0ft.	<u>15000</u>
16000	_____	+20		<u>16000</u>
18000	_____	+20		<u>18000</u>
20000	_____	+20	0ft.	<u>20000</u>
22000	_____	+30		<u>22000</u>
25000	_____	+30	0ft.	<u>25000</u>
30000	_____	+40	0ft.	<u>30000</u>
35000	_____	+40	0ft.	<u>35000</u>
40000	_____	+60	0ft.	<u>40000</u>
45000	_____	+60		<u>45000</u>
50000	_____	+60	0ft.	<u>50000</u>
53000	_____	+80		<u>53000</u>

The Altimeter has been tested and inspected as required by 14CFR par 91.411 (a & b) I.A.W. 14CFR part 43 Appendix E paragraphs (a,b(2),c,& d) and manufacturers specifications to 53,000 feet by:

Agency performing test: \_\_\_\_\_ Inspector: \_\_\_\_\_

LEARJET 20/30 SERIES STANDBY ALTIMETER TEST INFORMATION

Make: \_\_\_\_\_ A/C Reg.# \_\_\_\_\_  
 Part # \_\_\_\_\_ Work Order# \_\_\_\_\_  
 Serial # \_\_\_\_\_ Date: \_\_\_\_\_

**\*BAROMETRIC SCALE ERROR TEST:**

Barometer Setting (ft)	Altitude Difference (ft)	Altimeter Difference (±25 ft)
28.10	-1727	_____
28.50	-1340	_____
29.00	-863	_____
29.50	-392	_____
29.92	0	_____ <u>0</u> _____
30.50	+531	_____
30.90	+893	_____
30.99	+974	_____

**\*AFTER EFFECT TEST:**

Altitude Prior to Test (ft): \_\_\_\_\_  
 Altitude After Test (ft): \_\_\_\_\_  
 After Effect (±30 ft) \_\_\_\_\_

**\*CASE LEAK TEST:**

At 18000 (-100 ft): \_\_\_\_\_

**\*HYSTERESIS TEST:**

Altitude (ft)	Up Reading (ft)	Down Reading (±75ft)
40% _____	_____	_____
50% _____	_____	_____

**\*SCALE ERROR TEST:**

Alt (ft)	Altimeter Error (ft)	TOL: (ft)	Friction Error (ft)
-1000	_____	±20	
0	_____	±20	TOL:
500	_____	±20	
1000	_____	±20	_____ ±70
1500	_____	±25	
2000	_____	±30	_____ ±70
3000	_____	±30	_____ ±70
4000	_____	±30	
5000	_____	--	_____ ±70
6000	_____	±40	
8000	_____	±60	
10000	_____	±80	_____ ±80
12000	_____	±90	
14000	_____	±100	
15000	_____	--	_____ ±90
16000	_____	±110	
18000	_____	±120	
20000	_____	±130	_____ ±100
22000	_____	±140	
25000	_____	±155	_____ ±120
30000	_____	±180	_____ ±140
35000	_____	±205	_____ ±160
40000	_____	±230	_____ ±180
45000	_____	±255	
50000	_____	±280	_____ ±250
53000	_____	±280	

The Altimeter has been tested and inspected as required by 14CFR part 91.411 (a & b) I.A.W. 14CFR part 43 Appendix E paragraph (a,b,& d) to \_\_\_\_\_ ft. by:

Agency Performing Test \_\_\_\_\_ Test Inspector: \_\_\_\_\_

**GATES MACH / AIRSPEED INDICATOR TEST INFORMATION**

A/C Reg.# \_\_\_\_\_ Work Order# \_\_\_\_\_ Date: \_\_\_\_\_

**PILOT'S INDICATOR**

**COPILOT'S INDICATOR**

Part # \_\_\_\_\_

Part # \_\_\_\_\_

Serial# \_\_\_\_\_

Serial# \_\_\_\_\_

Test Point Mach Reading Tol.

Test Point Mach Reading Tol.

100 Kts - \_\_\_\_\_ + 2.0

100 Kts - \_\_\_\_\_ + 2.0

150 Kts - \_\_\_\_\_ + 2.5

150 Kts - \_\_\_\_\_ + 2.5

200 Kts - \_\_\_\_\_ + 3.0

200 Kts - \_\_\_\_\_ + 3.0

250 Kts - \_\_\_\_\_ + 4.0

250 Kts - \_\_\_\_\_ + 4.0

300 Kts - \_\_\_\_\_ + 4.0

300 Kts - \_\_\_\_\_ + 4.0

350 Kts - \_\_\_\_\_ + 4.0

350 Kts - \_\_\_\_\_ + 4.0

400 Kts - \_\_\_\_\_ + 4.0

400 Kts - \_\_\_\_\_ + 4.0

----- -10,000 Ft. -----  
305 Kts .55 \_\_\_\_\_ + .015      305 Kts .55 \_\_\_\_\_ + .015

----- -25,000 Ft. -----  
205 Kts .50 \_\_\_\_\_ + .015      205 Kts .50 \_\_\_\_\_ + .015

248 Kts .60 \_\_\_\_\_ + .015      248 Kts .60 \_\_\_\_\_ + .015

292 Kts .70 \_\_\_\_\_ + .015      292 Kts .70 \_\_\_\_\_ + .015

338 Kts .80 \_\_\_\_\_ + .015      338 Kts .80 \_\_\_\_\_ + .015

----- -41,000 Ft. -----  
220 Kts .75 \_\_\_\_\_ + .010      220 Kts .75 \_\_\_\_\_ + .010

237 Kts .80 \_\_\_\_\_ + .010      237 Kts .80 \_\_\_\_\_ + .010

243 Kts .82 \_\_\_\_\_ + .010      243 Kts .82 \_\_\_\_\_ + .010

----- -50,000 Ft. -----  
192 Kts .80 \_\_\_\_\_ + .015      192 Kts .80 \_\_\_\_\_ + .015

These air speed indicators have been tested IAW the above manufacturers specifications.  
 Agency performing test: \_\_\_\_\_ Inspector: \_\_\_\_\_

LEARJET 20/30 SERIES PILOT'S (#1) IS&S AIR DATA COMPUTER TEST INFO

Make: Innovative Solutions & Support

A/C Reg. # \_\_\_\_\_

Model: ADDU

Work Order # \_\_\_\_\_

Part: 9D- \_\_\_\_\_ S/N: \_\_\_\_\_

Date: \_\_\_\_\_

Configuration Module

Position: PILOT (#1)

9B- \_\_\_\_\_ S/N: \_\_\_\_\_

Set Altimeter to 29.92 in.

<u>Condition Number</u>	<u>Mach Number</u>	<u>Airspeed (kt)</u>	<u>Test Altitude</u>	<u>#1 ADDU Altitude</u>	<u>Nominal Altitude</u>
1	0.227	150	0	_____	<u>0</u> ± <u>15</u>
2	0.302	200	0	_____	<u>0</u> ± <u>15</u>
3	0.378	250	0	_____	<u>- 8</u> ± <u>15</u>
4	0.454	300	0	_____	<u>-35</u> ± <u>15</u>
5	0.273	150	10000	_____	<u>10000</u> ± <u>20</u>
6	0.363	200	10000	_____	<u>9999</u> ± <u>20</u>
7	0.452	250	10000	_____	<u>9968</u> ± <u>20</u>
8	0.541	300	10000	_____	<u>9947</u> ± <u>20</u>
9	0.332	150	20000	_____	<u>20000</u> ± <u>20</u>
10	0.440	200	20000	_____	<u>19973</u> ± <u>20</u>
11	0.547	250	20000	_____	<u>19950</u> ± <u>20</u>
12	0.651	300	20000	_____	<u>19941</u> ± <u>20</u>
13	0.754	350	20000	_____	<u>19966</u> ± <u>20</u>
14	0.410	150	30000	_____	<u>29984</u> ± <u>40</u>
15	0.541	200	30000	_____	<u>29955</u> ± <u>40</u>
16	0.668	250	30000	_____	<u>29946</u> ± <u>40</u>
17	0.791	300	30000	_____	<u>29997</u> ± <u>40</u>
18	0.525	150	41000	_____	<u>40959</u> ± <u>60</u>
19	0.687	200	41000	_____	<u>40950</u> ± <u>60</u>
20	0.810	240	41000	_____	<u>41013</u> ± <u>60</u>

Agency Performing Test: \_\_\_\_\_ Inspector: \_\_\_\_\_

LEARJET 20/30SERIES COPILOT'S (#2) IS&S AIR DATA COMPUTER TEST

Make: Innovative Solutions & Support

A/C Reg. # \_\_\_\_\_

Model: ADDU

Work Order # \_\_\_\_\_

Part: 9D- \_\_\_\_\_ S/N: \_\_\_\_\_

Date: \_\_\_\_\_

Configuration Module

Position: COPILOT (#2)

9B- \_\_\_\_\_ S/N: \_\_\_\_\_

Set Altimeter to 29.92 in.

<u>Condition Number</u>	<u>Mach Number</u>	<u>Airspeed (kt)</u>	<u>Test Altitude</u>	<u>#2 ADDU Altitude</u>	<u>Nominal Altitude</u>
1	0.227	150	0	_____	<u>0</u> ± <u>15</u>
2	0.302	200	0	_____	<u>0</u> ± <u>15</u>
3	0.378	250	0	_____	<u>- 8</u> ± <u>15</u>
4	0.454	300	0	_____	<u>-35</u> ± <u>15</u>
5	0.273	150	10000	_____	<u>10000</u> ± <u>20</u>
6	0.363	200	10000	_____	<u>9999</u> ± <u>20</u>
7	0.452	250	10000	_____	<u>9968</u> ± <u>20</u>
8	0.541	300	10000	_____	<u>9947</u> ± <u>20</u>
9	0.332	150	20000	_____	<u>20000</u> ± <u>20</u>
10	0.440	200	20000	_____	<u>19973</u> ± <u>20</u>
11	0.547	250	20000	_____	<u>19950</u> ± <u>20</u>
12	0.651	300	20000	_____	<u>19941</u> ± <u>20</u>
13	0.754	350	20000	_____	<u>19966</u> ± <u>20</u>
14	0.410	150	30000	_____	<u>29984</u> ± <u>40</u>
15	0.541	200	30000	_____	<u>29955</u> ± <u>40</u>
16	0.668	250	30000	_____	<u>29946</u> ± <u>40</u>
17	0.791	300	30000	_____	<u>29997</u> ± <u>40</u>
18	0.525	150	41000	_____	<u>40959</u> ± <u>60</u>
19	0.687	200	41000	_____	<u>40950</u> ± <u>60</u>
20	0.810	240	41000	_____	<u>41013</u> ± <u>60</u>

Agency Performing Test: \_\_\_\_\_ Inspector: \_\_\_\_\_

APPENDIX A

FLIGHT TEST PROCEDURES FOR  
AUTOPILOT ALTITUDE HOLD TEST

1. Obtain ATC clearance for straight and level flight at Flight level 300,  $\pm 1000$  ft., for a period of at least 10 minutes. Level and trim. Engage Autopilot, Engage HDG, Engage ALT.

*Note: Aircraft must be straight and level flight and in smooth non turbulent air for this test.*

*The test may be conducted in turbulent air and turns may be made during the 10 minute test period. However, should the aircraft deviate more than  $\pm 65$  feet under these conditions it shall not be considered a failure.*

- A. Fly Normal Cruise Speed (Mach Speed .72 to .78). Verify that altitude does not vary more than  $\pm 65$  feet in 10 minutes.

**PASS**

**FAIL**

2. Obtain ATC clearance for straight and level flight at Flight level 380, - 2000 ft. + 3000 ft., for a period of at least 10 minutes. Level and trim. Engage Autopilot, Engage HDG, Engage ALT.

*Note: Aircraft must be straight and level flight and in smooth non turbulent air for this test.*

*The test may be conducted in turbulent air and turns may be made during the 10 minute test period. However, should the aircraft deviate more than  $\pm 65$  feet under these conditions it shall not be considered a failure.*

- A. Fly Normal Cruise Speed (Mach Speed .72 to .78). Verify that altitude does not vary more than  $\pm 65$  feet in 10 minutes.

**PASS**

**FAIL**

Aircraft No. N-\_\_\_\_\_

Aircraft S/N:\_\_\_\_\_

Date:\_\_\_\_\_

\_\_\_\_\_  
Signature of Pilot in Command