Appendix C

То

### ADDENDUM NUMBER 4 TO THE SYSTEMS GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION - A300-600 GROUND TEST

### A300-600 MSN 701 test program to confirm operational characteristics of the rudder system, in answer to NTSB request

### I-/ Introduction :

In the frame of the AAL flight 587 accident on November 12, 2001, "iron bird" test session was held on 15, 16 and 17 May 2002 in Toulouse Blagnac (Cf MoM ref 506.0010/2002). A new test session on A/C (MSN 701) is now requested by the systems group in order to document the characteristics of the aircraft's flight control system:

### Technical content:

- Measurement of Variable Stop Actuator extension characteristics and associated rudder max deflection depending on Vc
- Measurement of control system characteristics under pedals motions and forces (forces applied pedal on Rudder Travel Limiter Unit stop)
- Measurement of control system characteristics under Yaw Damper input
- Measurement of control system characteristics under Yaw Damper input combined with force and motion applied on pedals
- Measurement of Flight Augmentation Computer control laws characteristics
- Measurement of Autopilot characteristics

### Organisation of the Test campaign

For the purpose of efficiency towards the successful completion of the Test program, as well as to guarantee the security of both personnel and equipment, each the NTSB and Airbus designate a test Supervisor who both co-ordinate and direct communication between the two and the conduct of test procedures assigned to each entity.

The Test Supervisor and its assistance team designated for each the NTSB and Airbus are listed in Appendix 3 of this document.

### **II-/ Test configuration :**

Tests will be achieved on A300-600 MSN701, aircraft on wheels, three hydraulics circuits pressurised (no electric pomp use).

Pedals motions and forces shall be applied on Pilot side.

Reminder: Individual pedal force shall not exceed 133 daN (300 lbs) (limit load).

Sum of the pedal forces shall not exceed 200 daN (450 lbs) (limit load).

### III-/ Means :

Pedals force measurement:

It shall be derived from the signal delivered by a specific sensor to be installed on the rod downstream of the first bellcrank of the rudder pedal control linkage under the cockpit floor, and measures the force on this rod (Cf Appendix 1).

### Pedals position measurement:

It shall be derived from the signal delivered by a specific sensor to be installed on the first bellcrank downstream of the instrumented rod above (installation similar to SB A300-31-6093, Cf Appendix 2).

Rudder control surface position measurement:

It shall be measured from the signal delivered by the A/C sensor 10CT mounted on the rudder rotation axis (sensor originally fitted on A300-600).

### Control wheel force measurement:

It shall be derived from the signals delivered by specific sensors to be installed on the vertical rod inside the Captain control column and the first horizontal rods downstream control columns (Captain and First Officer), and measure the force on these rods (Cf Appendix 1).

### Control wheel position measurement:

It shall be derived from the signal delivered by a specific sensor to be installed on the first bellcrank downstream of the horizontal rod in the control wheel mechanical linkage. (Cf Appendix 2).

### Aileron control surfaces position measurement:

It shall be measured from the signals delivered by the A/C sensors 6CT and 7CT mounted on the ailerons rotation axis (sensors originally fitted on A300-600).

### Control column force measurement:

It shall be derived from the signal delivered by a specific sensor to be installed on the first rod downstream of the control column under the cockpit floor, and measures the force on this rod (Cf Appendix 1).

### Control column position measurement:

It shall be derived from the signal delivered by a specific sensor to be installed on the second bellcrank in the control column mechanical linkage (installation similar to SB A300-31-6093, Cf Appendix 2).

### Pitch control surface position measurement:

It shall be measured from the signal delivered by the A/C sensor 12CT mounted on the right hand pitch control surface rotation axis (sensor originally fitted on A300-600).

Variable Stop Actuator length measurement:

It shall be measured from the signal delivered by a specific sensor to be mounted on the actuator.

Vc simulation tool:

It will permit to inject simulated Vc as an ADC output.

### Yaw Damper actuator servoloop kit:

It will permit to inject rudder deflection order to the Yaw Damper actuator.

### Yaw Auto Pilot actuator servoloop kit:

It will permit to inject rudder deflection order to the Yaw Auto Pilot actuator.

### Yaw rate simulation tool:

It will permit to inject simulated yaw rate to the FAC.

### Function generator.

Information to be recorded: For each test sequence, all the following parameters shall be simultaneously registered: Pedals position (parameter N° 271025) Paired pedals force (parameter N° 271003) Rudder control surface position (parameter N° 271024) Control wheel position (parameter N° 271026) Control wheel force (parameter N° 271008) Aileron control surfaces position (parameters N° 271020 and 271021) Control column position (parameter N° 271027) Control column force (parameter N° 271009) Pitch control surface position (parameter N° 271022) VSA length (parameter N° 312)

### IV-/ Test program :

### IV-0: Measurement of Variable Stop Actuator extension characteristics and associated rudder max deflection depending on Vc

*IV-0-1:* Vc = 160 knots

Push left pedal until it reaches RTL stop. Inject a positive ramp of 1 kt/sec until Vc reaches 310 knots. Let the left pedal come back but still apply sufficient force to be in permanent contact with RTL stop. Repeat the same on right pedal.

IV-0-2: Vc=160 knots

Inject a Vc step input to 395 knots until Variable Stop Actuator motion stops. Push left pedal until it reaches RTL stop. Return to neutral. Push right pedal until it reaches RTL stop.

*IV-0-3*: Vc=300 knots

Cut off electrical power supply to FLC 1 & 2: Pull C/B 5CY2 (110PP) and 305CY2 (231XP). Then pull C/B 5CY1 (301PP) and 305 CY1 (331XP).

IV-1 : Measurement of control system characteristics under pedals motions and forces (Rudder trim= 0°, Yaw Damper OFF; Auto Pilot OFF)

### *IV-1-1* Vc = 0 knots

Left and right slow pedal motion up to the pedal mechanical stops (about 20 s from neutral to full deflection)

*IV-1-2* Vc = 240 knots

IV-1-2-a: Push left pedal with a speed of 5 deg pedals / second until it reaches RTL stop. Keep on pushing the left pedal in order to increase left pedal force up to 100 daN (225 lbs) as continuously as possible.

Repeat the same on the right hand side.

IV-1-2-b: Idem IV-1-3-a but with a speed of 20 deg pedals / second.

*IV-1-3* Idem IV-1-3 but with Vc = 250 knots

IV-1-4 Idem IV-1-3 but with Vc = 260 knots

**WARNING**: For points IV-1-5, IV-1-6, IV-1-7, IV-3-1, IV-4-9, IV-4-10, IV-4-11, IV-4-12 below, pedal force shall be continuously monitored so that it does not exceed 100 daN (225 lbs) (conservative load). The aircraft behaviour in terms of vibration / oscillations shall be monitored and test sequence shall be stopped according to specific structural criteria.

For points IV-1-5, IV-1-6, IV-1-7, operator shall be trained to achieve these test sequences

### *IV-1-5* Vc=0 knots

Repeat in a continuous manner three times the following sequence:

Push left pedal. When left pedal position is higher than 15° (2/3 of full travel) and before it reaches pedals mechanical stop, push right pedal. When right pedal position is higher than 15° (2/3 of full travel) and before it reaches mechanical stop, return to neutral.

The three cycles shall be completed in about 1.5 min, trying to achieve a sine movement of a 30 sec period (Cf **WARNING** above).

### IV-1-6 Vc=0 knots

Same as IV-1-5 but the three cycles shall be completed in about 15 seconds, trying to achieve a sine movement of a 5 sec period (Cf **WARNING** above).

### *IV-1-7* Vc=0 knots

Same as IV-1-5 but the three cycles shall be completed in about 6 seconds, trying to achieve a sine movement of a 2 sec period (Cf **WARNING** above).

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### <u>IV-2</u>: Measurement of control system characteristics under Yaw Damper input without any force applied on pedals

### *IV-2-0* Vc=0 knot

Search for maximum possible rudder deflection with Yaw Damper actuator servoloop kit tool.

### *IV-2-1* Vc = 0 knot

Inject a left rudder position order ramp of 15 deg rudder / sec (equivalent to a rudder deflection speed order step input) to the Yaw Damper actuator, with Yaw Damper actuator servoloop kit tool and function generator (max ordered position: 8.5 deg rudder)

Repeat the same with a right ramp.

*IV-2-2* Idem IV-2-1 but with a ramp of 39 deg rudder / sec (39 deg rud / sec is the actuator and FAC max speed).

*IV-2-3* Idem IV-2-1 but with a ramp of 60 deg rudder / sec (rudder deflection speed should be 39 deg rud / sec only due to actuator max speed).

### IV-3 : Measurement of control system characteristics under Yaw Damper input combined with force and motion applied on pedals

### *IV-3-1* Vc = 0 knot

Inject a left ramp of 0.5 deg rudder / sec to the Yaw Damper actuator until rudder reaches max deflection (max deflection should be 8.5 deg rud due to function generator). During this rudder movement , apply the following cycle to the pedals:

push left pedal up to mechanical stop, return to neutral, push right pedal up to mechanical stop, return to neutral. This cycle shall be completed in about 3 seconds (Cf **WARNING** above). Continue movement in order to achieve a sine movement of a 3 sec period.

### *IV-3-2* Vc = 240 knots

Inject a rudder deflection order to the Yaw Damper actuator of 4 deg rudder left.

Push left pedal until it reaches RTLU stop.

Slowly increase pedal force up to 50 daN (112 lbs).

Inject a right ramp of 39 deg rudder / sec to the Yaw Damper until Yaw Damper output reaches 4 deg rudder right. Maintain 50 daN (112 lbs) on the left pedal.

### *IV-3-3* Vc = 240 knots

Inject a rudder deflection order to the Yaw Damper of 4 deg left.

Push right pedal until it reaches RTLU stop.

Slowly increase pedal force up to 50 daN (112 lbs).

Inject a right ramp of 39 deg rudder / sec to the Yaw Damper until Yaw Damper output reaches 4 deg rudder right. Resist pedal motion up to 100 daN (225 lbs).

### IV-4 : Measurement of FAC (Flight Augmentation Computer) control laws characteristics

*IV-4-1* Vc = 165 knots

Inject a step input yaw rate of 10 deg yaw /sec to the FAC until rudder reaches maximum deflection.

*IV-4-2* Idem IV-4-1 but with Vc = 200 knots

*IV-4-3* Idem IV-4-1 but with Vc = 240 knots

*IV-4-4* Idem IV-4-1 but with Vc = 260 knots

### *IV-4-5* Vc = 165 knots

Inject a yaw rate varying from 0 to 10 deg yaw /sec, with an increase rate of 0.1 deg yaw / sec / sec, to the FAC until rudder reaches maximum deflection.

*IV-4-6* Idem IV-4-5 but with Vc = 240 knots

IV-4-7 Idem IV-4-5 but with Vc = 240 knots and a yaw rate increase rate of 0.5 deg yaw / sec / sec

IV-4-8 Idem IV-4-5 but with Vc = 240 knots and a yaw rate increase rate of 1 deg yaw / sec / sec

IV-4-9 Vc = 240 knots

Inject a sinusoidal yaw rate varying from 0 to 10 deg yaw /sec, with a period of 10 seconds, to the FAC (Cf WARNING above)

IV-4-10 Idem IV-4-9 but with a period of 5 seconds (Cf WARNING above)

IV-4-11 Idem IV-4-9 but with a period of 3 seconds (Cf WARNING above)

IV-4-12 Idem IV-4-9 but with a period of 2 seconds (Cf WARNING above)

### IV-5 : Measurement of Autopilot actuator characteristics (Rudder trim= 0°, Yaw Damper OFF; Auto Pilot ON)

IV-5-0 Search for maximum possible rudder deflection with Autopilot actuator servoloop kit.

IV-5-1 Vc = 0 knots

Inject a left rudder position order ramp of 15 deg rudder / sec (equivalent to a rudder deflection speed order step input) to the Yaw Autopilot Actuator, with Yaw Auto Pilot actuator servoloop kit and function generator (max ordered position: 18 deg rudder).

Repeat the same with a right ramp.

IV-5-2 Idem IV-5-1 but with a ramp of 34 deg rudder / sec (34 deg rud / sec is the actuator and FAC max speed).

IV-5-3 Idem IV-5-1 but with a ramp of 60 deg rudder / sec (rudder deflection speed should be 34 deg rud / sec only due to actuator max speed).

Agreed and accepted

### **AIRBUS**

**Dominique CHATRENET** 

Vice President Flight Control & Hydraulics Systems

Date: 12/09/09

Signature:

### NATIONAL TRANSPORTATION SAFETY BOARD

Steven MAGLADRY

Systems Group Chairman

Date:

Signature:

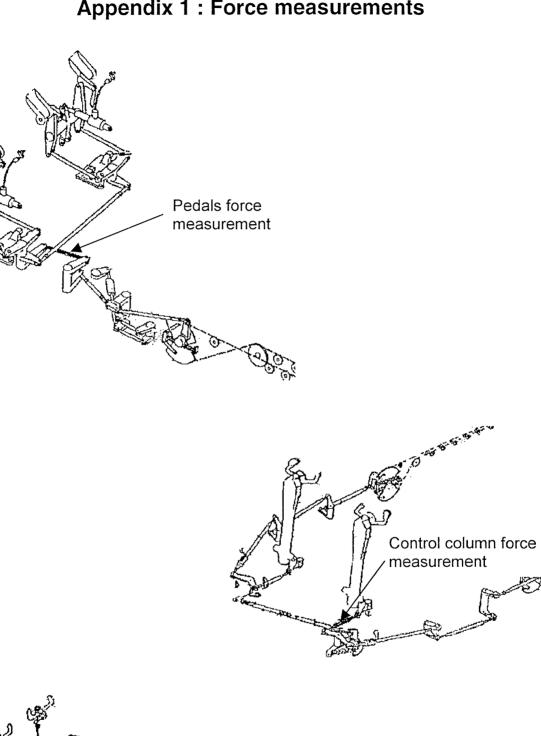
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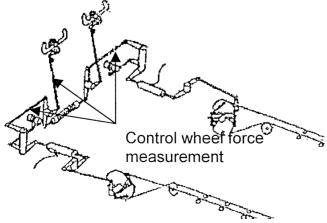
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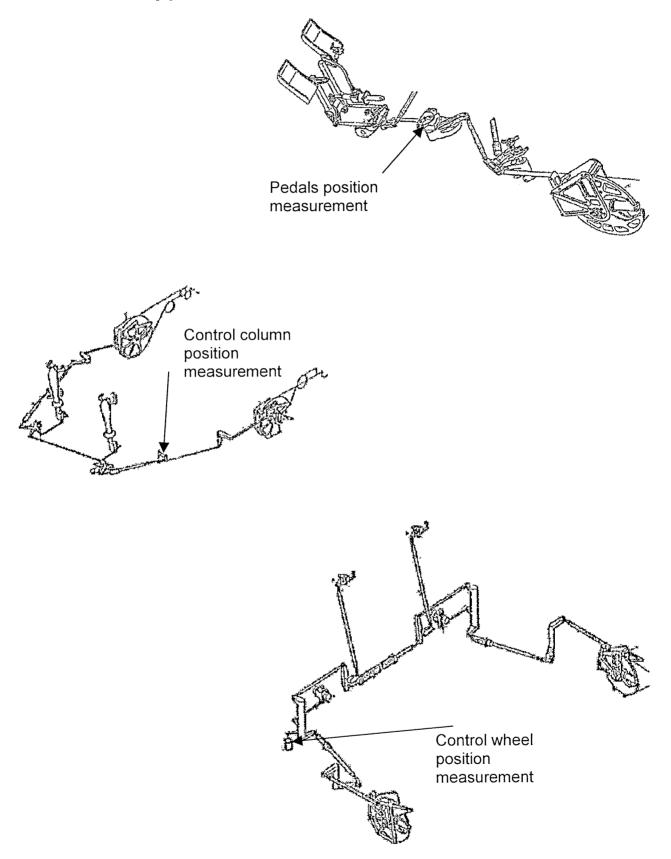
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### **Appendix 1 : Force measurements**



### **Appendix 2 : Position measurements**



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### Appendix 3 : Test Supervisory

### For Airbus:

| Ground Test Supervisor –<br>Instrumentation & Engineering | Denis OSWALD                              |
|---|---|
| With the assistance of:                                   |   |
| System Ground Test Follow-up –<br>Design Office -         | Laurent ANDRIEU<br>(back-up Cecile MAGNE) |
| Ground Test Maintenance Support<br>& Logistics liaison    | Dominique MAZZARINO                       |
| Ground Test Support<br>Engineering                        | André MAUMUS                              |
| HUMAN FACTORS Tests Support                               | Armand JACOB                              |

### For the NTSB

| Ground Test Supervisor - | Scott WARREN |
|--------------------------|--------------|
|--------------------------|--------------|

| With the assistance of:        |                 |
|--------------------------------|-----------------|
| System Ground Test Follow-up – | .Steve MAGLADRY |
| Instrumentation Engineering    | .Marc HEPP      |

HUMAN FACTORS Tests Support -.....Bart ELIAS

September 11th 2002

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| -> ALI  | IV-0 MEASUREMENT OF VSA EXTENSION CHARACTERISTICS AND ASSOCIATED<br>ALL TRIMS = 0° YAW DAMPER = OFF AUTO PIL | AND ASSOCIATI | CIATED RUDDER M<br>AUTO PILOT = OFF | IAX DEFLEC | RUDDER MAX DEFLECTION DEPENDING ON Vc       OT = OFF     SLATS/FLAPS = retracted | ON Vc<br>tracted     |
|---------|--|---------------|-------------------------------------|------------|--|----------------------|
|         | ACTIONS  | ACTORS        | READ                                |            | RESULTS  | COMMENTS/GMT         |
|         | IV-0-1 Vc = 160 kts  |               |                                     |            |  |                      |
| A       | Set Vc = 160 kts   | LACOMBE       |                                     | 34120611   |  | 253 IV01.001         |
|         |  |               | VSA                                 | 271040     |  |                      |
| മ       | Left pedal motion → RTL stop   | Pilot         | Rud. Ped.<br>Rud Surf               | 271025     |  | 16:29:00<br>16:30:30 |
|         |  |               | Rud. Force                          | 271003     |  | 00.10                |
|         |  |               | L Ped. Force                        | 271001     |  | 95 lbs               |
| U       | Increase Vc 1 kts/s → 310 kts  | LACOMBE       |                                     | 34120611   |  |                      |
|         | Left pedal comes back but apply force to maintain contact to   | Pilot         | VSA                                 | 271040     |  |                      |
|         | RTL stop   |               | Rud. Ped.                           | 271025     |  |                      |
|         |  |               | Rud. Surf                           | 271024     |  |                      |
|         |  |               | Rud. Force                          | 271003     |  |                      |
|         |  |               | L Ped. Force                        | 271001     |  |                      |
| ш       | Return to neutral  | Pilot         | Rud. Ped.                           | 271025     |  |                      |
|         |  |               | Rud. Surf                           | 271024     |  |                      |
| 100 mil |  |               |                                     |            |  |                      |
| ш       | Set Vc = 160 kts   | LACOMBE       | Vc 3                                | 34120611   |  |                      |
|         |  |               | VSA                                 | 271040     |  | 253 IV01.002         |
| U       | Right pedal motion → RTL stop  | Pilot         | Rud. Ped.                           | 271025     |  |                      |
|         | -  |               | Rud. Surf                           | 271024     |  | 16:36:00             |
|         |  |               | Rud. Force                          | 271003     |  | 16:39:15             |
|         |  |               | R Ped. Force                        | 271002     |  |                      |
| I       | Increase Vc 1 kts/s $\rightarrow$ 310 kt   | LACOMBE       |                                     | 34120611   |  |                      |
|         |  |               | VSA                                 | 271040     |  |                      |
| _       | Right pedal comes back but apply force to maintain contact to  | Pilot         | Rud. Ped.                           | 271025     |  |                      |
|         | RTL stop   |               | Rud. Surf                           | 271024     |  |                      |
|         |  |               | Rud. Force                          | 271003     |  |                      |
|         |  |               | R Ped. Force                        | 271002     |  |                      |
|         |  |               | Rud. Ped.                           | 271025     |  |                      |
| 7       | Return to neutral  | Pilot         | Rud. Surf                           | 271024     |  |                      |
|         |  |               |                                     |            |  |                      |

# IV-0 MEASUREMENT OF VSA EXTENSION CHARACTERISTICS AND ASSOCIATED RUDDER MAX DEFLECTION DEPENDING ON Vc ALL TRIMS = 0° | YAW DAMPER = OFF | | AUTO PILOT = OFF | | SLATS/FLAPS = retracted

| L | ACTIONS                    | ACTORS  | READ               | RESULTS | COMMENTS/GMT |
|---|----------------------------|---------|--------------------|---------|--------------|
|   | IV-0-2 Vc = 160 kts        |         |                    |         |              |
| ∢ | Set Vc = 160 kts           | LACOMBE | Vc 34120611        | 311     | 253 IV02     |
|   |                            |         | VSA 2710           | 040     |              |
| m | B Vc step 160kts → 395 kts | LACOMBE | Vc 34120611        | 311     | 16:44:15     |
|   |                            |         | VSA 2710           | 040     | 16:47:20     |
| ပ | C Push left pedal to stop  | Pilot   | L ped force 271001 | 100     |              |
|   |                            |         | Rud.surf 271024    | 224     |              |
|   | D Push right pedal to stop | Pilot   | R ped force 271002 | 202     |              |
|   |                            |         | Rud.surf 271024    | 224     |              |
|   |                            |         |                    |         |              |

# IV-0 MEASUREMENT OF VSA EXTENSION CHARACTERISTICS AND ASSOCIATED RUDDER MAX DEFLECTION DEPENDING ON Vc ALL TRIMS = 0° YAW DAMPER = OFF AUTO PILOT = OFF SLATS/FLAPS = retracted

|   | ACTIONS   |                       | ACTORS  | В       | READ     | RESULTS | COMMENTS/GMT |
|---|---|-----------------------|---------|---------|----------|---------|--------------|
|   | IV-0-3-1 Vc = 300 kts   |                       |         |         |          |         | 253 IV03.001 |
| ∢ | A Set Vc = 300 kts  |                       | LACOMBE | Vc      | 34120611 |         | 16:07:51     |
|   |   |                       |         | VSA     | 271040   |         | 16:11:00     |
| m | B Cut off electrical power supply to FLC2 5CY2 and 305CY2 Pilot | 5CY2 and 305CY2       | Pilot   | VSA     | 271040   |         | nothing      |
|   |   | J4 J5                 |         | RTL fit | 271042   |         |              |
| ပ | C Cut off electrical power supply to FLC1                       | 5CY1 and 305CY1 Pilot | Pilot   | VSA     | 271040   |         | retract      |
|   |   | J1 J2                 |         | RTL flt | 271041   |         | 253 IV03.002 |
|   | Reset C/B   |                       | Pilot   |         |          |         | 16:16:00     |
|   |   |                       |         |         |          |         | 16:17:20     |

IV-0 MEASUREMENT OF VSA EXTENSION CHARACTERISTICS AND ASSOCIATED RUDDER MAX DEFLECTION DEPENDING ON Vo Nota: Post test program NSTB request

SLATS/FLAPS = retracted

AUTO PILOT = OFF

YAW DAMPER = OFF

| ALL TRIMS = 0°                                 |         |                |         |              |
|--|---------|----------------|---------|--------------|
| ACTIONS  | ACTORS  | READ           | RESULTS | COMMENTS/GMT |
| IV-0-3-2 Vc = 300 kts                          |         |                |         | 253 IV03.003 |
| A Set Vc = 300 kts                             | LACOMBE | Vc 34120611    | 611     | 16:19:00     |
|  |         | VSA 271040     | 040     | 16:20:30     |
| B Cut off electrical general 115 VAC/400 power | Pilot   | VSA 271040     | 040     | retract      |
|  |         | RTL fit 271042 | 042     |              |
|  |         | RTL fit 271041 | 041     |              |
| D Reset C/B                                    | Pilot   |                |         |              |
|  |         |                |         |              |

IV-0 MEASUREMENT OF VSA EXTENSION CHARACTERISTICS AND ASSOCIATED RUDDER MAX DEFLECTION DEPENDING ON VC Nota: Post test program NSTB request

| ۲  | ALL TRIMS = 0°         | YAW DAMPER = OFF  | AUT      | AUTO PILOT = OFF |          | SLATS/FLAPS = retracted | racted       |
|----|------------------------|---|----------|------------------|----------|-------------------------|--------------|
|    |                        | ACTIONS   | ACTORS   | READ             |          | RESULTS                 | COMMENTS/GMT |
|    | IV-0-3-3 Vc = 300 kts  | Si  |          |                  |          |                         | 254 IV03.004 |
| ∣∢ | A Set Vc = 300 kts     |   | LACOMBE  | Vc 341           | 34120611 |                         | 16:05:30     |
|    |                        |   |          | VSA 2            | 271040   |                         | 16:06:28     |
| ш  | Shut down A/C external | B Shut down A/C external ground electrical power supply | Ground   |                  | 271040   |                         | retract      |
|    |                        |   | mechanic | RTL fit 27       | 271042   |                         |              |
|    |                        |   |          | RTL fit 2'       | 271041   |                         |              |
| ပ  | C Reset power          |   | Ground   |                  |          |                         |              |
|    |                        |   | mechanic |                  |          |                         |              |
|    |                        |   |          |                  |          |                         |              |

# IV-1 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER PEDALS MOTIONS AND FORCES ALL TRIMS = 0° YAW DAMPER = OFF AUTO PILOT = OFF SLATS/FLAPS = retracted

|   | ACTIONS   | ACTORS  | READ      | AD       | RESULTS | COMMENTS/GMT |
|---|---|---------|-----------|----------|---------|--------------|
|   | IV-1-1 Vc = 0 kts                                       |         |           |          |         | 253 IV11.001 |
| R | A Set Vc = 0 kts  | LACOMBE | Vc        | 34120611 |         | 16:51:20     |
| ۵ | B Left pedal motion $\rightarrow$ to stop (approx 20 s) | Pilot   | Rud. Ped. | 271025   |         | 16:53:54     |
|   | -   |         | Rud. Surf | 271024   |         | 253 IV11.002 |
| ပ | C Return to neutral (approx 20 s)                       | Pilot   |           |          |         | 16:57:32     |
|   | D Right pedal motion → to stop (approx 420s)            | Pilot   | Rud. Ped. | 271025   |         | 16:59:45     |
|   | -   |         | Rud. Surf | 271024   |         | 253 IV11.003 |
| ш | E Return to neutral (approx 20 s)                       | Pilot   |           |          |         | 17:00:21     |
|   |   |         |           |          |         | 17:02:30     |

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 IV-1 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER PEDALS MOTIONS AND FORCES

 ALL TRIMS = 0°
 | YAW DAMPER = OFF |
 | AUTO PILOT = OFF |

| F     | ALL TRIMS = 0° YAW DAMPER = OFF   | AUT     | AUTO PILOT = OFF | ALL TRIMS = 0° YAW DAMPER = OFF AUTO PILOT = OFF | SLATS/FLAPS = retracted | acted               |
|-------|---|---------|------------------|--|-------------------------|---------------------|
|       |   |         |                  |  |                         |                     |
|       | ACTIONS   | ACTORS  | READ             | 0  | RESULTS                 | COMMENTS/GMT        |
|       | IV-1-2 Vc = 240 kts   |         |                  |  |                         |                     |
| ∢     | Set Vc = 240 kts  | LACOMBE | Vc :             | 34120611   |                         | 253 IV12.001        |
|       |   |         | VSA              | 271040   |                         | 17:06:50            |
| മ     | Left pedal motion at $5^{\circ}$ /s $\rightarrow$ to RTL stop (approx 2 s)    | Pilot   | Rud. Ped.        | 271025   |                         | 17:08:20            |
|       | -   |         | Rud. Surf        | 271024   |                         |                     |
|       | Increase pedal force up to 100daN = 225 lbs                                   |         | Rud. Force       | 271003   |                         |                     |
|       |   |         | L Ped. Force     | 271001   |                         | Max 100 daN/225 lbs |
|       |   | Pilot   | Rud. Force       | 271003   |                         |                     |
|       |   |         | L Ped. Force     | 271001   |                         | Max 100 daN/225 lbs |
| ပ     | Return to neutral   |         |                  |  |                         |                     |
|       |   |         |                  |  |                         |                     |
|       | Right pedal motion at $5^{\circ}$ /s $\rightarrow$ to RTL stop (approx 2 s)   | Pilot   |                  | 34120611   |                         |                     |
|       |   |         | VSA              | 271040   |                         |                     |
|       |   |         | Rud. Ped.        | 271025   |                         |                     |
|       |   |         | Rud. Surf        | 271024   |                         |                     |
|       |   |         | Rud. Force       | 271003   |                         |                     |
|       |   |         | R Ped. Force     | 271002   |                         |                     |
|       | Increase pedal force up to 100daN = 225 lbs                                   |         | Rud. Force       | 271003   |                         |                     |
|       |   |         | R Ped. Force     | 271002   |                         |                     |
|       |   |         |                  |  |                         |                     |
| ш     | Left pedal motion at $20^{\circ}$ /s $\rightarrow$ to RTL stop (approx 1/2 s) | Pilot   | Rud. Ped.        | 271025   |                         | 253 IV12.002        |
|       |   |         | Rud. Surf        | 271024   |                         | 17:13:50            |
|       |   |         | Rud. Force       | 271003   |                         | 17:14:55            |
| ***** |   |         | L Ped. Force     | 271001   |                         |                     |
|       | Increase pedal force up to 100daN = 225 lbs                                   |         | Rud. Force       | 271003   |                         |                     |
|       |   |         | L Ped. Force     | 271001   |                         |                     |
| щ     | Return to neutral   |         | 1                |  |                         |                     |
| ני    | Right needal motion at $20^{\circ/s} \rightarrow to RTI stop (approx 1/2 s)$  | Pilot   | Rud. Ped.        | 271025   |                         |                     |
| )     |   |         | Rud. Surf        | 271024   |                         |                     |
|       |   |         | Rud. Force       | 271003   |                         |                     |
|       |   |         | R Ped. Force     | 271002   |                         |                     |
|       |   |         | Rud. Force       | 271003   |                         |                     |
|       | Increase pedal force up to 100daN = 225 Ibs                                   |         | R Ped. Force     | 271002   |                         |                     |
| I     | Return to neutral   |         |                  |  |                         |                     |
|       |   |         |                  | _  |                         |                     |

IV-1 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER PEDALS MOTIONS AND FORCES

|      |   |         |              |          | SI ATS/FI ADS = retracted | acted               |
|------|---|---------|--------------|----------|---------------------------|---------------------|
| ł    |   |         |              |          | -                         |                     |
|      | ACTIONS   | ACTORS  | READ         |          | RESULTS                   | COMMENTS/GMT        |
|      | IV-1-3 Vc = 250 kts   |         |              |          |                           |                     |
| ⊲    | Set Vc = 250 kts  | LACOMBE | Vc 34        | 34120611 |                           | 253 IV13.001        |
|      |   |         | VSA          | 271040   |                           | 17:18:50            |
| m    | Left pedal motion at $5^{\circ}/s \rightarrow$ to RTL stop (approx 1.5 s)     | Pilot   | Rud. Ped.    | 271025   |                           | 17:19:50            |
|      |   |         | Rud. Surf    | 271024   |                           |                     |
|      |   |         | Rud. Force   | 271003   |                           |                     |
|      |   |         | L Ped. Force | 271001   |                           | Max 100 daN/225 lbs |
|      | Increase pedal force up to 100daN = 225 lbs                                   |         | Rud. Force   | 271003   |                           |                     |
|      |   |         | L Ped. Force | 271001   |                           | Max 100 daN/225 lbs |
| ပ    | Return to neutral   |         |              |          |                           |                     |
|      |   |         |              |          |                           |                     |
|      | Right pedal motion at $5^{\circ}/s \rightarrow$ to RTL stop (approx 1.5 s)    | Pilot   |              | 34120611 |                           |                     |
|      |   |         | VSA          | 271040   |                           |                     |
|      |   |         | Rud. Ped.    | 271025   |                           |                     |
|      |   |         | Rud. Surf    | 271024   |                           |                     |
|      |   |         | Rud. Force   | 271003   |                           |                     |
|      |   |         | R Ped. Force | 271002   |                           |                     |
|      | Increase pedal force up to 100daN = 225 lbs                                   |         | Rud. Force   | 271003   |                           |                     |
|      |   |         | R Ped. Force | 271002   |                           |                     |
| 1000 |   |         |              |          |                           |                     |
| Ш    | Left pedal motion at $20^{\circ}$ /s $\rightarrow$ to RTL stop (approx 1/3 s) | Pilot   | Rud. Ped.    | 271025   |                           | 253 IV13.002        |
|      |   |         | Rud. Surf    | 271024   |                           | 17:21:40            |
|      |   |         | Rud. Force   | 271003   |                           | 17:22:20            |
|      |   |         | L Ped. Force | 271001   |                           |                     |
|      | Increase pedal force up to 100daN = 225 lbs                                   |         | Rud. Force   | 271003   |                           |                     |
|      |   |         | L Ped. Force | 271001   |                           |                     |
|      | Return to neutral   |         |              |          |                           |                     |
| U    | Binht nedal motion at 20°/c → to RTI ston (approx 1/3 s)                      | Pilot   | Rud. Ped.    | 271025   |                           |                     |
| )    |   |         | Rud. Surf    | 271024   |                           |                     |
|      |   |         | Rud. Force   | 271003   |                           |                     |
|      |   |         | R Ped. Force | 271002   |                           |                     |
|      | Increase pedal force up to 100daN = 225 lbs                                   |         | Rud. Force   | 271003   |                           |                     |
|      |   |         | R Ped. Force | 271002   |                           |                     |
|      | Increase pedal force up to Toodaly - 220 lbs                                  |         |              |          |                           |                     |
|      |   |         |              | -        | 1                         |                     |

 IV-1 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER PEDALS MOTIONS AND FORCES

 ALL TRIMS = 0°
 YAW DAMPER = OFF

|  | ALL TRIMS = 0° YAW DAMPER = OFF | ALL TRIMS = 0° YAW DAMPER = OFF  | AUT     | AUTO PILOT = OFF |          | UTO PILOT = OFF SLATS/FLAPS = retracted  | racted              |
|--|---------------------------------|--|---------|------------------|----------|--|---------------------|
| W1.4 Vc = 260 kts         ACIUNS   |                                 |  | ACTOD?  |                  |          |  | COMMENTS/CMT        |
| W-1-14VC = 260 ktsLACOMBEVo3120611Set VC = 260 ktsSet VC = 260 ktsVA271040Left pedal motion at 5's $\rightarrow$ to RTL stop (approx 1 s)PilotRud Sid271024Increase pedal force up to 100daN = 225 lbsRud Force271001Rud Force271001Return to neutralLeft pedal motion at 5's $\rightarrow$ to RTL stop (approx 1 s)PilotVc371244Return to neutralLeft pedal motion at 5's $\rightarrow$ to RTL stop (approx 1 s)PilotVc371040Return to neutralLeft pedal motion at 5's $\rightarrow$ to RTL stop (approx 1 s)PilotVc371024Rud Force271003Rud Force271003Rud Force271003Increase pedal force up to 100daN = 225 lbsRud Force271003Rud Force271003Rut force271003Rud Force271003Rud Force271003Rut force271003Rud Force271003Rud Force271003Rut force271003Rud Force271003Rud Force271003Rut force up to 100daN = 225 lbsRud Force271003Rud Force271003Rut force up to 100daN = 225 lbsRud Force271003Rud Force271003Rut force up to 100daN = 225 lbsRud Force271003Rud Force271003Rut force up to 100daN = 225 lbsRud Force271003Rud Force271003Rut force up to 100daN = 225 lbsRud Force271003Rud Force271003Rut force up to 100daN = 225 lbsRud Force2710  |                                 |  | ACIONS  |                  |          | НЕЭЦГІЭ  |                     |
| Set Vc = 260 kts       LACOMBE       Vc       34120611       Vc         Left pedal motion at 5'/s $\rightarrow$ to RTL stop (approx 1 s)       Pilot       Rud Fed.       271023         Increase pedal force up to 100daN = 225 lbs       Rud Force       271003       Rud Force       271003         Return to meutral       Rud Force       271003       Rud Force       271003       Rud Force       271003         Return to meutral       Rud Force       271003       Rud Force       271003       Rud Force       271003         Return to meutral       Rud Force       271003       Rud Force       271003       Rud Force       271003         Return to meutral       Rud Force       271003       Rud Force       271003       Rud Force       271003         Increase pedal force up to 100daN = 225 lbs       Rud Force       271003       Rud Force       271003       Rud Force       271003         Rut force up to 100daN = 225 lbs       Rud Suff       271025       Rud Force       271003       Rud Force       271003         Rut force up to 100daN = 225 lbs       Rud Suff       271025       Rud Force       271003       Rud Force       271003         Rut force up to 100daN = 225 lbs       Rud Force       271003       Rud Force       271003       Rud F   |                                 | 2<br>2   |         |                  |          |  |                     |
| VSA271040Left pedal motion at 5's $\rightarrow$ to RTL stop (approx 1 s)PilotVSA271040Increase pedal force up to 100daN = 225 lbsRud Suff271025Return to neutralRud Suff271025Return to neutralNoRud Suff271025Return to neutralNoVC271011Return to neutralNoNo271025Return to neutralNoNo271025Return to neutralNoNo271025Increase pedal force up to 100daN = 225 lbsRud Suff271025Increase pedal force up to 100daN = 225 lbsRud Suff271025Return to neutralNoNo271025Increase pedal force up to 100daN = 225 lbsRud Force271002Return to neutralNoNoNoReturn to neutralNoNoNo<   | ∢                               | Set Vc = 260 kts   | LACOMBE | Vc               | 34120611 |  | 253 IV14.001        |
| Left pedal motion at 5's $\rightarrow$ to RTL stop (aptrox 1 s)PilotRud. Pede.271025PilotLeft pedal motion at 5's $\rightarrow$ to RTL stop (approx 1 s)Rud. Force271031PilotRutun to neutralLeft Force271001PilotVocRutun to neutralNoNo241061PilotRutun to neutralNoNo241061PilotRutun to neutralNoNo241061PilotRutun to neutralNoNo2410261PilotRutun to neutralNoNo271025PilotRutun to neutralNoNo271025PilotRutun to neutralNo271025Pilot271025Rutun to neutralNoNo271025PilotRutun to neutralPilotNoNo271025Rutun to neutralNoNoRud. Force271003Rutun to neutralNoNoNo271025Rutun to neutralNoRud. Surf271025Rutun to neutralNoRud. Surf271025Rutun to neutralNoRud. Surf271026Rutun to neutralNoRud. Surf271025Rutun to neutralNoRud. Surf271025Rutun to neutralNoRud. Surf271025Rutun to neutralNoRud. Surf271026Rutun to neutralNoRud. Surf271025Rutun to neutralNoRud. Surf271026Rutun to neutralNoRud  |                                 |  |         | VSA              | 271040   |  | 17:25:00            |
| RudStringRudStringStringIncrease pedal force up to 100daN = 225 lbsLediForce271001LediReturn to neutralImageLediForce271001ImageReturn to neutralImageLediForce271001ImageReturn to neutralImageImageImage25 lbsImageReturn to neutralImageVis271026ImageImageIncrease pedal force up to 100daN = 225 lbsPilotVis271026ImageReturn to neutralImageRudForce271002ImageReturn to neutralImageRudForce271002ImageReturn to neutralImageRudForce271002ImageReturn to neutralImageRudForce271003ImageReturn to neutralImageRudForce271003ImageIncrease pedal force up to 100daN = 225 lbsRudForce271003ImageReturn to neutralImageRudForce271003ImageIncrease pedal force up to 100daN = 225 lbsRudForce271003ImageReturn to neutralImageRudForce271003ImageReturn to neutralImageRudForce271003ImageReturn to neutralImageRudForce271003ImageReturn to neutralImageRudForce271003ImageReturn to neutralI   | m                               | Left pedal motion at $5^{s/s} \rightarrow$ to RTL stop (approx 1 s)        | Pilot   | Rud. Ped.        | 271025   |  | 17:25:55            |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$  |                                 | -  |         | Rud. Surf        | 271024   |  |                     |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$  |                                 |  |         | Rud. Force       | 271003   |  |                     |
| $   \mbox{Increase pedal force up to 100daN = 225 lbs }   \mbox{Increase pedal force up to 100daN = 225 lbs }   \mbox{Increase pedal motion at $7's $> to RTL stop (approx 1 s) }   \mbox{Pilot}   \mbox{Increase pedal force up to 100daN = 225 lbs }   \mbox{Increase pedal force up to 100daN = 225 lbs }   \mbox{Rud Force 271002 }   \mbox{Rud Force 271003 }     R$   |                                 |  |         | L Ped. Force     | 271001   |  | Max 100 daN/225 lbs |
| Return to neutral       L Ped. Force       271001         Return to neutral       Non-       3412611         Right pedal motion at 5'/s $\rightarrow$ to RTL stop (approx 1 s)       No       3412611         Increase pedal force up to 100daN = 225 lbs       Rud. Force       271003         Return to neutral       Rud. Force       271003         Return to neutral       Rud. Force       271003         Return to neutral       Rud. Force       271003         Increase pedal force up to 100daN = 225 lbs       Rud. Force       271003         Return to neutral       Rud. Force       271003       Rud. Force         Increase pedal force up to 100daN = 225 lbs       Rud. Force       271003       Rud. Force         Return to neutral       Rud. Force       271003       Rud. Force       271003         Increase pedal force up to 100daN = 225 lbs       Rud. Force       271003       Rud. Force       271003         Return to neutral       Rud. Force       271003       Rud. Force       271003       Rud. Force       271003         Return to neutral       Rud. Force       271003       Rud. Force       271003       Rud. Force       271003         Return to neutral       Led. Force       271003       Rud. Force       271003       Rud. Force <td></td> <td>Increase pedal force up to 100daN = 225 lbs</td> <td></td> <td>Rud. Force</td> <td>271003</td> <td></td> <td></td>  |                                 | Increase pedal force up to 100daN = 225 lbs                                |         | Rud. Force       | 271003   |  |                     |
| Return to neutralReturn to neutralNoRight pedal motion at 5'/s $\rightarrow$ to RTL stop (approx 1 s)PilotVc34120611Visit271025Nud. Force271002Increase pedal force up to 100daN = 225 lbsRud. Force271002Return to neutralReturn to neutralRed. Force271002Return to neutralNud. Force271002Nud. ForceReturn to neutralRed. Force271002Nud. ForceReturn to neutralNud. Force271002Nud. ForceReturn to neutralNud. Force271003Nud. ForceReturn to neutralNud. Force271003Nud. ForceReturn to neutralNud. Force271003Nud. ForceReturn to neutralNud. Force271003Nud. ForceRud. Force271003Nud. Force271003Rud. force up to 100daN = 225 lbsNud. Force271003Rud. force up to 100daN = 225 lbsRud. Force271003Rud. force up to 100daN = 225 lbsRud. Force271003Rud. force up to 100daN = 225 lbsRud. Force271002Rud. for  |                                 |  |         | L Ped. Force     | 271001   |  | Max 100 daN/225 lbs |
| Right pedal motion at 5's $\rightarrow$ to RTL stop (approx 1 s)PilotVc34120611Right pedal motion at 5's $\rightarrow$ to RTL stop (approx 1 s)VSA271040Increase pedal force up to 100daN = 225 lbsRud. Force271002Return to neutralRud. Force271002Left pedal motion at 20's $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Force271003Increase pedal force up to 100daN = 225 lbsRud. Force271003Rud. Force271003Return to neutralRud. Force271003Rud. Force271003Rud. Force271003Increase pedal force up to 100daN = 225 lbsRud. Force271003Rud. Force271003Rud. Force271003Return to neutralRud. Force271003Rud. Force271003Rud. Force271003Rud. Force271003Return to neutralRud. Force271003Rud. Force271003Rud. Force271003Rud. Force271003Return to neutralRud. Force271003Rud. Force271003Rud. Force271003Rud. Force271003Ruth pedal motion at 20's $\rightarrow$ to RTL stop (approx 1/4 s)Rud. Force271003Rud. Force271003Rud. Force271003Ruth to neutralRud. Force271003Rud. Force271003Rud. Force271003Rud. Force271003Ruth to neutralRud. Force271003Rud. Force271003Rud. Force271003Rud. Force271003Ruth to neutralRud. Force271003Rud. Force<  | ပ                               | Return to neutral  |         |                  |          |  |                     |
| WSA $271040$ NoIncrease pedal force up to 100daN = 225 lbsRud. Ped. 271025Rud. Force 271002Rud Force 271002RPed. Force 271002Rud Force 271002Return to neutralRed Force 271002Rud Force 271002Left pedal motion at $20^{7}$ (s $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Force 271002Increase pedal force up to 100daN = 225 lbsRud. Force 271002Rud. Force 271003Increase pedal force up to 100daN = 225 lbsLed. Force 271003Led. Force 271003Increase pedal force up to 100daN = 225 lbsRud. Force 271003Rud. Force 271003Right pedal motion at $20^{7}$ (s $\rightarrow$ to RTL stop (approx $\chi$ s)Rud. Force 271003Rud. Force 271003Right pedal motion at $20^{7}$ (s $\rightarrow$ to RTL stop (approx $\chi$ s)Rud. Force 271003Rud. Force 271003Increase pedal force up to 100daN = 225 lbsRud. Force 271003Rud. Force 271003Return to neutralIncrease pedal force up to 100daN = 225 lbsRud. Force 271003Rud. Force 271003Rud. Force 271003Rud. Force 271003Rud. Force 271003Rud. Force 271003Rud. Force 271003Increase pedal force up to 100daN = 225 lbsRud. Force 271003Rud. Force 271003Increase pedal force up to 100daN = 225 lbsRud. Force 271003Rud. Force 271003Increase pedal force up to 100daN = 225 lbsRud. Force 271003Rud. Force 271003Increase pedal force up to 100daN = 225 lbsRud. Force 271003Rud. Force 271003Increase pedal force up to 100daN = 225 lbsRud. Force 271003Rud. Force 271003 </td <td></td> <td>Richt nedal motion at 5°/s → to RTI ston (approx 1 s)</td> <td>Pilot</td> <td>Vc</td> <td>34120611</td> <td></td> <td></td>   |                                 | Richt nedal motion at 5°/s → to RTI ston (approx 1 s)                      | Pilot   | Vc               | 34120611 |  |                     |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$  | )                               |  |         | VSA              | 271040   |  |                     |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$  |                                 |  |         |                  | 271025   |  |                     |
| $\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$   |                                 |  |         | Rud. Surf        | 271024   |  |                     |
| Increase pedal force up to 100daN = 225 lbsR Ped. Force 271002Return to neutralR.U. Force 271003Return to neutralEff pedal motion at 20°/s $\rightarrow$ to RTL stop (approx 1/4 s)Increase pedal force up to 100daN = 225 lbsR.ud. Force 271003Increase pedal force up to 100daN = 225 lbsI.Ped. Force 271003Return to neutralR.ud. Force 271003Return to neutralI.Ped. Force 271003Return to neutralR.ud. Force 271003Return to neutralR.ud. Force 271003Return to neutralI.Ped. Force 271003Return to neutralR.ud. Force 271003Return to neutralR.ud. Force 271003Return to neutralI.Ped. Force 271003Return to neutralR.ud. Surf 271025Return to neutralR.ud. Surf 271025Return to neutralR.ud. Force 271003Return to neutralR.ud. Force 271003Return to neutralR.red. Force 271002Return to neutralR.red. Force   |                                 |  |         | Rud. Force       | 271003   |  |                     |
| Return to neutralRud. Force271003Return to neutralRud. Force271002Left pedal motion at 20'/s $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Ped.Left pedal motion at 20'/s $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. SurfIncrease pedal force up to 100daN = 225 lbsLeft.271025Increase pedal force up to 100daN = 225 lbsLeft.271003Rud. Force271001Rud. Force271003Rud. Force271003Rud. Force271003Right pedal motion at 20's $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Ped.271025Right pedal motion at 20's $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Force271003Rud. Force271003Rud. Force271003Rud. ForceRight pedal motion at 20's $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Force271003Rud. Force271003 <td></td> <td>Increase pedal force up to 100daN = 225 lbs</td> <td></td> <td>R Ped. Force</td> <td>271002</td> <td></td> <td></td>   |                                 | Increase pedal force up to 100daN = 225 lbs                                |         | R Ped. Force     | 271002   |  |                     |
| Return to neutralR Ped. Force271002Return to neutralEdit pedal motion at 20°/s $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Force271025Left pedal motion at 20°/s $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Surf271024Increase pedal force up to 100daN = 225 lbsL Ped. Force271003Rud. Force271001L Ped. Force271003Rud. Force271001Rud. Force271003Right pedal motion at 20°/s $\rightarrow$ to RTL stop (approx ¼ s)PilotRud. Ped. 271023Right pedal motion at 20°/s $\rightarrow$ to RTL stop (approx ¼ s)PilotRud. Ped. 271023Rud. Force271003Rud. Ped. 271023Rud. Force271003Rud. ForceRud. Force271003Rud. Force271003Rud  |                                 |  |         | Rud. Force       | 271003   |  |                     |
| Return to neutralReturn to neutral20%Left pedal motion at 20% $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Surf271025Increase pedal force up to 100daN = 225 lbsRud. Force271003EndIncrease pedal force up to 100daN = 225 lbsL Ped. Force271003EndReturn to neutralL Ped. Force271001EndEndReturn to neutralL Ped. Force271001EndEndRight pedal motion at 20% $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Force271003EndRight pedal motion at 20% $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Force271003EndRight pedal motion at 20% $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Force271003EndRud. Force up to 100daN = 225 lbsRud. Force271003EndEndEnce271003Return to neutralRud. Force271003Rud. Force271003EndEndEndRud. Force271003Rud. Force271003EndEndEndEndEndEndRud. force up to 100daN = 225 lbsRud. Force271003Rud. Force271003EndE   |                                 |  |         | R Ped. Force     | 271002   |  |                     |
| Left pedal motion at 20°/s $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Eurf.271025Increase pedal force up to 100daN = 225 lbsL Ped. Force271003Increase pedal force up to 100daN = 225 lbsL Ped. Force271001Rud. Force271001L Ped. Force271001Rud. Force271001L Ped. Force271001Right pedal motion at 20°/s $\rightarrow$ to RTL stop (approx ¼ s)PilotRud. Ped. 271001Rud. Force271001Rud. Force271003Increase pedal force up to 100daN = 225 lbsRud. Force271003Rud. Force271003Rud. Force271003Rud. Force271003Rud. Force271003Rud. Force271003Rud. Force271003Rud. Force271003Rud. Force271003Return to neutralRed. Force271003Rud. ForceReturn to neutralReturn to neutralRed. Force271002  | ш                               | Return to neutral  |         |                  |          |  |                     |
| Left pedal motion at 20 /s $\rightarrow$ to K1L stop (approx 1/4 s)mutual set and surf Surf S17024Increase pedal force up to 100daN = 225 lbsLeft. Surf. S17003Increase pedal force up to 100daN = 225 lbsLeft. Force 271001Return to neutralLeft. Force 271003Right pedal motion at 20°/s $\rightarrow$ to RTL stop (approx 1/4 s)Right pedal motion at 20°/s $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Surf 271025Right pedal motion at 20°/s $\rightarrow$ to RTL stop (approx 1/4 s)PilotRud. Surf 271026Rud. Surf 271026Rud. Surf 271027Rud. Surf 271027Rud. Force 271003Rud. Force 271003Return to neutralReturn to neutral  | ſ                               |  | +~!:0   | םיק<br>חיק       | 271025   |  | 253 N/14 003        |
| Increase pedal force up to 100daN = 225 lbsKud. Suff $2/1024$ Rud. Force $2/1003$ Rud. Force $2/1003$ Return to neutralL Ped. Force $2/1003$ Right pedal motion at 20°/s $\rightarrow$ to RTL stop (approx ½ s)PilotRud. Ped. $2/1025$ Rud. Force $2/1024$ Rud. $2/1025$ Increase pedal force up to 100daN = 225 lbsRud. Force $2/1003$ Return to neutralReturn to neutralRud. Force $2/1003$ Rud. Force $2/1002$  | L                               | Lett pedal motion at $20^{7}$ $\rightarrow$ to K I L stop (approx 1/4 s)   |         | Luu. reu.        | 070117   |  | 200 14 002          |
| Increase pedal force up to 100daN = 225 Ibs<br>Rud. Force 271001<br>Rud. Force 271001<br>Rud. Force 271001<br>Rud. Force 271001<br>Rud. Force 271002<br>Rud. Acres 271003<br>Rud. Force 271003<br>Rud. |                                 |  |         | Rud. Surt        | 2/1024   |  | 17:28:10            |
| Return to neutralL Ped. ForceRight pedal motion at $20^{\circ}/s \rightarrow \text{to RTL stop (approx ¼ s)}$ PilotRud. ForceRud. SurfRud. SurfRud. SurfIncrease pedal force up to 100daN = 225 lbsRud. ForceRud. ForceReturn to neutralReturn to neutralReturn to neutral   |                                 | Increase pedal force up to 100daN = 225 lbs                                |         | Rud. Force       | 2/1003   | and a second | 17:29:05            |
| Return to neutralRud. ForceReturn to neutralL Ped. ForceRight pedal motion at $20^{\circ}/s \rightarrow$ to RTL stop (approx ¼ s)PilotRud. Ped.Rud. SurfRud. SurfRud. SurfIncrease pedal force up to 100daN = 225 lbsRud. ForceReturn to neutralReturn to neutralReturn to neutral   |                                 |  |         | L Ped. Force     | 271001   |  |                     |
| Return to neutralEt curl of curlRight pedal motion at $20^{\circ}/s \rightarrow$ to RTL stop (approx ¼ s)PilotRud. Ped.Rud. SurfRud. SurfRud. SurfIncrease pedal force up to 100daN = 225 lbsRod. ForceRud. ForceReturn to neutralReturn to neutralR Ped. Force  |                                 |  |         | L Dad Force      | 2/1003   |  |                     |
| Return to neutralPliotRud. Ped.Right pedal motion at $20^{\circ}/s \rightarrow$ to RTL stop (approx ¼ s)PilotRud. Ped.Rud. SurfRud. ForceRud. ForceIncrease pedal force up to 100daN = 225 lbsRed. ForceReturn to neutralReturn to neutral   |                                 |  |         |                  |          |  |                     |
| Right pedal motion at $20^{\circ}/s \rightarrow \text{to RTL stop (approx 1/4 s)}$ PilotRud. Ped.Rud. ForceRud. ForceRud. ForceRud. ForceIncrease pedal force up to 100daN = 225 lbsRud. ForceReturn to neutralReturn to neutral   |                                 | Return to neutral  |         |                  |          |  |                     |
| Rud. Surf         Rud. Force         Return to neutral   | ני                              | Right needal motion at $20^{\circ/s} \rightarrow$ to RTL stop (approx ½ s) | Pilot   | Rud. Ped.        | 271025   |  |                     |
| Rud. Force         Increase pedal force up to 100daN = 225 lbs         Return to neutral   | )                               |  |         | Rud. Surf        | 271024   |  |                     |
| Increase pedal force up to 100daN = 225 lbs Return to neutral Return to neutral  |                                 |  |         | Rud. Force       | 271003   |  |                     |
| Increase pedal force up to 100daN = 225 lbs Return to neutral Return to neutral  |                                 |  |         | R Ped. Force     | 271002   |  |                     |
| Increase pedal force up to 100daN = 225 lbs Return to neutral  |                                 |  |         | Rud. Force       |          |  |                     |
|  |                                 | Increase pedal force up to 100daN = 225 lbs                                |         | R Ped. Force     |          |  |                     |
|  |                                 | Return to neutral  |         |                  |          |  |                     |

## IV-1 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER PEDALS MOTIONS AND FORCES Warning: Do not exceed 100 daN = 225 lbs on pedal force

| A          | ALL TRIMS = 0°  | YAW DAMPER = OFF  | AUT     | AUTO PILOT = OFF |          | SLATS/FLAPS = retracted | etracted            |
|------------|---|---|---------|------------------|----------|-------------------------|---------------------|
|            | AC  | ACTIONS   | ACTORS  | READ             |          | RESULTS                 | COMMENTS/GMT        |
|            | IV-1-5 Vc = 0 kts (note delta ped max=21°)  | delta ped max=21°)  |         |                  |          |                         |                     |
| ∣∢         | A Set Vc = 0 kts  |   | LACOMBE | Vc               | 34120611 |                         | 253 IV15            |
|            | ****  |   |         | VSA              | 271040   |                         | 17:51:00            |
| m          | +   | Push left pedal up to 15° (2/3 of full travel) but don't reach  | Pilot   | Rud. Ped.        | 271025   |                         | 17:52:45            |
|            | stop  |   |         | Rud. Surf        | 271024   |                         |                     |
|            |   |   |         | Rud. Force       | 271003   |                         |                     |
|            |   |   |         | L Ped. Force     | 271001   |                         | Max 100 daN/225 lbs |
| O          | C Push right pedal up to 15° (2   | Push right pedal up to 15° (2/3 of full travel) but don't reach | Pilot   | Rud. Ped.        | 271025   |                         |                     |
|            | stop  |   |         | Rud. Surf        | 271024   |                         |                     |
|            | -   |   |         | Rud. Force       | 271003   |                         |                     |
|            |   |   |         | R Ped. Force     | 271002   |                         | Max 100 daN/225 lbs |
| ഥ<br>      | D Return to neutral. Cycle achieved in 30s and continue immediately with next point | nieved in 30s and continue<br>at                                |         |                  |          |                         |                     |
|            |   |   |         |                  |          |                         |                     |
| Ш          | E Repeat cycle. Cycle achieved in 30s and continue                                  | ed in 30s and continue  | Pilot   | Rud. Ped.        | 271025   |                         |                     |
|            |   | nt  |         | Rud. Surf        | 271024   |                         |                     |
|            |   |   |         | Rud. Force       | 271003   |                         |                     |
|            |   |   |         | L Ped. Force     | 271001   |                         |                     |
|            |   |   |         | R Ped. Force     | 271002   |                         |                     |
|            |   |   |         |                  |          |                         |                     |
| <u> </u> Ľ | F Repeat cycle. Cycle achieved in 30s   | ed in 30s   | Pilot   | Rud. Ped.        | 271025   |                         |                     |
|            | •   |   |         | Rud. Surf        | 271024   |                         |                     |
|            |   |   |         | Rud. Force       | 271003   |                         |                     |
|            |   |   |         | L Ped. Force     | 271001   |                         |                     |
|            |   |   |         | R Ped. Force     | 271002   |                         |                     |
|            |   |   |         |                  |          |                         |                     |

## IV-1 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER PEDALS MOTIONS AND FORCES Warning: Do not exceed 100 daN = 225 lbs on pedal force

| A | ALL TRIMS = 0° YAW DAMPER = OFF                                   | AUT     | AUTO PILOT = OFF |          | SLATS/FLAPS = retracted | itracted            |
|---|---|---------|------------------|----------|-------------------------|---------------------|
|   | ACTIONS   | ACTORS  | READ             |          | RESULTS                 | COMMENTS/GMT        |
|   | IV-1-6 Vc = 0 kts   |         |                  |          |                         |                     |
| ∢ | A Set Vc = 0 kts  | LACOMBE | Vc :             | 34120611 |                         | 253 IV16            |
|   |   |         | VSA              | 271040   |                         | 17:55:56            |
| m | 3 Push left pedal up to 15° (2/3 of full travel) but don't reach  | Pilot   | Rud. Ped.        | 271025   |                         | 17:56:33            |
|   | stop  |         | Rud. Surf        | 271024   |                         |                     |
|   |   |         | Rud. Force       | 271003   |                         |                     |
|   |   |         | L Ped. Force     | 271001   |                         | Max 100 daN/225 lbs |
| U | C Push right pedal up to 15° (2/3 of full travel) but don't reach | Pilot   | Rud. Ped.        | 271025   |                         |                     |
|   | stop  |         | Rud. Surf        | 271024   |                         |                     |
|   |   |         | Rud. Force       | 271003   |                         |                     |
|   |   |         | R Ped. Force     | 271002   |                         | Max 100 daN/225 lbs |
|   | ) Return to neutral. Cycle achieved in 5s and continue            |         | Rud. Ped.        | 271025   |                         |                     |
|   | immediately with next point                                       |         | Rud. Surf        | 271024   |                         |                     |
|   |   |         | Rud. Force       | 271003   |                         |                     |
|   |   |         | L Ped. Force     | 271001   |                         |                     |
|   |   |         | R Ped. Force     | 271002   |                         |                     |
|   |   |         |                  |          |                         |                     |
| ш | E Repeat cycle. Cycle achieved in 5s and continue                 | Pilot   | Rud. Ped.        | 271025   |                         |                     |
|   | immediately with next point                                       |         | Rud. Surf        | 271024   |                         |                     |
|   |   |         | Rud. Force       | 271003   |                         |                     |
|   |   |         | L Ped. Force     | 271001   |                         |                     |
|   |   |         | R Ped. Force     | 271002   |                         |                     |
|   |   |         |                  |          |                         |                     |
| L | Repeat cycle. Repeat cycle. Cycle achieved in 5s                  | Pilot   | Rud. Ped.        | 271025   |                         |                     |
|   | ·<br>·  |         | Rud. Surf        | 271024   |                         |                     |
|   |   |         | Rud. Force       | 271003   |                         |                     |
|   |   |         | L Ped. Force     | 271001   |                         |                     |
|   |   |         | R Ped. Force     | 271002   |                         |                     |
|   |   |         |                  |          |                         |                     |

## IV-1 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER PEDALS MOTIONS AND FORCES Warning: Do not exceed 100 daN = 225 lbs on pedal force

| ActronsActorsActorsREADRESULTSCOMMENTS(G)A Set Vc = 0 ktsVc = 0 ktsVc = 0 kts253 (V17)253 (V17)B vush left pedal up to 15° (2/3 of full travel) but don't reachPilotVc = 2102417:55 2817:55 28C Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud Surf27102517:55 28C Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud Surf27102517:55 28C Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud Surf27102517:55 28C Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud Surf27102517:55 28C Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud Surf271024Max 100 daN/22518C Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud Surf271024Max 100 daN/22518C Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud Surf271024Max 100 daN/22518C Push right pedal up to 15° (2/3 of full travel)Rud Surf271024Max 100 daN/22518C Push right pedal up to 15° (2/3 of full travel)Rud Surf271024Max 100 daN/22518C Push right pedal up to 15° (2/3 of full travel)Rud Surf271024Max 100 daN/22518C Push right pedal up to 15° (2/3 of full travel)Rud Surf271024Max 100 daN/22518C Push right pedal up to 15° (2/3 of full travel)Rud Surf271024Max 100 daN/22518 <t< th=""><th>Ā</th><th>ALL TRIMS = 0° YAW DAMPER = OFF</th><th>AUT</th><th>AUTO PILOT = OFF</th><th></th><th>SLATS/FLAPS = retracted</th><th>tracted</th></t<> | Ā          | ALL TRIMS = 0° YAW DAMPER = OFF | AUT     | AUTO PILOT = OFF |        | SLATS/FLAPS = retracted | tracted             |
|---|------------|---------------------------------|---------|------------------|--------|-------------------------|---------------------|
| ACTORSACTORSREADRESULTSIV-1-7 Vc = 0 ktsACTIONSACTORSNc $3120611$ 253Ev C = 0 ktsVc $3120611$ 273273Set Vc = 0 ktsVc $3120611$ 273273Push left pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Ped.27102417.5Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Surf271024MaxPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Surf271024MaxPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Surf271024MaxPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Surf271024MaxPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Fed.271024MaxPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Fed.271024MaxPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Fed.271024MaxPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Fed.271024MaxReturn to neutral. Cycle achieved in 2s and continuePilotRud. Fed.271025MaxRepeat cycle. Cycle achieved in 2s and continuePilotRud. Fed.271024PilotRepeat cycle. Cycle achieved in 2sPilotRud. Force271002PilotPilotRepeat cycle. Cycle achieved in 2s   |            |                                 |         |                  |        |                         |                     |
| IV-1-7Vc = 0 ktsLacOMBEVc $34120611$ NcSet Vc = 0 ktsNc $34120611$ NcNcSet Vc = 0 ktsPlotNc $34120611$ NcPush left pedal up to 15° (2/3 of full travel) but don't reachPliotRud. Ped. $271024$ NcPush right pedal up to 15° (2/3 of full travel) but don't reachPliotRud. Surf $271024$ NcPush right pedal up to 15° (2/3 of full travel) but don't reachPliotRud. Surf $271024$ NcPush right pedal up to 15° (2/3 of full travel) but don't reachPliotRud. Surf $271024$ NcPush right pedal up to 15° (2/3 of full travel) but don't reachPliotRud. Surf $271024$ NcPush right pedal up to 15° (2/3 of full travel) but don't reachPliotRud. Force $271003$ NcPush right pedal up to 15° (2/3 of full travel)PliotRud. Force $271003$ NcPush right pedal up to 15° (2/3 of full travel)PliotRud. Force $271003$ NcPush right pedal up to 15° (2/3 of full travel)PliotRud. Force $271003$ NcRud. Force271003Rud. Force $271003$ NcNcRepeat cycle. Cycle achieved in 2s and continuePliotRud. Force $271003$ NcRepeat cycle. Cycle achieved in 2s and continuePliotRud. Force $271003$ NcRud. ForceCyrlosPloitRud. Force $271003$ NcRepeat cycle. Cycle achieved in 2sPliotRud. Force $271003$ Nc<  |            | ACTIONS                         | ACTORS  | READ             |        | RESULTS                 | COMMENTS/GMT        |
| Set Vc = 0 ktsLacOMBEVc34120611IPush left pedal up to 15° (2/3 of full travel) but don't reachPilotVSA $271040$ IPush left pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Surf $271024$ IPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Force $271024$ IPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Force $271024$ IPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Force $271024$ IPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Force $271024$ IPush right pedal up to 15° (2/3 of full travel)Rud. Force $271024$ IIPush right pedal up to 15° (2/3 of full travel)Rud. Force $271026$ IIRud. Force $271026$ Rud. Surf $271026$ IIIRepeat cycle. Cycle achieved in 2s and continuePilotRud. Surf $271026$ IIRud. Force $271026$ Rud. Surf $271026$ IIIIRud. Force $271026$ Rud. Surf $271026$ IIIIIRud. Force $271026$ Rud. Surf $271026$ <  |            | IV-1-7 Vc = 0 kts               |         |                  |        |                         |                     |
| Push left pedal up to 15° (2/3 of full travel) but don't reachVSA $271026$ NPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Force $271024$ NPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Force $271024$ NPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Force $271024$ NPush right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Force $271024$ NRud. Force $271025$ Rud. Force $271026$ NNReturn to neutral. Cycle achieved in 2s and continuePilotRud. Surf $271026$ NRepeat cycle. Cycle achieved in 2s and continuePilotRud. Surf $271026$ NRepeat cycle. Cycle achieved in 2s and continuePilotRud. Eorce $271002$ NRepeat cycle. Cycle achieved in 2s and continuePilotRud. Surf $271026$ NRepeat cycle. Cycle achieved in 2s and continuePilotRud. Eorce $271002$ NRepeat cycle. Cycle achieved in 2s and continuePilotRud. Surf $271026$ NRepeat cycle. Cycle achieved in 2sPilotRud. Surf $271026$ NNRepeat cycle. Cycle achieved in 2sPilotRud. Surf $271026$ NNRepeat cycle. Cycle achieved in 2sPilotRud. Surf $271026$ NNRepeat cycle. Cycle achieved in 2sPilotRud. Eorce $271001$ NNRepeat cy   | ∣∢         |                                 | LACOMBE |                  | 120611 |                         | 253 IV17            |
| Push left pedal up to 15° (2/3 of full travel) but don't reach<br>stopPilotRud. Eur. $271025$ Pund.Push right pedal up to 15° (2/3 of full travel) but don't reach<br>stopPilotRud. Eor.ce $271003$ Pund.Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Eor.ce $271003$ Pund.Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Eor.ce $271003$ Pund.Rutu for ce $271003$ Rud. Eor.ce $271002$ Pund.Return to neutral. Cycle achieved in 2s and continuePilotRud. Surf $271024$ Pund.Return to neutral. Cycle achieved in 2s and continuePilotRud. Eor.ce $271003$ Pund.Repeat cycle. Cycle achieved in 2s and continuePilotRud. Eor.ce $271002$ Pund.Repeat cycle. Cycle achieved in 2s and continuePilotRud. Eor.ce $271002$ Pund.Repeat cycle. Cycle achieved in 2s and continuePilotRud. Eor.ce $271002$ Pund.Repeat cycle. Cycle achieved in 2s and continuePilotRud. Eor.ce $271002$ Pund.Rute for ce $271002$ Pund.Pund.Pund.Pund.Rute for ce $271002$ Pund.Pund.Pund.Pund.Rute for ce $271002$ Pund.Pund.Pund.Pund.Rute for ce $271002$ Pund.Pund.Pund.Pund.Rute for ce. Cycle achieved in 2sPund.Pund.Pund.Pund.Rute for ce. Cycle achieved in   |            |                                 |         |                  | 71040  |                         | 17:58:45            |
| stopRud. Surf $271024$ mud.Push right pedal up to 15° (2/3 of full travel) but don't reachRud. Force $271003$ Rud. Force $271024$ Push right pedal up to 15° (2/3 of full travel) but don't reachRud. Surf $271024$ Rud. Surf $271024$ Return to neutral. Cycle achieved in 2s and continuePilotRud. Force $271002$ Rud. Force $271002$ Return to neutral. Cycle achieved in 2s and continuePilotRud. Force $271002$ Rud. Force $271002$ Return to neutral. Cycle achieved in 2s and continuePilotRud. Force $271002$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2s and continuePilotRud. Force $271002$ Rud. Surf $271002$ Repeat cycle. Cycle achieved in 2s and continuePilotRud. Force $271002$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2s and continuePilotRud. Force $271002$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2s and continuePilotRud. Force $271002$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2s and continuePilotRud. Surf $271024$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2sPilotRud. Surf $271024$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2sPilotRud. Surf $271024$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2sPilotRud. Force $271024$ Rud. Force $271024$ Repeat cycle. Cycle achieved  | m          | +                               | Pilot   |                  | :71025 |                         | 17:59:28            |
| Rud. Force271003Rud. Force271003Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Surf271025Return to neutral. Cycle achieved in 2s and continuePilotRud. Surf271023Return to neutral. Cycle achieved in 2s and continuePilotRud. Surf271024Return to neutral. Cycle achieved in 2s and continuePilotRud. Surf271023Return to neutral. Cycle achieved in 2s and continuePilotRud. Surf271024Repeat cycle. Cycle achieved in 2s and continuePilotRud. Surf271024Repeat cycle. Cycle achieved in 2s and continuePilotRud. Surf271023Repeat cycle. Cycle achieved in 2s and continuePilotRud. Surf271024Repeat cycle. Cycle achieved in 2s and continuePilotRud. Surf271026Repeat cycle. Cycle achieved in 2s and continuePilotRud. Surf271023Repeat cycle. Cycle achieved in 2s and continuePilotRud. Surf271024Rud. Surf271026Rud. Surf271026Rud. Surf271027Rud. Surf271026Rud. Surf271023Rud. Surf271023Rud. Surf271024Rud. Surf271024Rud. Surf271026Rud. Surf271023Rud. Surf271027Rud. Surf271026Rud. Surf271023Rud. Surf271023Rud. Surf271024Rud. Surf271024Rud. Surf271024Rud. Surf271023Rud. Surf  | .,         |                                 |         |                  | 71024  |                         |                     |
| Push right pedal up to $15^{\circ}$ (2/3 of full travel) but don't reachL Ped. Force271001L Ped. Force271025stopRud. Surf271023Rud. Force271003Rud. Force271003Return to neutral. Cycle achieved in 2s and continuePilotRud. Force271003Rud. Force271003Return to neutral. Cycle achieved in 2s and continuePilotRud. Force271003Rud. Force271003Repeat cycle. Cycle achieved in 2s and continuePilotRud. Force271003Rud. Force271003Repeat cycle. Cycle achieved in 2s and continuePilotRud. Force271002Rud. Force271003Repeat cycle. Cycle achieved in 2s and continuePilotRud. Force271003Rud. Force271003Repeat cycle. Cycle achieved in 2s and continuePilotRud. Force271003Rud. Force271003Repeat cycle. Cycle achieved in 2s and continuePilotRud. Force271003Rud. Force271003Repeat cycle. Cycle achieved in 2sPilotRud. Force271003Rud. Force271003Repeat cycle. Cycle achieved in 2sPilotRud. Force271003Rud. Force271003Repeat cycle. Cycle achieved in 2sPilotRud. Force271003Rud. Force271003Rude ForcePilotRud. Force271003Rud. Force271003Rud. ForcePilotRud. Force271003Rud. Force271003Rud. ForcePilotRud. Force271003Rud. Force2  |            |                                 |         |                  | 21003  |                         |                     |
| Push right pedal up to 15° (2/3 of full travel) but don't reachPilotRud. Eurd. $271026$ mud.stopRud. Surf. $271024$ mud.mud.mud.Return to neutral. Cycle achieved in 2s and continuePilotRud. Force $271002$ mud.Return to neutral. Cycle achieved in 2s and continuePilotRud. Force $271002$ mud.Return to neutral. Cycle achieved in 2s and continuePilotRud. Surf. $271026$ mud.Reter to neutral. Cycle achieved in 2s and continuePilotRud. Surf. $271026$ mud.Repeat cycle. Cycle achieved in 2s and continuePilotRud. Surf. $271026$ mud.Repeat cycle. Cycle achieved in 2s and continuePilotRud. Surf. $271026$ mud.Repeat cycle. Cycle achieved in 2s and continuePilotRud. Surf. $271026$ mud.Repeat cycle. Cycle achieved in 2s and continuePilotRud. Surf. $271026$ mud.Repeat cycle. Cycle achieved in 2sPilotRud. Surf. $271026$ mud.Repeat cycle. Cycle achieved in 2sPilotRud. Surf. $271026$ mud.Repeat cycle. Cycle achieved in 2sPilotPilotPilotmud.PilotRepeat cycle. Cycle achieved in 2sPilotPilotPilotPilotPilotRud. Surf.PilotPilotPilotPilotPilotPilotRud. Surf.PilotPilotPilotPilotPilotPilotRud. Surf.PilotPilotP   |            |                                 |         |                  | 1001   |                         | Max 100 daN/225 lbs |
| stopRud. Surf $271024$ Rud. Surf $271024$ Return to neutral. Cycle achieved in 2s and continuePilotRud. Force $271002$ Rud. SurfReturn to neutral. Cycle achieved in 2s and continuePilotRud. Surf $271024$ Rud. SurfReteat cycle. Cycle achieved in 2s and continuePilotRud. Force $271002$ Rud. SurfReteat cycle. Cycle achieved in 2s and continuePilotRud. Force $271002$ Rud. SurfRepeat cycle. Cycle achieved in 2s and continuePilotRud. Ped. Force $271002$ Rud. SurfRepeat cycle. Cycle achieved in 2s and continueRud. Surf $271024$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2sRud. Surf $271024$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2sPilotRud. Surf $271024$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2sPilotRud. Surf $271024$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2sPilotRud. Surf $271024$ Rud. Surf $271024$ Repeat cycle. Cycle achieved in 2sPilotRud. Force $271024$ Rud. Force $271024$ Repeat cycle. Cycle achieved in 2sPilotRud. Force $271024$ Rud. Force $271024$ Repeat cycle. Cycle achieved in 2sPilotRud. Force $271024$ Rud. Force $271024$ Repeat cycle. Cycle achieved in 2sPilotPilotRud. Force $271024$ Rud. ForceRepeat cycle. Cycle achieved in 2sP   | O          | 1                               | Pilot   |                  | 21025  |                         |                     |
| Repeat cycle achieved in 2s and continue       Rud. Force       271003       Rud. Force       271025         Return to neutral. Cycle achieved in 2s and continue       Pilot       Rud. Force       271025       Rud. Force       271026         Return to neutral. Cycle achieved in 2s and continue       Pilot       Rud. Force       271021       Rud. Force       271003         Repeat cycle. Cycle achieved in 2s and continue       Pilot       Rud. Force       271001       Rud. Force       271002         Repeat cycle. Cycle achieved in 2s and continue       Pilot       Rud. Force       271003       Rud. Force       271003         Repeat cycle. Cycle achieved in 2s and continue       Pilot       Rud. Force       271003       Rud. Force       271003         Repeat cycle. Cycle achieved in 2s and continue       Pilot       Rud. Force       271003       Rud. Force       271003         Rud. Force       Z71003       Rud. Force       Z71003       Rud. Force       Z71003       Rud. Force       Z71003         Repeat cycle. Cycle achieved in 2s       Pilot       Rud. Force       Z71003       Rud. Force  |            |                                 |         |                  | 21024  |                         |                     |
| Return to neutral. Cycle achieved in 2s and continueR Ped. Force271025Return to neutral. Cycle achieved in 2s and continuePilotRud. Fed.271024Immediately with next pointRud. Force271003ImmediatelyRepeat cycle. Cycle achieved in 2s and continuePilotRud. Force271002Repeat cycle. Cycle achieved in 2s and continuePilotRud. Fed. Force271003Repeat cycle. Cycle achieved in 2s and continuePilotRud. Fed. Force271003Repeat cycle. Cycle achieved in 2s and continueRud. Force271003ImmediatelyRepeat cycle. Cycle achieved in 2sPilotRud. Force271003Repeat cycle. Cycle achieved in 2s<   |            |                                 |         |                  | 271003 |                         |                     |
| Return to neutral. Cycle achieved in 2s and continue       Pilot       Rud. Ped.         immediately with next point       Rud. Surf       Rud. Force         Rud. Force       Rud. Force       Rud. Force         Repeat cycle. Cycle achieved in 2s and continue       Pilot       Rud. Ped.         Rud. Surf       Rud. Surf       Rud. Force         Repeat cycle. Cycle achieved in 2s and continue       Pilot       Rud. Force         Rud. Force       Rud. Surf       Rud. Surf         Rud. Force       Rud. Surf       Rud. Force         Rud. Force       L Ped. Force       L Ped. Force         Rud. Surf       Rud. Surf       Rud. Surf         Rud. Surf       Rud. Surf       Rud. Surf         Rud. Surf       Rud. Surf       Rud. Surf         Rud. Force       L Ped. Force       L Ped. Force         Repeat cycle. Cycle achieved in 2s       Pilot       Rud. Force   |            |                                 |         |                  | 271002 |                         | Max 100 daN/225 lbs |
| immediately with next point       Rud. Surf         Rud. Force       L Ped. Force         Rud. Force       L Ped. Force         Repeat cycle. Cycle achieved in 2s and continue       Pilot       Rud. Ped.         Rud. Surf       Rud. Surf       Rud. Surf         Rud. Force       Rud. Surf       Rud. Surf         Rud. Surf       Rud. Surf       Rud. Force         Repeat cycle. Cycle achieved in 2s       Pilot       Rud. Force         Repeat cycle. Cycle achieved in 2s       Pilot       Rud. Force         Repeat cycle. Cycle achieved in 2s       Pilot       Rud. Force   |            |                                 | Pilot   |                  | 21025  |                         |                     |
| Rud. Force         LPed. Force         RPed. Force         RPed. Force         Rud. Force         Repeat cycle. Cycle achieved in 2s         Repeat cycle. Cycle achieved in 2s  |            | immediately with next point     |         |                  | 271024 |                         |                     |
| Repeat cycle       L Ped. Force         Repeat cycle       Rud. Ped. Force         Rud. Sand continue       Pilot       Rud. Ped.         Immediately with next point       Rud. Surf       Rud. Force         Rud. Force       Rud. Force       Rud. Force         Repeat cycle. Cycle achieved in 2s       Pilot       Rud. Force         Rud. Surf       Rud. Force       Rud. Force         Rud. Cycle       Rud. Surf       Pilot         Repeat cycle. Cycle achieved in 2s       Pilot       Pilot   |            |                                 |         | d)               | 271003 |                         |                     |
| Repeat cycle       Cycle achieved in 2s and continue       Pilot       Rud. Ped.         Rud. Surf       Rud. Surf       Rud. Force       Rud. Force         Rud. Force       Rud. Force       Rud. Force       Rud. Force         Repeat cycle. Cycle achieved in 2s       Pilot       Rud. Force         Rud. Force       Rud. Force       Rud. Force         Repeat cycle. Cycle achieved in 2s       Pilot       Interference   |            |                                 |         | e                | 271001 |                         |                     |
| Repeat cycle. Cycle achieved in 2s and continue       Pilot       Rud. Ped.         immediately with next point       Rud. Surf       Rud. Surf         Rud. Force       L Ped. Force       L Ped. Force         Repeat cycle. Cycle achieved in 2s       Pilot       Pilot   |            |                                 |         |                  | 271002 |                         |                     |
| Repeat cycle. Cycle achieved in 2s and continue       Pilot       Rud. Ped.         immediately with next point       Rud. Surf       Rud. Force         Rud. Force       Rud. Force       Rud. Force         Repeat cycle. Cycle achieved in 2s       Pilot       Ited. Force  |            |                                 |         |                  |        |                         |                     |
| immediately with next point     Rud. Surf       Rud. Force     L Ped. Force       Repeat cycle. Cycle achieved in 2s     Pilot  | ш          |                                 | Pilot   |                  | 271025 |                         |                     |
| Rud. Force       L Ped. Force       R Ped. Force       R Ped. Force   |            | immediately with next point     |         |                  | 271024 |                         |                     |
| L Ped. Force       R Ped. Force       R Ped. Force       Pliot  |            |                                 |         |                  | 271003 |                         |                     |
| R Ped. Force           Repeat cycle. Cycle achieved in 2s         Pilot   |            |                                 |         |                  | 271001 |                         |                     |
| Repeat cycle. Cycle achieved in 2s  |            |                                 |         |                  | 271002 |                         |                     |
| Repeat cycle. Cycle achieved in 2s  |            |                                 |         |                  |        |                         |                     |
|   | <u> </u> L |                                 | Pilot   |                  |        |                         |                     |
|   |            |                                 |         |                  | _      |                         |                     |

IV-2 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER YAW DAMPER INPUT WITHOUT ANY FORCE APPLIED ON PEDALS

| AL | ALL TRIMS = 0°  | YAW DAMPER = OFF  | AUT     | AUTO PILOT = OFF |          | SLATS/FLAPS = retracted | etracted     |
|----|---|---|---------|------------------|----------|-------------------------|--------------|
|    |   |   |         |                  |          |                         |              |
|    | AC  | ACTIONS   | ACTORS  | READ             |          | RESULTS                 | COMMENTS/GMT |
|    | IV-2-0 Vc = 0 kts Manual increase                         | ual increase  |         |                  |          |                         |              |
| ∢  | Set Vc = 0 kts  |   | LACOMBE | Vc               | 34120611 |                         | 254 IV20.001 |
|    |   |   |         | VSA              | 271040   |                         | 08:46:50     |
| m  | Set FAC/FCC configuration B                               | ñ   | BAUDET  |                  |          |                         | 08:48:00     |
| ပ  | Set Yaw Damper KIT ON                                     |   | BAUDET  |                  |          |                         |              |
|    | ł   | Set a left rudder deflection in the YDA servo-loop until rudder | BAUDET  | Fct gen          | 271045   |                         |              |
|    | stops at max deflection                                   |   |         | YD current       | 271046   |                         |              |
|    |   |   |         | Rud pos          | 271024   |                         |              |
|    |   |   |         |                  |          |                         |              |
| ш  | Set a right rudder deflection in the YDA servo-loop until | in the YDA servo-loop until                                     | BAUDET  | Fct gen          | 271045   |                         | 254 IV20.002 |
|    | rudder stops at max deflection                            | u   |         | YD current       | 271046   |                         | 08:50:00     |
|    |   |   | -       | Rud pos          | 271024   |                         | 08:51:00     |
|    |   |   |         |                  |          |                         |              |
|    |   |   |         |                  |          |                         |              |

IV-2 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER YAW DAMPER INPUT WITHOUT ANY FORCE APPLIED ON PEDALS

| AL | ALL TRIMS = 0°                    | YAW DAMPER = OFF  | AUT     | AUTO PILOT = OFF |          | SLATS/FLAPS = retracted | etracted     |
|----|-----------------------------------|---|---------|------------------|----------|-------------------------|--------------|
|    |                                   | ACTIONS   | ACTORS  | READ             | Q        | RESULTS                 | COMMENTS/GMT |
|    | IV-2-1 Vc = 0 kts ramp 15°/s      | mp 15°/s  |         |                  |          |                         |              |
| ∢  | Set Vc = 0 kts                    |   | LACOMBE | Vc               | 34120611 |                         | 254 IV21     |
|    |                                   |   |         | VSA              | 271040   |                         | 08:56:20     |
| ш  | Set FAC/FCC configuration B       | on B  | BAUDET  |                  |          |                         | 08:56:40     |
| ပ  |                                   | Set a 15°/s left rudder deflection in the YDA servo-loop until  | BAUDET  | Fct gen          | 271045   |                         |              |
|    | rudder stops at a 8.5° deflection | flection  |         | YD current       | 271046   |                         |              |
|    |                                   |   |         | Rud pos          | 271024   |                         |              |
|    |                                   |   |         |                  |          |                         |              |
|    | +                                 | Set a 15°/s right rudder deflection in the YDA servo-loop until | BAUDET  | Fct gen          | 271045   |                         |              |
|    | rudder stops at a 8.5° deflection | eflection   |         | YD current       | 271046   |                         |              |
|    |                                   |   |         | Rud pos          | 271024   |                         |              |
|    |                                   |   |         |                  |          |                         |              |
|    |                                   |   |         |                  |          |                         |              |

IV-2 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER YAW DAMPER INPUT WITHOUT ANY FORCE APPLIED ON PEDALS

|   | ALL TRIMS = 0°                       | YAW DAMPER = OFF  | AUT     | AUTO PILOT = OFF |          | SLATS/FLAPS = retracted | etracted     |
|---|--------------------------------------|---|---------|------------------|----------|-------------------------|--------------|
|   | A                                    | ACTIONS   | ACTORS  | READ             | D        | RESULTS                 | COMMENTS/GMT |
| 1 | IV-2-2 Vc = 0 kts ramp 39°/s         | p 39°/s   |         |                  |          |                         |              |
| A | Set Vc = 0 kts                       |   | LACOMBE | Vc               | 34120611 |                         | 254 IV22     |
|   |                                      |   |         | VSA              | 271040   |                         | 09:03:00     |
|   | Set FAC/FCC configuration B          | В   | BAUDET  |                  |          |                         | 09:03:15     |
|   | Set a 39°/s left rudder defled       | Set a 39°/s left rudder deflection in the YDA servo-loop until  | BAUDET  | Fct gen          | 271045   |                         |              |
|   | rudder stops at a 8.5° deflection    | ction   |         | YD current       | 271046   |                         |              |
|   |                                      |   |         | Rud pos          | 271024   |                         |              |
|   |                                      |   |         |                  |          |                         |              |
|   | Set a 39°/s <b>right</b> rudder defl | Set a 39°/s right rudder deflection in the YDA servo-loop until | BAUDET  | Fct gen          | 271045   |                         |              |
|   | rudder stops at a 8.5° deflection    | ction   |         | YD current       | 271046   |                         |              |
|   |                                      |   |         | Rud pos          | 271024   |                         |              |
|   |                                      |   |         |                  |          |                         |              |

IV-2 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER YAW DAMPER INPUT WITHOUT ANY FORCE APPLIED ON PEDALS

| AACTIONSACTORSACTORSREADRESULTSCOMMENTS/GIN-2-3-1 Vc = 0 kts ramp 60'sVc = 0 ktsEADEADEADEAUEAUCOMMENTS/GIASet Vc = 0 ktsComfiguration BLACOMBEVc 3412061109:09:2009:09:20BSet FAC/FCC configuration BBAUDETVc 3412061109:09:4009:09:40CSet a 60°/s left rudder deflection in the YDA servo-loop untilBAUDETFct gen 27104609:09:40DSet a 60°/s left rudder deflectionBAUDETFct gen 27104609:09:04DSet a 60°/s right rudder deflection in the YDA servo-loop untilBAUDETFct gen 27104609:09:40DSet a 60°/s right rudder deflection in the YDA servo-loop untilBAUDETYD current 27104609:09:40DSet a 60°/s right rudder deflection in the YDA servo-loop untilBAUDETFct gen 27102409:09:60DSet a 60°/s right rudder folcetionIn the YDA servo-loop untilBAUDETYD current 27104609:09:60DSet a 60°/s right rudder folcetionIn der stops at a 8.5° deflectionFct gen 27102409:09:6009:09:60DSet a 60°/s right rudder stops at a 8.5° deflectionMc pos 271026Mc pos09:09:6009:09:00DSet a 60°/s right rudder folcetionIn the YDA servo-loop untilBAUDETFct gen 271046Mc pos00Nudder stops at a 8.5° deflectionMc pos271026Mc pos000000Nudder stops at a 8.5° deflectionMc pos<   | AL | ALL TRIMS = 0° YAW                        | YAW DAMPER = OFF        | AUT     | AUTO PILOT = OFF |          | SLATS/FLAPS = retracted | etracted     |
|---|----|---|-------------------------|---------|------------------|----------|-------------------------|--------------|
| IV-2-3-1 Vc = 0 kts ramp 60°/sLACOMBEVc $34120611$ MSet Vc = 0 ktsLACOMBEVc $34120611$ MSet FAC/FC configuration BBAUDETPAUDETPAMSet a $60^{\circ}$ /s left rudder deflection in the YDA servo-loop untilBAUDETFct gen $271046$ MSet a $60^{\circ}$ /s left rudder deflectionBAUDETFct gen $271046$ MMSet a $60^{\circ}$ /s left rudder deflectionBAUDETFct gen $271046$ MMSet a $60^{\circ}$ /s right rudder deflectionBAUDETFct gen $271046$ MMSet a $60^{\circ}$ /s right rudder deflectionBAUDETFct gen $271046$ MMSet a $60^{\circ}$ /s right rudder deflectionBAUDETFct gen $271046$ MMSet a $60^{\circ}$ /s right rudder deflectionBAUDETFct gen $271046$ MMSet a $60^{\circ}$ /s right rudder deflectionBAUDETFct gen $271046$ MMSet a $60^{\circ}$ /s right rudder deflectionBAUDETFct gen $271046$ MMSet a $60^{\circ}$ /s right rudder deflectionBAUDETFct gen $271046$ MMMSet a $60^{\circ}$ /s right rudder deflectionBAUDETBAUDETMMMMMSet a $60^{\circ}$ /s right rudder deflectionBAUDETBAUDETMMMMMSet a $60^{\circ}$ /s right rudder deflectionBAUDETBAUDETMMMMMSet a $60^{\circ}$ /s right rudder deflection <th></th> <th>ACTIONS</th> <th></th> <th>ACTORS</th> <th>REA</th> <th>D</th> <th>RESULTS</th> <th>COMMENTS/GMT</th> |    | ACTIONS                                   |                         | ACTORS  | REA              | D        | RESULTS                 | COMMENTS/GMT |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $   |    | IV-2-3-1 Vc = 0 kts ramp 60°/s            |                         |         |                  |          |                         |              |
| Set FAC/FCC configuration BVSA271040Set a 60°/s left rudder deflection in the YDA servo-loop until<br>rudder stops at a 8.5° deflectionBAUDETEct gen271045Rud for stops at a 8.5° deflectionBAUDETFct gen271046PSet a 60°/s right rudder deflectionBAUDETFct gen271024PSet a 60°/s right rudder deflectionBAUDETFct gen271024PSet a 60°/s right rudder deflectionBAUDETFct gen271046Prudder stops at a 8.5° deflectionBAUDETFct gen271046Prudder stops at a 8.5° deflectionBAUDETFct gen271024Prudder stops at a 8.5° deflectionBAUDETFct gen271024Prudder stops at a 8.5° deflectionBAUDETFct gen271024PRud pos271024PPPPRud pos271024PP <td< td=""><td>⊲</td><td></td><td></td><td>LACOMBE</td><td>Vc</td><td>34120611</td><td></td><td>254 IV23.001</td></td<>   | ⊲  |   |                         | LACOMBE | Vc               | 34120611 |                         | 254 IV23.001 |
| Set FAC/FCC configuration B       BAUDET       A       A         Set a 60°/s left rudder deflection in the YDA servo-loop until       BAUDET       Fct gen       271045         rudder stops at a 8.5° deflection       BAUDET       Fct gen       271046       A         rudder stops at a 8.5° deflection       BAUDET       Fct gen       271046       A         rudder stops at a 8.5° deflection       In the YDA servo-loop until       BAUDET       Fct gen       271024         Set a 60°/s right rudder deflection in the YDA servo-loop until       BAUDET       Fct gen       271046       A         rudder stops at a 8.5° deflection       In the YDA servo-loop until       BAUDET       Fct gen       271046       A         rudder stops at a 8.5° deflection       Rud pos       271024       A       A       A  |    |   |                         |         | VSA              | 271040   |                         | 09:09:20     |
| Set a 60°/s left rudder deflection       the YDA servo-loop until       BAUDET       Fct gen         rudder stops at a 8.5° deflection       YD current       Rud pos         Set a 60°/s right rudder deflection       BAUDET       Fct gen         Set a 60°/s right rudder deflection       ND Servo-loop until       BAUDET         Fct gen       YD current         rudder stops at a 8.5° deflection       Rud pos         rudder stops at a 8.5° deflection       Rud pos  | ۱m | +   |                         | BAUDET  |                  |          |                         | 09:09:40     |
| rudder stops at a 8.5° deflection           YD current           Rud pos         Rud pos           Set a 60°/s right rudder deflection in the YDA servo-loop until         BAUDET         Fct gen           rudder stops at a 8.5° deflection         YD current         Rud pos  | ပ  | Set a 60°/s left rudder deflection in the | PDA servo-loop until    | BAUDET  | Fct gen          | 271045   |                         |              |
| Rud pos       Rud pos         Set a 60°/s right rudder deflection in the YDA servo-loop until       BAUDET       Fct gen         rudder stops at a 8.5° deflection       YD current       Rud pos   | ł  | rudder stops at a 8.5° deflection         | -                       |         | YD current       | 271046   |                         |              |
| Set a 60°/s <b>right</b> rudder deflection in the YDA servo-loop until BAUDET Fct gen<br>rudder stops at a 8.5° deflection<br>Rud pos   |    |   |                         |         | Rud pos          | 271024   |                         |              |
| Set a 60°/s right rudder deflection in the YDA servo-loop until BAUDET Ect gen<br>rudder stops at a 8.5° deflection Rud be a Rud pos  | 1  |   |                         |         |                  |          |                         |              |
| YD current<br>Rud pos   |    |   | ne YDA servo-loop until |         | Fct gen          | 271045   |                         |              |
| Rud pos   |    | rudder stops at a 8.5° deflection         |                         |         | YD current       | 271046   |                         |              |
|   |    |   |                         |         | Rud pos          | 271024   |                         |              |
|   |    |   |                         |         |                  |          |                         |              |

IV-2 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER YAW DAMPER INPUT WITHOUT ANY FORCE APPLIED ON PEDALS

Nota: Post test program NSTB request

| ACTIONS       IV-2-3-2 Vc = 0 kts step       A       Set Vc = 0 kts       B       Set FAC/FCC configuration B       C       Set a step left rudder deflection in the YDA servo-loop until |              | REA        |                    | RESULTS | COMMENTS/GMT<br>254 IV23.002<br>09:27:10 |
|---|--------------|------------|--------------------|---------|--|
|   |              |            |                    |         | 254 IV23.002<br>09:27:10                 |
|   |              |            | 34120611<br>271040 |         | 254 IV23.002                             |
|   |              |            | 34120611<br>271040 |         | 09:27:10                                 |
|   |              | VSA        | 271040             |         | 09:27:10                                 |
| *   |              |            |                    |         | 09:27:10                                 |
| *****   |              |            |                    |         |  |
| ruddar etone at a 8 6° daflaction   |              | Fct gen    | 271045             |         | 09:27:30                                 |
|   |              | YD current | 271046             |         |  |
|   |              | Rud pos    | 271024             |         |  |
|   |              |            | _                  |         |  |
| D Set a step right rudder deflection in the YDA servo-loop until  | until BAUDET | Fct gen    | 271045             |         |  |
| rudder stops at a 8.5° deflection   |              | YD current | 271046             |         |  |
|   |              | Rud pos    | 271024             |         |  |
|   |              |            |                    |         |  |

519.0440/02 Appendix 4 Page 18 IV-3 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER YAW DAMPER INPUT COMBINED WITH FORCE APPLIED ON PEDALS

| AL | ALL TRIMS = 0°   YA  | YAW DAMPER = OFF         | LUA     | AUTO PILOT = OFF    |          | SLATS/FLAPS = retracted | racted       |
|----|--|--------------------------|---------|---------------------|----------|-------------------------|--------------|
|    |  |                          |         |                     |          |                         |              |
|    | ACTIONS  |                          | ACTORS  | READ                | _        | RESULTS                 | COMMENTS/GMT |
|    | IV-3-1 Vc = 0 kts ramp 0.5°/s  |                          |         |                     |          |                         |              |
| ∢  | A Set Vc = 0 kts   |                          | LACOMBE | Vc                  | 34120611 |                         | 254 IV31     |
|    |  |                          |         | VSA                 | 271040   |                         |              |
| ш  | Set FAC/FCC configuration B  |                          | BAUDET  |                     |          |                         |              |
| ပ  | Set a 0.5°/s left rudder deflection in the YDA servo-loop until                                      | the YDA servo-loop until | BAUDET  | Fct gen             | 271045   |                         | 09:39:10     |
|    | rudder stops at max deflection.  |                          |         | YD current          | 271046   |                         | 09:39:40     |
|    | Continue with next step before rudder stop   | ore rudder stop          |         | Rud. Surf           | 271024   |                         |              |
|    | D During the rudder motion   |                          | Pilot   | Rud. Ped.           | 271025   |                         |              |
|    | Push left pedal $\rightarrow$ mech stop $\rightarrow$ neutral $\rightarrow$ right $\rightarrow$ mech | itral→ right→ mech       |         | Rud. Surf           | 271024   |                         |              |
|    | stop→neutral   |                          |         | Rud. Force          | 271003   |                         |              |
|    | Cycle performed in 3 s repeated 4 times  | times                    |         | R Ped. Force 271002 | 271002   |                         |              |
|    |  |                          |         |                     |          |                         |              |

519.0440/02 Appendix 4 Page 19 IV-3 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER YAW DAMPER INPUT COMBINED WITH FORCE APPLIED ON PEDALS

| AL | ALL TRIMS = 0°                      | YAW DAMPER = OFF  | AUT     | AUTO PILOT = OFF |          | SLATS/FLAPS = retracted | etracted            |
|----|-------------------------------------|---|---------|------------------|----------|-------------------------|---------------------|
| L  |                                     |   | 00000   |                  |          |                         |                     |
|    |                                     | ACTIONS   | ACTORS  | READ             | _        | HESULIS                 | COMMENTS/GMT        |
|    | IV-3-2 Vc = 240 kts ramp 39°/s      | kts ramp 39°/s  |         |                  |          |                         |                     |
| ∢  | Set Vc = 240 kts                    |   | LACOMBE | Vc               | 34120611 |                         | 254 IV32.001        |
|    |                                     |   |         | VSA              | 271040   |                         | 09:57:45 (Bad data) |
| ш  | Set FAC/FCC configuration B         | uration B   | BAUDET  | -                |          |                         | 09:58:30            |
| ပ  | ł                                   | Set a 39°/s left rudder deflection in the YDA servo-loop until  | BAUDET  | Fct gen          | 271045   |                         |                     |
|    | rudder reaches 4° left (approx 1 s) | ft (approx 1 s)   |         | YD current       | 271046   |                         | 254 IV32.002        |
|    |                                     |   |         | Rud. Surf        | 271024   |                         | 09:59:30            |
|    | Push left pedal → RTLU stop         | TLU stop  | Pilot   | Rud. Ped.        | 271025   |                         | 10:00:20            |
|    | -                                   | _   |         | Rud. Surf        | 271024   |                         | 11° left?           |
|    |                                     |   |         | Rud. Force       | 271003   |                         |                     |
|    |                                     |   |         | L Ped. Force     | 271001   |                         |                     |
| ш  |                                     | Increase left pedal force up to 50 daN= 112 lbs                 | Pilot   | L Ped. Force     | 271001   |                         | Max 50 daN= 112lbs  |
|    |                                     |   |         | Rud. Force       | 271003   |                         |                     |
| ш  | Set a 39°/s right rud               | Set a 39°/s right rudder deflection in the YDA servo-loop until | BAUDET  | Fct gen          | 271045   |                         |                     |
|    | YDA output reaches 4° rudder right  | 4° rudder right   |         | YD current       | 271046   |                         |                     |
|    |                                     |   |         | Rud. Surf        | 271024   |                         | 7° left?            |
|    |                                     |   |         | Rud. Force       | 271003   |                         |                     |
|    |                                     |   |         | Yaw position     | 271030   |                         |                     |
|    |                                     |   |         |                  |          |                         |                     |

519.0440/02 Appendix 4 Page 20 IV-3 MEASUREMENT OF CONTROL SYSTEM CHARACTERISTICS UNDER YAW DAMPER INPUT COMBINED WITH FORCE APPLIED ON PEDALS

| F  | ALL TRIMS = 0° YAW DAMPER = OFF                                 | LUA     | AUTO PILOT = OFF |          | SLATS/FLAPS = retracted | etracted            |
|----|---|---------|------------------|----------|-------------------------|---------------------|
|    | ACTIONS   | ACTORS  | READ             |          | RESULTS                 | COMMENTS/GMT        |
|    | IV-3-3 Vc = 240 kts ramp 39°/s                                  |         |                  |          |                         |                     |
| ∢  | Set Vc = 240 kts  | LACOMBE | Vc 3             | 34120611 |                         | 254 IV33.001        |
|    |   |         | VSA              | 271040   |                         | 10:03:00            |
| m  | Set FAC/FCC configuration B                                     | BAUDET  |                  |          |                         | 10:03:45            |
| ပ  | Set a 15°/s left rudder deflection in the YDA servo-loop until  | BAUDET  | Fct gen          | 271045   |                         | 254 IV33.002        |
|    | rudder reaches 4° left (approx 1 s)                             |         | YD current       | 271046   |                         | 10:07:30            |
|    |   |         | Rud. Surf        | 271024   |                         | 10:08:02            |
| ပ  | Push right pedal → RTLU stop                                    | Pilot   | Rud. Ped.        | 271025   |                         |                     |
|    |   |         | Rud. Surf        | 271024   |                         | 11° right?          |
|    |   |         | Rud. Force       | 271003   |                         |                     |
|    |   |         | R Ped. Force     | 271002   |                         |                     |
|    | Increase right pedal force up to 50 daN= 112 lbs                | Pilot   | R Ped. Force     | 271002   |                         | Max 50 daN= 112lbs  |
|    | -   |         | Rud. Force       | 271003   |                         |                     |
| ш  | Set a 39°/s right rudder deflection in the YDA servo-loop until | BAUDET  | Fct gen          | 271045   | -                       |                     |
|    | YDA output reaches 4° rudder right                              |         | YD current       | 271046   |                         |                     |
|    |   |         | Rud. Surf        | 271024   |                         | 11° right?          |
|    |   |         | Yaw position     | 271030   |                         |                     |
| ш. | Resist (Increase?)pedal motion force up to 100 daN= 225 lbs     | Pilot   | R Ped. Force     | 271002   |                         | Max 100 daN= 225lbs |
|    |   |         | Rud. Force       | 271003   |                         |                     |
| I  |   |         | Rud. Surf        | 271024   |                         |                     |
|    |   |         | Yaw position     | 271030   |                         |                     |
|    |   |         |                  |          |                         |                     |

## IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

| TRIMS = 0° | YAW DAMPER = ON | AUTO PILOT = OFF | SLATS/FLAPS = retracted |
|------------|-----------------|------------------|-------------------------|
|------------|-----------------|------------------|-------------------------|

| 2   | ACTIONS   | ACTORS  | READ                  | ۹D                  | RESULTS | COMMENTS/GMT |
|-----|---|---------|-----------------------|---------------------|---------|--------------|
|     | IV-4-1 Vc = 165 kts rate 10°/s                                |         |                       |                     |         |              |
| Set | A Set Vc = 165 kts  | LACOMBE | Vc                    | 34120611            |         | 254 IV41     |
|     |   |         | VSA                   | 271040              |         | 10:54:30     |
| Set | B Set FAC/FCC configuration A                                 | LACOMBE |                       |                     |         | 10:55:20     |
| Set | C Set a 10°/s yaw rate to the FAC until rudder max deflection | LACOMBE | YD current            | 271046              |         |              |
|     |   |         | Rud. Surf             | 271024              |         |              |
|     |   |         | Yaw cd                | 271029              |         |              |
|     |   |         | Yaw pos               | 271030              |         |              |
|     |   |         | Yaw rate input 22F330 | ut 22F330           |         |              |
|     |   |         | Yaw rate              | 22 <sup>E</sup> 330 |         |              |
|     |   |         |                       |                     |         |              |

IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

|      | ACTIONS   | ACTORS  | READ                         | RESULTS | COMMENTS/GMT |
|------|---|---------|------------------------------|---------|--------------|
| J    | IV-4-2 Vc = 200 kts rate 10°/s                                |         |                              |         |              |
| +    | A Set Vc = 200 kts  | LACOMBE | Vc 34120611                  |         | 254 IV42     |
|      |   |         | VSA 271040                   |         | 10:59:30     |
| m    | Set FAC/FCC configuration A                                   | LACOMBE |                              |         | 11:00:25     |
| ł    | S Set a 10°/s yaw rate to the FAC until rudder max deflection | LACOMBE | YD current 271046            |         |              |
|      |   |         | Rud. Surf 271024             |         |              |
|      |   |         |                              |         |              |
|      |   |         | Yaw pos 271030               |         |              |
|      |   |         | Yaw rate input 22F330        |         |              |
|      |   |         | Yaw rate 22 <sup>E</sup> 330 |         | -            |
| 1000 |   |         |                              |         |              |

IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

|         | ACTIONS   | ACTORS  | READ                  |                     | RESULTS | COMMENTS/GMT |
|---------|---|---------|-----------------------|---------------------|---------|--------------|
|         | IV-4-3 Vc = 240 kts rate 10°/s                              |         |                       |                     |         |              |
| A<br>A  | Set Vc = 240 kts  | LACOMBE |                       | 34120611            |         | 254 IV43     |
|         |   |         | VSA                   | 271040              |         | 11:03:00     |
| с,<br>Ш | Set FAC/FCC configuration A                                 | LACOMBE |                       |                     |         | 11:03:50     |
| 0)<br>0 | Set a 10°/s yaw rate to the FAC until rudder max deflection | LACOMBE | YD current            | 271046              |         |              |
|         |   |         | Rud. Surf             | 271024              |         |              |
|         |   |         |                       | 271029              |         |              |
|         |   |         | Yaw pos               | 271030              |         |              |
|         |   |         | Yaw rate input 22F330 | 22F330              |         |              |
|         |   |         | Yaw rate              | 22 <sup>E</sup> 330 |         |              |
|         |   |         |                       |                     |         |              |

IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

|          | ACTIONS   | ACTORS  | READ                         | RESULTS | COMMENTS/GMT |
|----------|---|---------|------------------------------|---------|--------------|
| ł        | IV-4-4 Vc = 260 kts rate 10°/s                                |         |                              |         |              |
| 1        | A Set Vc = 260 kts  | LACOMBE | Vc 34120611                  |         | 254 IV44     |
|          |   |         | VSA 271040                   |         | 11:05:40     |
| m        | Set FAC/FCC configuration A                                   | LACOMBE |                              |         | 11:06:23     |
| <b> </b> | C Set a 10°/s yaw rate to the FAC until rudder max deflection | LACOMBE | YD current 271046            |         |              |
|          |   |         | Rud. Surf 271024             |         |              |
|          |   |         | Yaw cd 271029                |         |              |
|          |   |         | Yaw pos 271030               |         |              |
|          |   |         | Yaw rate input 22F330        |         |              |
|          |   |         | Yaw rate 22 <sup>E</sup> 330 |         |              |
|          |   |         |                              |         |              |

IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

| IV-4-5         Vc = 1           A         Set Vc = 165 kts | IV-4-5 Vc = 165 kts rate 10°/s + ramp 0.1°/s/s                   |         |                       |                     |          |
|--|--|---------|-----------------------|---------------------|----------|
| Set $Vc = 16$  |  |         | -                     |                     |          |
|  | 5 kts  | LACOMBE | Vc 3412               | 34120611            | 254 IV45 |
|  |  |         | VSA 27                | 271040              | 11:08:30 |
| B Set FAC/FC   | Set FAC/FCC configuration A                                      | LACOMBE |                       |                     | 11:09:48 |
| Set a 10°/s  | C Set a 10°/s yaw rate with a slope of 0.1°/s/s to the FAC until | LACOMBE | YD current 27         | 271046              |          |
| rudder max deflection                                      | deflection   |         | Rud. Surf 27          | 271024              |          |
|  |  |         | Yaw cd 27             | 271029              |          |
|  |  |         | Yaw pos 27            | 271030              |          |
|  |  |         | Yaw rate input 22F330 | F330                |          |
|  |  |         | Yaw rate 22           | 22 <sup>E</sup> 330 |          |
|  |  |         |                       |                     |          |

IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

|   | ACTIONS  | ACTORS  | READ                         | RESULTS | COMMENTS/GMT        |
|---|--|---------|------------------------------|---------|---------------------|
| l | IV-4-6 Vc = 240 kts rate 10°/s + ramp 0.1°/s/s                   |         |                              |         |                     |
| ₹ | Set Vc = 240 kts   | LACOMBE | Vc 34120611                  |         | 254 IV46.001        |
|   |  |         | VSA 271040                   |         | 11:14:50 (Bad data) |
| m | Set FAC/FCC configuration A                                      | LACOMBE |                              |         | 11:15:13            |
| 5 | C Set a 10°/s yaw rate with a slope of 0.1°/s/s to the FAC until | LACOMBE | YD current 271046            |         |                     |
|   | rudder max deflection  |         | Rud. Surf 271024             |         | 254 IV46.002        |
|   |  |         | Yaw cd 271029                |         | 11:15:40            |
|   |  |         | Yaw pos 271030               |         | 11:16:55            |
|   |  |         | Yaw rate input 22F330        |         |                     |
|   |  |         | Yaw rate 22 <sup>E</sup> 330 |         |                     |
|   |  |         |                              |         |                     |

IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

| IV-4-7       Vc = 240 kts rate 10°/s + ramp 0.5°/s/s       LACOMBE       Vc         A       Set Vc = 240 kts       LACOMBE       Vc         B       Set FAC/FCC configuration A       LACOMBE       VSA         C       Set a 10°/s yaw rate with a pitch of 0.5°/s/s to the FAC until       BAUDET       YD curre         rudder max deflection       rudder max deflection       Yaw cd       Yaw cd | ACT        | ACTORS   | READ                  | D                   | RESULTS | COMMENTS/GMT |
|--|------------|----------|-----------------------|---------------------|---------|--------------|
| Set Vc = 240 kts<br>Set FAC/FCC configuration A<br>Set a 10°/s yaw rate with a pitch of 0.5°/s/s to the FAC until<br>rudder max deflection   | p 0.5°/s/s |          |                       |                     |         |              |
| Set FAC/FCC configuration A LACOMBE LACOMBE Set a 10°/s yaw rate with a pitch of 0.5°/s/s to the FAC until BAUDET rudder max deflection  | LACO       |          | Vc                    | 34120611            |         | 254 IV47.001 |
| Set FAC/FCC configuration A LACOMBE LACOMBE Set a 10°/s yaw rate with a pitch of 0.5°/s/s to the FAC until BAUDET rudder max deflection  |            | -        | VSA                   | 271040              |         | 11:19:10     |
| BAUDET   | LACO       | MBE      |                       |                     |         | 11:19:44     |
|  |            |          | YD current            | 271046              | -       |              |
| Yaw cd<br>Yaw pos<br>Yaw rate  |            | L        | Rud. Surf             | 271024              |         | 254 IV47.002 |
| Yaw pos  |            |          | Yaw cd                | 271029              |         | 11:55:10     |
| Yaw rate   |            | <u> </u> | Yaw pos               | 271030              |         | 11:56:00     |
|  |            | <u> </u> | Yaw rate input 22F330 | it 22F330           |         |              |
| 1 aw rate  |            | <u> </u> | Yaw rate              | 22 <sup>E</sup> 330 |         |              |
|  |            |          |                       |                     |         |              |

IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

| IV-4-8         Vc = 2           A         Set Vc = 240 kts |  | 212-24  | חראם                  |                     | HESULIS | COMMENIS/GMI |
|--|--|---------|-----------------------|---------------------|---------|--------------|
| Set Vc =   | IV-4-8 Vc = 240 kts rate 10°/s + ramp 1°/s/s                   |         |                       |                     |         |              |
|  | = 240 kts  | LACOMBE | Vc 32                 | 34120611            |         | 254 IV48     |
|  |  |         | VSA                   | 271040              |         | 12:01:45     |
| B Set FAC  | Set FAC/FCC configuration A                                    | LACOMBE |                       |                     |         | 12:02:30     |
| Set a 10   | C Set a 10°/s yaw rate with a pitch of 1°/s/s to the FAC until | LACOMBE | YD current            | 271046              |         |              |
| rudder r   | rudder max deflection  |         | Rud. Surf             | 271024              |         |              |
|  |  |         | Yaw cd                | 271029              |         |              |
|  |  |         | Yaw pos               | 271030              |         |              |
|  |  |         | Yaw rate input 22F330 | 22F330              |         |              |
|  |  |         | Yaw rate              | 22 <sup>E</sup> 330 |         |              |
|  |  |         |                       |                     |         |              |

## IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

|  | YAW DAMPER = ON | AUTO PILOT = OFF | SLATS/FLAPS = retracted |
|--|-----------------|------------------|-------------------------|
|--|-----------------|------------------|-------------------------|

|   | ACTIONS  | ACTORS  | READ                  | D                   | RESULTS | COMMENTS/GMT |
|---|--|---------|-----------------------|---------------------|---------|--------------|
|   | IV-4-9 Vc = 240 kts rate $10^{\circ}$ /s + sinusoid on 10s   |         |                       |                     |         |              |
| A | Set Vc = 240 kts   | LACOMBE | Vc                    | 34120611            |         | 254 IV49     |
|   |  |         | VSA                   | 271040              |         | 12:10:10     |
| В | Set FAC/FCC configuration A                                  | LACOMBE |                       |                     |         | 12:11:00     |
| U | Set a sinusoidal yaw rate from 0 to 10°/s on a 10s period to | LACOMBE | YD current            | 271046              |         |              |
|   | the FAC until rudder max deflection                          |         | Rud. Surf             | 271024              |         |              |
|   |  |         | Yaw cd                | 271029              |         |              |
|   |  |         | Yaw pos               | 271030              |         |              |
|   |  |         | Yaw rate input 22F330 | it 22F330           |         |              |
|   |  |         | Yaw rate              | 22 <sup>E</sup> 330 |         |              |
|   |  |         |                       |                     |         |              |

## IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

| ATS/FLAPS = retracted |  |
|-----------------------|--|
| AUTO PILOT = OFF      |  |
| YAW DAMPER = ON       |  |
| ALL TRIMS = 0°        |  |

|   | ACTIONS   | ACTORS  | READ                  | 10                  | RESULTS | COMMENTS/GMT |
|---|---|---------|-----------------------|---------------------|---------|--------------|
| A | IV-4-10 Vc = 240 kts rate 10°/s + sinusoid on 5s                  |         |                       |                     |         |              |
| 1 | A Set Vc = 240 kts  | LACOMBE | Vc                    | 34120611            |         | 254 IV410    |
|   |   |         | VSA                   | 271040              |         | 12:12:40     |
| 1 | B Set FAC/FCC configuration A                                     | LACOMBE |                       |                     |         | 12:13:13     |
| 1 | C Set a sinusoidal yaw rate from 0 to 10°/s on a 5s period to the | LACOMBE | YD current            | 271046              |         |              |
|   | FAC until rudder max deflection                                   |         | Rud. Surf             | 271024              |         |              |
|   |   |         | Yaw cd                | 271029              |         |              |
|   |   |         | Yaw pos               | 271030              |         |              |
|   |   |         | Yaw rate input 22F330 | ut 22F330           |         |              |
|   |   |         | Yaw rate              | 22 <sup>E</sup> 330 |         |              |
|   |   |         |                       |                     |         |              |

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IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

| Nu-4-11 Vc = 240 kts rate 10°/s + sinusoid on 3sLACOMBEVc34120611254 IV411.001ASet Vc = 240 kts $240 kts$ 271040Yaw Damper254 IV411.001BSet FAC/FC configuration ALACOMBEVSA271040Yaw Damper12:15:20CSet a sinusoidal yaw rate from 0 to 10°/s on a 3s period to theLACOMBEMc27102412:15:00FAC until rudder max deflectionLACOMBEYD current27102412:15:01254 IV411.002FAC until rudder max deflectionYD serrent271029271029254 IV411.002256 IV411.002Yaw posYaw pos271029Yaw Damper12:25:23 (.001 repeated)225:00225:00Yaw rateYaw rate22 <sup>7</sup> 330Yaw Damper12:25:23 (.001 repeated)225:00225:00Yaw rateYaw rate22 <sup>7</sup> 330Yaw Damper12:25:23 (.001 repeated)225:00Yaw rateYaw rate27 <sup>5</sup> 330Yaw Damper12:25:23 (.001 repeated)Yaw rateYaw rate27 <sup>5</sup> 330Yaw rateYaw rate  | L     | ACTIONS   | ACTORS  | READ         | ٨D                  | RESULTS            | COMMENTS/GMT             |
|--|-------|---|---------|--------------|---------------------|--------------------|--------------------------|
| Set Vc = 240 kts     LACOMBE     Vc     34120611     Paw Damper       VSA     271040     Yaw Damper       Set FAC/FC configuration A     LACOMBE     VSA     271040     Yaw Damper       Set FAC/FC configuration A     LACOMBE     VSA     271040     Yaw Damper       Set FAC/FC configuration A     LACOMBE     VC     271040     Vaw Damper       Set a sinusoidal yaw rate from 0 to 10°/s on a 3s period to the     LACOMBE     YD current     271026       FAC until rudder max deflection     Yaw od     271029     Yaw Damper       FAC until rudder max deflection     Yaw rate input     271030     Yaw Damper       Yaw rate input     27330     Yaw rate     Cycles   |       | IV-4-11 Vc = 240 kts rate 10°/s + sinusoid on 3s            |         |              |                     |                    |                          |
| Set FAC/FCC configuration A     LACOMBE     VSA     271040     Yaw Damper       Set FAC/FCC configuration A     LACOMBE     eycles       Set a sinusoidal yaw rate from 0 to 10°/s on a 3s period to the FAC until rudder max deflection     LACOMBE     Yaw cd     271024       FAC until rudder max deflection     Yaw cd     271029     Yaw Damper       FAC until rudder max deflection     Yaw cd     271029     Yaw Damper       FAC until rudder max deflection     Yaw cd     271030     Yaw Damper       Yaw rate     Yaw pos     271030     Yaw Damper       Yaw rate     Yaw rate input     227330     cycles   | ◄     | ļ   | LACOMBE | Vc           | 34120611            |                    | 254 IV411.001            |
| Set FAC/FCC configuration A<br>Set FAC/FCC configuration A<br>Set a sinusoidal yaw rate from 0 to 10°/s on a 3s period to the<br>FAC until rudder max deflection<br>FAC until rudder max deflection<br>Taw pos 271030<br>Yaw pos 271030<br>Yaw pos 271030<br>Yaw rate input 22F330<br>Yaw rate input 22F330<br>Yaw rate input 22F330<br>Yaw rate input 22F330<br>Yaw rate input 22F330   |       |   |         | VSA          | 271040              | Yaw Damper         | 12:15:20                 |
| Set FAC/FCC configuration A<br>Set FAC/FCC configuration A<br>Set a sinusoidal yaw rate from 0 to 10°/s on a 3s period to the<br>FAC until rudder max deflection<br>FAC until |       |   |         |              |                     | disengaged after 2 |                          |
| Set a sinusoidal yaw rate from 0 to 10°/s on a 3s period to the       LACOMBE       YD current       271046       Provided in the input       271029       Provided in the input       Provided in the input       271029       Provided interval       Provided interva       Provided interva  | m     |   | LACOMBE |              |                     | 2000               | 12:15:51                 |
| Rud. Surf     271024       Yaw cd     271029       Yaw bos     271030       Yaw Damper       Yaw rate input       Yaw rate input       Yaw rate       Yaw rate   | ပ     | Set a sinusoidal yaw rate from 0 to 10°/s on a 3s period to | ·····   | YD current   | 271046              |                    |                          |
| Yaw cd 271029<br>Yaw pos 271030<br>Yaw Damper<br>disengaged after 2<br>cycles<br>Yaw rate input 22F330<br>Yaw rate 22 <sup>E</sup> 330   |       | FAC until rudder max deflection                             |         | Rud. Surf    | 271024              |                    | 254 IV411.002            |
| Yaw pos 271030 Yaw Damper<br>disengaged after 2<br>cycles<br>Yaw rate input 22F330<br>Yaw rate 22 <sup>E</sup> 330   |       |   |         | Yaw cd       | 271029              |                    | 12:25:00                 |
| disengaged after 2<br>Yaw rate input 22F330<br>Yaw rate 22 <sup>E</sup> 330  |       |   |         | Yaw pos      | 271030              | Yaw Damper         | 12:25:23 (.001 repeated) |
| Yaw rate input 22F330<br>Yaw rate 22 <sup>E</sup> 330  |       |   |         |              |                     | disengaged after 2 |                          |
|  |       |   |         |              |                     | cycles             |                          |
| Yaw rate   |       |   |         | Yaw rate inp | ut 22F330           |                    |                          |
|  |       |   |         | Yaw rate     | 22 <sup>E</sup> 330 |                    |                          |
|  | 10000 |   |         |              |                     |                    |                          |

IV-4 MEASUREMENT OF FAC (Flight Augmentation Computer) CONTROL LAWS

| LACOMBE         Vc         34120611           LACOMBE         VSA         271040           VSA         271040         271046           LACOMBE         YD current         271024           Rud. Surf         271029         771029           Yaw cd         271029         771030           Yaw rate input         271030         78           Yaw rate         271030         78 |      | ACTIONS   | ACTORS  | READ          | ND                  | RESULTS | COMMENTS/GMT |
|---|------|---|---------|---------------|---------------------|---------|--------------|
|   |      | IV-4-12 Vc = 240 kts rate $10^{\circ}/s$ + sinusoid on 2s   |         |               |                     |         |              |
| Set FAC/FCC configuration AVSA $271040$ Set FAC/FCC configuration ALACOMBELACOMBESet a sinusoidal yaw rate from 0 to 10°/s on a 2s period to theLACOMBEFAC until rudder max deflectionYD current $271026$ Yaw cd $271029$ Yaw rate input $271030$ Yaw rate input $22F330$ Yaw rate input $22F330$   | 1 -  | Set Vc = 240 kts  | LACOMBE | Vc            | 34120611            |         | 254 IV412    |
| Set FAC/FCC configuration A     LACOMBE     A       Set a sinusoidal yaw rate from 0 to 10°/s on a 2s period to the FAC until rudder max deflection     LACOMBE     YD current     271046       FAC until rudder max deflection     Yaw cd     271029     Yaw cd     271030       Yaw rate input     271030     Yaw rate input     22F330   |      |   |         | VSA           | 271040              |         | 12:22:25     |
| Set a sinusoidal yaw rate from 0 to 10°/s on a 2s period to the LACOMBE FAC until rudder max deflection   | Ι.   |   | LACOMBE |               |                     |         | 12:22:52     |
|   | 1    | Set a sinusoidal yaw rate from 0 to 10°/s on a 2s period to |         | YD current    | 271046              |         |              |
|   |      | FAC until rudder max deflection                             |         | Rud. Surf     | 271024              |         |              |
|   |      |   |         | Yaw cd        | 271029              |         |              |
|   |      |   |         | Yaw pos       | 271030              |         |              |
| <u> </u>  |      |   |         | Yaw rate inpl | ut 22F330           |         |              |
|   |      |   |         | Yaw rate      | 22 <sup>E</sup> 330 |         |              |
|   | 1000 |   |         |               |                     |         |              |

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| ΡΓ       | ALL TRIMS = 0°                    | YAW DAMPER = OFF   | AUT     | AUTO PILOT = ON     |          | SLATS/FLAPS = retracted | tracted      |
|----------|-----------------------------------|--|---------|---------------------|----------|-------------------------|--------------|
|          |                                   |  |         |                     |          |                         |              |
|          |                                   | ACTIONS  | ACTORS  | READ                | 0        | RESULTS                 | COMMENTS/GMT |
|          | IV-5-0 Vc = 0 kts Manual increase | nual increase  |         |                     |          |                         |              |
| ◄        | Set Vc = 0 kts                    |  | LACOMBE | Vc                  | 34120611 |                         | 254 IV50.001 |
|          |                                   |  |         | VSA                 | 271040   |                         | 12:57:15     |
| <b>m</b> | Set FAC/FCC configuration D       | D  | LACOMBE |                     |          |                         | 12:58:00     |
| ပ        | Set AP ON and YD OFF              |  | Pilot   |                     |          |                         |              |
|          |                                   | Set a left rudder rate to the APYA up to rudder max deflection | BAUDET  | Fct gen             | 271045   |                         |              |
|          |                                   |  |         | APYA current 271047 | 271047   |                         |              |
|          |                                   |  |         | Rud. Surf           | 271024   |                         |              |
|          |                                   |  |         | APYA pos            | 271031   |                         |              |
|          |                                   |  |         |                     |          |                         |              |
| Ш        |                                   | Set a right rudder rate to the APYA up to rudder max           | BAUDET  | Fct gen             | 271045   |                         | 254 IV50.002 |
|          | deflection                        |  |         | APYA current 271047 | 271047   |                         | 13:00:25     |
|          |                                   |  |         | Rud. Surf           | 271024   |                         | 13:01:10     |
|          |                                   |  |         | APYA pos            | 271031   |                         |              |
|          |                                   |  |         |                     |          |                         |              |
|          |                                   |  |         |                     |          |                         |              |

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| = ON SLATS/FLAPS = retracted    | READ RESULTS COMMENTS/GMT |                              | 34120611 254 IV51      | 271040 13:11:00 | 13:11:45                          |                              | 271045   | APYA current 271047 | rf 271024 | bs 271031 | 271045  | APYA current 271047 | rf 271024 | os 271031 |  |
|---------------------------------|---------------------------|------------------------------|------------------------|-----------------|-----------------------------------|------------------------------|--|---------------------|-----------|-----------|---|---------------------|-----------|-----------|--|
| AUTO PILOT = ON                 | ACTORS                    |                              | _ACOMBE Vc             | VSA             | ACOMBE                            | t.                           | BAUDET Fct gen   | APYA c              | Rud. Surf | APYA pos  | <br>BAUDET   Fct gen  | APYA c              | Rud. Surf | APYA pos  |  |
| ALL TRIMS = 0° YAW DAMPER = OFF | ACTIONS                   | IV-5-1 Vc = 0 kts rate 15°/s | A Set Vc = 0 kts   LAC |                 | B Set FAC/FCC configuration D LAC | C Set AP ON and YD OFF Pilot | Set a 15°/s left rudder rate to the APYA for an 18° rudder max BAU | deflection          |           |           | E Set a 15°/s right rudder rate to the APYA for an 18° rudder BAU | max deflection      |           |           |  |

| F               | ALL TRIMS = 0°   | YAW DAMPER = OFF           | TUA                                     | AUTO PILOT = ON  |          | SLATS/FLAPS = retracted   | etracted     |
|-----------------|--|----------------------------|---|--|----------|---|--------------|
|                 |  |                            |   |  |          |   |              |
| 1               | ACTIONS  | ONS                        | ACTORS                                  | READ   |          | RESULTS   | COMMENTS/GMT |
|                 | IV-5-2 Vc = 0 kts rate 34 °/s                              | °/S                        |   |  |          |   |              |
| $\triangleleft$ | Set Vc = 0 kts   |                            | LACOMBE                                 | Vc<br>3  | 34120611 |   | 254 IV52     |
|                 |  |                            |   | VSA  | 271040   |   | 13:13:25     |
| <b>m</b>        | Set FAC/FCC configuration D                                |                            | LACOMBE                                 |  |          |   | 13:14:00     |
| ပ               | Set a 34°/s left rudder rate to the APYA for an 18° rudder |                            | max BAUDET                              | Fct gen  | 271045   |   |              |
|                 | deflection   |                            |   | APYA current 271047  | 271047   |   |              |
|                 |  |                            |   | Rud. Surf  | 271024   |   |              |
|                 |  |                            |   | APYA pos   | 271031   |   |              |
|                 |  |                            |   |  |          |   |              |
|                 | Set a 34°/s right rudder rate to the APYA for an 18° rudde | the APYA for an 18° rudder | BAUDET                                  | Fct gen  | 271045   |   |              |
|                 | max deflection   |                            |   | APYA current 271047  | 271047   |   |              |
|                 |  |                            |   | Rud. Surf  | 271024   |   |              |
|                 |  |                            |   | APYA pos   | 271031   |   |              |
|                 |  |                            |   |  |          |   |              |
|                 |  |                            | 2010-0010-0010-0010-0010-0010-0010-0010 | VANALASTIN A ANALASTININA (INTERNATIONAL AND A SUBJECT OF A ANALASTINI A SUBJECT OF A SUBJECT OF A ANALASTINI A SUBJECT OF A<br>ANALASTINI A SUBJECT OF A ANALASTINI A SUBJECT |          | A DATE OF A DESCRIPTION OF A DATE OF A DA |              |

|           | ALL TRIMS = 0° YAW DAMPER = OFF                             |                           | AUT     | AUTO PILOT = ON     |   | SLATS/FLAPS = retracted | tracted      |
|-----------|---|---------------------------|---------|---------------------|---|-------------------------|--------------|
|           |   |                           |         |                     |   |                         |              |
|           | ACTIONS   |                           | ACTORS  | READ                | 0   | RESULTS                 | COMMENTS/GMT |
|           | IV-5-3 Vc = 0 kts rate 60 °/s                               |                           |         |                     |   |                         |              |
|           | Set Vc = 0 kts  |                           | ACOMBE  | Vc                  | 34120611                                    |                         | 254 IV53     |
|           |   |                           |         | VSA                 | 271040                                      |                         | 13:17:15     |
|           | Set FAC/FCC configuration D                                 |                           | LACOMBE |                     |   |                         | 13:17:35     |
|           | Set a 60°/s left rudder rate to the APYA for an 18° rudder  | max                       | BAUDET  | Fct gen             | 271045                                      |                         |              |
|           | deflection  |                           |         | APYA current 271047 | 271047                                      |                         |              |
|           |   |                           |         | Rud. Surf           | 271024                                      |                         |              |
| _         |   |                           |         | APYA pos            | 271031                                      |                         |              |
| 1.11.1.21 |   |                           |         |                     |   |                         |              |
|           | Set a 60°/s right rudder rate to the APYA for an 18° rudder |                           | BAUDET  | Fct gen             | 271045                                      |                         |              |
|           | max deflection  |                           |         | APYA current 271047 | 271047                                      |                         |              |
|           |   |                           |         | Rud. Surf           | 271024                                      |                         |              |
|           |   |                           |         | APYA pos            | 271031                                      |                         |              |
|           |   |                           |         |                     |   |                         |              |
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