CHECK FLIGHT CERTIFICATE

CANADAIR CRJ-700 (CF34-8C1 engines) **(CL600-2C10 REGIONAL JET)**	**CFS 322 Issue 1**	Registration:

Date:	Crew:	Observer:

Performance	Climb #1	Climb #2	
Average Weight			
Average Altitude			ft
Average Temp.			°C
Speed			KIAS
Achieved Rate			fpm
Scheduled Rate			fpm
Margin			fpm
Permitted Margin	-80	-100	fpm

Airfield:

Start Weight Kg/Lbs*:

Takeoff cg:

Performance:

SATIS/UNSATIS/NOT APPLICABLE*

*(delete as applicable)**

Defects

No.	Defect	-/R/FT	Action?

(use a continuation sheet as necessary)

Conclusions/Comments

I CERTIFY that I have tested the above aircraft and have detailed the deficiencies and unsatisfactory features above. Those items annotated R or FT must be dealt with as shown in the notes on the reverse side.

Name:	Signed:	Date:	Licence No.:
For CAA Use only	Report Logged by:	Date:	Report No.:

NOTES

General
Only CAA personnel or pilots specifically briefed to carry out CAA Check Flights may conduct the test.
General notes on test conduct can be found in the CAA Check Flight Handbook.

Registration: If the aircraft is not on the UK register, add the manufacturers serial number and expected UK registration (if known).
Crew: Captain, co-pilot, Flight engineer (where applicable).
Airfield: Departure airfield.
Start Weight: Actual all up weight at first engine start. Also delete Kg or Lbs as appropriate.
Takeoff cg: Actual cg at lift-off, preferably as a % of the Mean Aerodynamic Chord.

Performance
A full description of climb analysis is given in the CAA Check Flight Handbook.
Climb#1/Climb#2: Enter in these columns data from the first and second climbs.
Average Weight: The aircraft all up weight at the midpoint of the measured climb.
Average Altitude: The altitude at which the line drawn to average the measured points passes through at the mid time.
Average Temp: The temperature at which the line drawn to average the measured points passes through at the mid time.
Speed: The target climb speed (Indicated Airspeed.)
Achieved Rate: The climb rate as given by the slope of the line drawn to average the measured altitude points in feet per minute.
Scheduled Rate: The expected gross rate of climb read from the appropriate graph in the Flight Manual with any adjustments for configuration differences. For large aircraft, the basic gross data are normally to be found in a separate supplement labelled 'Additional Flight Test Data'.
Margin: The difference between the Scheduled and Achieved rates of climb (negative if achieved is lower than scheduled).

Defects
Enter all defects from the flight. All defects must also be entered in the Technical Log. Procedural items entered in the Technical Log (such as re-stowing oxygen masks) need not be entered here. Items affecting flight safety which were known before the flight, whether or not they were deferred should be entered. In the latter case, the defect should be annotated accordingly after the details.
No.: The first column is to allow the items to be numbered.
Defect: Enter details of the defect.
-/R/FT: Classify each defect according to its impact on safety, regardless of whether it can be deferred according to the MEL. Any deferrals should be dealt with in the normal way in the Technical Log. Items requiring rectification (or deferral under the MEL) before further flight for hire or reward or before the issue of the CofA should be marked 'R'. Additionally, items that require re-checking in-flight following rectification (such as inadequate climb performance) should be marked 'FT'. Items requiring both should be marked 'R/FT'.
Action?: This column should be left blank unless further information is required from the engineers or the item is considered to be of sufficient import that CAA action is considered necessary, then the person/department/agency from whom further action is required should be noted in this column. Annotate accordingly if an MOR or similar report is to be raised.

Conclusions/Comments
Any conclusions, notes or comments useful for tracking defects may be entered.
Name: Only the pilot who carried out the test may sign this sheet.

CAA Check Flight Schedules

All CAA Check Flight Schedules (CFSs) are prepared based on a design standard which, before September 2003, was the UK Type Certificate. Following the creation of EASA there may be different design standards in service within the European Union (EU) - this may include modifications approved in any EU country.

It is the responsibility of the flight crew to ensure that the exercises and limitations in the CFS are correct for the aircraft under test.

The prime source of information will be the aircraft flight manual and in the event of conflict the flight manual should be taken as overriding.

CAA policy is that pilots who conduct airtests on the behalf of the Authority must be acceptable to the Authority, must have been briefed on techniques and safety considerations before carrying out the tests in these schedules and must have carried out an airtest within the last 4 years.

The CAA does not accept responsibility for the use of a CAA CFS on a Check flight not directly under their control.

CHECK FLIGHT SCHEDULE

CANADAIR CRJ-700 (CF34-8C1 engines) **CFS 322, issue 1**
(CL600-2C10 REGIONAL JET)

INTRODUCTION

This schedule is applicable to Canadair Regional Jet (CRJ 700) aircraft. It is based on the assumption that the everyday operation of the aircraft serves as a continuous check on the functioning of all normal services. On these test flights, however, the crew are expected generally to monitor the behaviour of all equipment and report any unserviceable items. In addition to completing all the required tests in this schedule any characteristics which are considered unsafe or undesirable must be recorded.

The minimum flight crew for this test flight shall be two pilots and one observer to record the results of the tests. Passengers may not be carried. Oxygen shall be available for all persons on board. The tests should, if possible, be carried out in the sequence as written; altitude conditions must be observed.

The data and procedures contained in this schedule is correct at the time of writing, but might not be in agreement with subsequent Flight Manual amendments. In cases of conflict the current Flight Manual is over-riding, and CAA should be informed.

The limitations and procedures in the supplementary data in the Flight Manual must be observed.

Passenger oxygen masks should be latched up to ensure that they do not deploy during testing.

Loading and calculation of weight

The aircraft is to be loaded with fuel to achieve a take-off weight as required with the cg within normal limits.

Zero Fuel Weight	
Total Fuel	

1. BEFORE TAKE-OFF

1.1 BEFORE ENGINE START

1.1.1 CONTROL DISCONNECTS

With the hydraulic pumps on, pull the pitch disconnect and rotate 90º. Move each control column in turn. Confirm that each column moves only the elevator on the same side but does not move the opposite column. Reconnect the control columns.	**SAT/UNSAT**

Pull the aileron disconnect and rotate 90º. After 20 seconds an amber **SPOILERONS ROLL** message and two amber **ROLL SEL** PBAs should be seen. Move each control wheel in turn. Confirm that each wheel moves the aileron on the same side and the opposite spoilers and does not move the opposite wheel.	**SAT/UNSAT**

Press in the pilot's ROLL SEL PBA. A green **PLT ROLL CMD** message and green **PLT ROLL** PBA should be seen. Amber SPOILERONS ROLL message and ROLL SEL PBAs should go out. L wheel should control L aileron and all spoiler panels, R wheel should only control the R aileron	**SAT/UNSAT**

Press out the pilot's ROLL SEL PBA. The green PILOT ROLL PBA and PLT ROLL CMD should go out and amber **SPOILERONS ROLL** message and **ROLL SEL** PBAs should appear after 20 seconds.	**SAT/UNSAT**

Press in the co-pilots ROLL SEL PBA. A green **CPLT ROLL CMD** message and green **CPLT ROLL** PBA should be seen. Amber SPOILERONS ROLL message and ROLL SEL PBAs should go out. L wheel should only control L aileron, R wheel should control the R aileron and all spoiler panels.	**SAT/UNSAT**

Press out the co-pilot's ROLL SEL PBA. The green CPLT ROLL PBA and PLT ROLL CMD should go out and amber **SPOILERONS ROLL** message and **ROLL SEL** PBAs should appear after 20 seconds.	**SAT/UNSAT**

Reconnect the aileron disconnect. Check that roll controls and surfaces return to normal and all messages clear.	**SAT/UNSAT**

1.1.2 DISPLAY REVERSION

Check the following for correct indications:

Selector **NORM** - all indicators should be normal	**SAT/UNSAT**
Selector **PFD** - MFD shows PFD format and PFD screen blanks	**SAT/UNSAT**
Selector **EICAS** - MFDs show EICAS status page, Step button on EICAS control panel works	**SAT/UNSAT**
Selector **NORM -** MFDs show previously selected page	**SAT/UNSAT**

1.1.3 **SOURCE SELECTOR PANEL** (after attitude displayed on PFD)

ATT/HDG - select 1 then 2 : 4xMAG1(2) & 2xATT1(2) amber messages should be seen	**SAT/UNSAT**
AIR DATA - select 1 then 2 : 2xADC1 (2) amber messages should be seen	**SAT/UNSAT**
EICAS - select ED1 the ED2 : ED1(2) shows PRI & all synoptic pages ; ED2(1) blanks - select Norm : ED1 shows Primary display ; ED2 shows Status display	**SAT/UNSAT**
DISP CONT-select 1 then 2 : 4xDCP1 (2) amber messages should be seen - onside DCP controls onside and cross-side displays (bearing pointers)	**SAT/UNSAT**
Return all selections to NORM. There should be no common source annunciations.	**SAT/UNSAT**

Set 4000 feet as a landing altitude.

1.2 **AFTER ENGINE START**

1.2.1 **TAKE-OFF CONFIGURATION WARNING**

With the stabiliser trim in the green band, spoilers in, flaps 8 or 20, park brake OFF, advance both throttles to about the climb detent and check that there is no warning with the "TO CONFIG OK" message displayed. **SAT/UNSAT**

Check that warnings correctly occur for:-

STABILISER TRIM - outside green band (both ends) but by less than 1 div. **SAT/UNSAT**

AILERON TRIM - outside green band, but by less than 1 div. **SAT/UNSAT**

RUDDER TRIM - outside green band, but by less than 1 div. **SAT/UNSAT**

FLAPS - UP and 1º **SAT/UNSAT**

FLAPS - 30º and 45º **SAT/UNSAT**

AUTOPILOT - on (needs 70% N1) **SAT/UNSAT**

PARK BRAKE - set **SAT/UNSAT**

FLIGHT SPOILERS - deploy to the first detent **SAT/UNSAT**

Return throttles to idle, trims and flaps to the required take-off settings and spoilers in.

2. **TAKE-OFF**

Carry out a normal take-off.

Record any unusual characteristics.

3. **ENGINE ACCELERATIONS (about 4000 feet)**

With the aircraft in level flight, at the trim speed in table 1, with flaps 45, gear down, accelerate each engine in turn from idle to the target N_1 figure.

ACU's on.

Record:

Zero fuel weight	Kg.
Fuel contents	Kg.
Aircraft weight	Kg.
Altitude	feet
SAT	°C
From table 1 determine trim speed knots	knots
Target N_1 from Table 1	%

Record:

ENGINE	LEFT	RIGHT	LIMITS
IDLE N_1	%	%	
ACCELERATION TIME	secs	secs	<8 secs

4. **PERFORMANCE CLIMB (start altitude 3000 to 8000 feet)**

Carry out an engine-idle take-off climb for 5 minutes on a constant heading clear of cloud and significant turbulence.

Configuration:

GEAR	UP	
FLAPS	20	
PRESSURISATION	FROM APU	
ANTI-ICE	OFF	
LEFT ENGINE	IDLE	
RIGHT ENGINE	APR THRUST – power lever in the detent (see table 2)	%N1
ALTIMETER	1013 SET	
APU	ON	

Record:

Zero fuel weight	kg
Fuel contents	kg
Start weight	kg
Climb speed (Table 2)	knots

TIME	ALTITUDE	IAS	SAT	TAT
0				
½				
1				
1½				
*2				
2½				
3				
3½				
4				
4½				
5				

*ENGINE READINGS	L	R
N_1 %		
ITT °C		
N_2 %		
FUEL FLOW KG/HR		
OIL TEMP °C		
OIL PRESS PSI		
FUEL TEMP °C		
VIBRATION		
TRIMS: STABILISER		
AIL	RUD	
TURBULENCE		

Zero fuel weight	kg
Fuel contents	kg
Finish weight	kg

5. **PERFORMANCE CLIMB (start altitude below 16000 feet)**

Carry out a single engine en-route climb for 5 minutes on a constant heading, clear of clouds and turbulence. Cool the right engine at idle for 5 minutes before shutting it down.

Configuration:

GEAR	UP	
SLATS and FLAPS	UP	
PRESSURISATION	AUTO (1 ACU in HIGH)	
ANTI-ICE	OFF	
RIGHT ENGINE	SHUT DOWN	
LEFT ENGINE	MAXIMUM CONTINUOUS THRUST (see table 3)	%N1
ALTIMETER	1013 SET	
APU	ON	

Record:

Zero fuel weight	kg
Fuel contents	kg
Start weight	kg
Climb speed (Table 3)	knots

TIME	ALTITUDE	IAS	SAT	TAT
0				
½				
1				
1½				
*2				
2½				
3				
3½				
4				
4½				
5				

*ENGINE READINGS	L	R
N_1 %		
ITT °C		
N_2 %		
FUEL FLOW KG/HR		
OIL TEMP °C		
OIL PRESS PSI		
FUEL TEMP °C		
VIBRATION		
TRIMS: STABILISER		
AIL	RUD	
TURBULENCE		

Zero fuel weight	kg
Fuel contents	kg
Finish weight	kg

6. **ENGINE RELIGHT**

At the end of the en-route climb, at the en-route climb speed, carry out a cross-bleed start.

Record:

ALTITUDE	FEET
IAS	KNOTS
WINDMILL N_2	%
TIME TO 20% N_2	SECS
TIME TO ITT RISE	SECS
MAX ITT	°C
TIME TO IDLE	SECS
IDLE N_2	%

Keep engine at idle for 5 minutes before applying power.
Shut down the APU.

7. FUEL MANUAL CROSSFLOW

Check the fuel manual crossflow for correct indications and operation as follows:

AUTO OVERRIDE	IN	MANUAL XFLOW (status)	
		AUTO OVERRIDE MANUAL PBA	**SAT/UNSAT**
L X FLOW	IN	L XFLOW ON (status) & PBA Left XFLOW SOV indicates OPEN	
		Left fuel quantity increases, Right fuel quantity decreases	**SAT/UNSAT**
L X FLOW	OUT	L XFLOW ON (status) & PBA both out	**SAT/UNSAT**
R X FLOW	IN	R XFLOW ON (status) & PBA Right XFLOW SOV indicates OPEN	
		Right fuel quantity increases, Left fuel quantity decreases	**SAT/UNSAT**
L XFLOW	IN	After a time delay L&R XFLOW FAIL (PBA) and XFLOW PUMP (amber) message seen	
L&R XFLOW	OUT	L&R XFLOW FAIL (PBA) and XFLOW PUMP (amber) messages disappear	
GRAVITY XFLOW	SELECT	Gravity Xflow OPEN PBA and green GRAVITY XFLOW message seen	
GRAVITY XFLOW	OFF	Gravity Xflow OPEN PBA and green GRAVITY XFLOW message disappear	
AUTO OVERRIDE	OUT	MANUAL XFLOW (status) & PBA out	
		Fuel system normal, fuel transfer from centre to main tanks	**SAT/UNSAT**

8. FUNCTIONING (17000 feet)

Select the MAN ALT to mid and the PRESS CONTROL to MAN. The white MAN in the PBA and CABIN PRESS MAN message should be seen with the cabin pressure readout on ED1. Select MAN ALT to UP.	**SAT/UNSAT**

Record:	ALTITUDE	LIMITS
Altitude when the CABIN ALT (amber) occurs		(8200-8800 feet)
Altitude when the CABIN PRESSURE (voice) occurs		(9700-10300 feet)
Altitude when the CABIN ALT (red) occurs		(9700-10300 feet)
Confirm crew oxygen masks and microphone operation	SAT/UNSAT	

Select MAN ALT to mid to stabilise the cabin altitude. Select EMER DEPRESS to ON. The amber EMER in the PBA and EMER DEPRESS message should be seen.	**SAT/UNSAT**

Cabin altitude increases - record mean altitude		(13500-15000 feet)
Record altitude when the PASS OXY ON (amber) occurs. The amber ON should be seen in the PBA. It may be necessary to turn the L&R packs off to achieve this.		(13500-14500 feet)

With both packs ON select EMER DEPRESS to OFF. Amber EMER DEPRESS message and PBA ON indication should disappear. Select MAN ALT to down and reduce the cabin to below 10,000 feet then select MAN ALT to mid.	**SAT/UNSAT**
Select PRESS CONTROL out. The white PRESS CONTROL MAN in the PBA, CABIN PRESS MAN message and cabin pressure readout on ED1should disappear.	**SAT/UNSAT**
Select the LDG ELEV to the destination altitude.	
Reset the PAX OXY PBA Cycle the PAX OXYGEN circuit breakers (2-P9 & 2-P10 – behind the co-pilot)	

9. CLIMB

Continue the climb to FL300

Check all controls for breakout loads, centering, backlash weight and response. **SAT/UNSAT**

Check all trimmers for friction backlash and response. **SAT/UNSAT**

Check each AFCS in turn, autopilot off, yaw damper disengaged. Excite Dutch roll, engage yaw damper. Repeat for other AFCS. **SAT/UNSAT**

10. FUNCTIONING **DO NOT EXCEED 8.8 PSI**

In level flight at FL300 with AUTO PRESS record aircraft altitude:		
and cabin altitude:		(4000-4600 feet)

Select PRESS CONTROL to MAN and check the white CABIN PRESS MAN message appears. Select MAN ALT to down with MAN RATE to MAX.

Record maximum differential achieved (this may produce a red DIFF PRESSURE message and CABIN PRESSURE aural).	PSI	(8.5 - 8.7 PSI)

Select PRESS CONTROL to AUTO

11. HIGH MACH RUN

When level at FL350 and 0.7 MACH apply a high power and accelerate to 0.88 Mach.

Record:	Mach meter reading at overspeed warning (greater than 0.85 Mach)	CAPTAIN
		CO-PILOT

Handling at 0.88 Mach is normal. **SAT/UNSAT**

No abnormal roll on selecting full spoiler. **SAT/UNSAT**

12. APU RELIGHT (FL 350)

At 270 knots, 35000 feet relight the APU with the APU GEN off.

Record:	Time to start light out	secs	
	Maximum EGT	°C	1038°C
	Maximum RPM	RPM	
	Time to ready light on	secs	

13. ENGINE RELIGHT (FL 200) BELOW FL210

At 290 knots above FL210, idle left engine for 5 minutes before shutting it down. When the ITT is below 90°C, and provided that N_2 is greater than 7.2%, carry out a windmill relight at FL210. It may be necessary to descend to achieve the minimum N_2 and speed may need to be increased to V_{MO}. Keep the engine at idle for 5 minutes before applying power.

Record:

ALTITUDE	FEET
IAS	KNOTS
WINDMILL N_2	%
TIME TO ITT RISE	SECS
TIME TO 20% N_2	SECS
MAX ITT	°C
TIME TO IDLE	SECS
IDLE N_2	%

Shut down the APU before test 14 (high IAS).

14. HIGH IAS (FL 200)

In the clean configuration accelerate to 345 knots.

Record: Airspeed at overspeed warning (not less than 335 knots)

CAPTAIN
CO-PILOT

15. STALLING (below FL 150)

Stalls should be carried with the autopilot disengaged, yaw damper on, from the trim speed given on pages 15,16 and 17 with idle power.

Record:

Zero fuel weight	
Fuel contents	
Aircraft weight	

Configuration		Trim	Stall warning		Stick push		
Gear	Flap	Knots	Target	Actual	Target	Actual	Behaviour
Up	Up						
							Sat/Unsat
Up	20º						
							Sat/Unsat
Down	45						
							Sat/Unsat
Comments							

Retract flaps and gear as required

16. FUNCTIONING (FL100)

At 165 knots.

Time for flap movement 0 to 45	secs	(28 seconds max)
Time for flap movement 45 to 0	secs	(28 seconds max)

Select flap 8

Time for gear down	secs	(14 seconds max)
Time for gear up	secs	(14 seconds max)

Retract flaps

At 190 knots with flaps 20º and gear up, ensure HYD 3A & 3B pumps are ON	
PULL the LANDING GEAR MAN RELEASE. Force should be less than 55lb and the red GEAR DISAGREE message should be seen. Landing gear should lock down with 3 green indications. The handle button should be up.	**SAT/UNSAT**
Select the normal gear lever DOWN. GEAR DISAGREE message should disappear.	**SAT/UNSAT**
STOW the LDG GEAR MAN RELEASE	
Retract the gear and flaps. Hydraulics as required.	**SAT/UNSAT**

17. LANDING

Carry out a normal landing **SAT/UNSAT**

18. SLAT/FLAP EMERGENCY SWITCH

Ensure that the flaps and slats are all up.
Deploy the EMER FLAP switch - slats should move to 25 and the flaps to 20 **SAT/UNSAT**
Green **FLAPS EMER** message should appear
Move the normal flap lever to the 20 detent
Move the EMER FLAP switch to NORMAL and retract the flaps **SAT/UNSAT**

19. AFTER ENGINE SHUT-DOWN

Before the flight test certificate is completed (next page) both climbs should be checked to ensure that the achieved rate-of-climb is within the allowable tolerance. Results worse than the allowable tolerance should be investigated before the flight test is signed off as being successfully completed. Record the results on the front sheet.

20. Deferred Defects

Record any existing deferred defects from the Tech. Log and their date of insertion.

Deferred defect	Date

Table 1 - Engine acceleration data - CF34-3C1

Target N1 for engine accelerations

OAT	Pressure altitude (feet x 1000)					
°C	0	2	4	6	8	10
-40	78.2	79.0	79.8	80.6	81.5	82.4
-35	79.0	79.8	80.6	81.4	82.3	83.2
-30	79.8	80.6	81.4	82.2	83.1	84.1
-25	80.6	81.4	82.2	83.0	83.9	84.9
-20	81.4	82.2	83.0	83.8	84.7	85.7
-15	82.1	83.0	83.8	84.6	85.5	86.4
-10	82.9	83.8	84.6	85.4	86.3	87.2
-5	83.7	84.5	85.3	862	87.1	88.0
0	84.4	85.3	86.1	86.9	87.8	88.8
5	85.1	86.0	86.8	87.7	88.6	89.5
10	85.9	86.8	87.6	88.4	89.3	90.3
15	86.6	87.5	88.3	89.2	89.9	89.8
20	87.3	88.2	89.1	89.4	89.3	89.2
25	88.0	88.9	88.9	88.7	88.6	88.5
30	88.8	88.5	88.2	88.0	87.8	87.7
35	87.6	875	87.3	87.1	87.0	86.8
40	86.3	86.3	86.2	86.2	86.1	-
45	84.9	84.9	85.0	85.2	-	-
50	83.4	83.4	83.7	-	-	-

Approach speed Flaps 45	
Weight	Vref
Kg	Knots
36000	148
35500	147
35000	145
34500	144
34000	143
33500	142
33000	141
32500	140
32000	139
31500	138
31000	137
30500	136
30000	135
29500	133
29000	132
28500	131
28000	130

Target N_1 is 1% below the scheduled value for go-around N_1 with anti-ice off & ACUs on.

Table 2 - Climb data - CF34-8C1 engines

	APR thrust setting - %N1					
	Zero engine bleed					
OAT	Altitude – thousand feet					
°C	**0**	**2**	**4**	**6**	**8**	**10**
-40	82.2	82.8	83.4	84.2	84.9	85.4
-35	83.1	83.7	84.3	85.0	85.8	86.3
-30	83.9	84.5	85.1	85.8	86.6	87.1
-25	84.7	85.3	85.9	86.7	87.4	87.9
-20	85.5	86.1	86.7	87.5	88.2	88.7
-15	86.3	86.9	87.5	88.3	89.0	89.5
-10	87.1	87.7	88.3	89.1	89.8	90.3
-5	87.9	88.5	89.1	89.8	90.6	91.1
0	88.7	89.3	89.9	90.6	91.4	91.9
5	89.4	90.1	90.7	91.4	92.2	92.7
10	90.2	90.8	91.4	92.2	92.9	93.4
15	90.9	91.6	92.2	92.9	93.5	93.6
20	91.7	92.3	92.9	93.2	93.2	93.1
25	92.4	93.1	92.9	92.7	92.7	92.6
30	93.2	92.8	92.4	92.2	92.1	92.0
35	92.3	92.2	91.8	91.5	91.4	91.4
40	91.2	91.2	91.0	90.8	90.8	-
45	89.9	89.8	90.1	90.1	-	-
50	88.4	88.4	89.1	-	-	-

V2 (knots IAS) ; Flap 20° ; ISA -20°C						
Wt	Pressure Altitude (thousand feet)					
Kg	0	2	4	6	8	10
26000	137	135	133	132	131	130
27000	136	134	133	131	130	129
28000	135	133	132	131	130	128
29000	134	133	131	130	129	128
30000	133	132	131	130	129	129
31000	133	132	132	132	131	131
32000	134	134	134	122	133	133
33000	136	136	135	125	135	135
34000	138	138	137	137	137	137

V2 (knots IAS) ; Flap 20° ; ISA						
Wt	Pressure Altitude (thousand feet)					
Kg	0	2	4	6	8	10
26000	136	134	133	132	130	129
27000	135	134	132	131	130	129
28000	134	133	131	130	129	128
29000	134	132	131	130	129	128
30000	133	132	130	130	129	129
31000	132	132	132	131	131	131
32000	134	134	133	133	133	133
33000	136	136	135	135	135	135
34000	138	137	137	137	137	137

V2 (knots IAS) ; Flap 20° ; ISA+20°C						
Wt	Pressure Altitude (thousand feet)					
Kg	0	2	4	6	8	10
26000	136	134	133	132	130	129
27000	135	134	132	131	130	129
28000	134	133	131	130	129	128
29000	134	132	131	130	129	128
30000	133	132	130	130	129	129
31000	132	132	132	131	131	131
32000	134	134	133	133	133	133
33000	136	136	135	135	135	135
34000	138	137	137	137	137	137

Table 3 – En-route climb data

Maximum continuous thrust setting - %N1
Anti-ice off ; ACU on

OAT	Pressure altitude (feet x 1000)					
°C	0	5	10	15	20	25
-60	-	-	-	-	85.2	86.7
-55	-	-	-	-	86.1	87.5
-50	-	-	-	85.0	87.0	88.4
-45	-	-	83.7	85.9	87.8	89.2
-40	80.4	82.5	84.6	86.8	88.7	90.1
-35	81.2	83.3	85.4	87.6	89.5	90.9
-30	82.0	84.2	86.3	88.4	90.3	91.8
-25	82.8	85.0	87.1	89.2	91.2	92.6
-20	83.6	85.8	87.9	90.1	92.0	92.3
-15	84.4	86.6	88.7	90.9	92.8	91.6
-10	85.2	87.4	89.5	91.7	92.2	91.0
-5	86.0	88.2	90.3	92.4	91.7	90.4

Weight	V_{FTO}
Kg	KIAS
33000	196
32500	195
32000	193
31500	192
31000	190
30500	189
30000	187
29500	185
29000	183
28500	182
28000	180
27500	179
27000	177
26500	176
26000	174

STALL SPEEDS – FLAPS UP / GEAR UP / CG AT 30% MAC - KIAS													
AIRCRAFT WEIGHT		Pressure altitude - feet											
		12000 feet			13000 feet			14000 feet			15000 feet		
Kg	Lb	Trim	Shaker	Pusher	Trim	Shaker	Pusher	Trim	Shaker	Pusher	Trim	Shaker	Pusher
20500	45195	151.1	121.3	111.2	151.1	121.3	111.3	151.1	121.4	111.3	151.2	121.4	111.3
21000	46297	152.9	122.8	112.6	152.9	122.8	112.6	153.0	122.9	112.6	153.0	122.9	112.7
21500	47399	154.7	124.3	113.9	154.8	124.3	114.0	154.8	124.3	114.0	154.8	124.4	114.0
22000	48502	156.5	125.7	115.3	156.6	125.8	115.3	156.6	125.8	115.3	156.6	125.8	115.4
22500	49604	158.3	127.2	116.6	158.3	127.2	116.6	158.4	127.2	116.7	158.4	127.3	116.7
23000	50706	160.1	128.6	117.9	160.1	128.6	117.9	160.1	128.7	118.0	160.2	128.7	118.0
23500	51809	161.8	130.0	119.2	161.8	130.0	119.2	161.9	130.1	119.3	161.9	130.1	119.3
24000	52911	163.5	131.4	120.5	163.6	131.4	120.5	163.6	131.5	120.5	163.7	131.5	120.6
24500	54013	165.2	132.8	121.7	165.3	132.8	121.8	165.3	132.9	121.8	165.4	132.9	121.8
25000	55116	166.9	134.1	123.0	166.9	134.2	123.0	167.0	134.2	123.1	167.0	134.3	123.1
25500	56218	168.6	135.5	124.2	168.6	135.5	124.3	168.7	135.6	124.3	168.7	135.6	124.3
26000	57320	170.2	136.8	125.5	170.3	136.9	125.5	170.3	136.9	125.5	170.4	137.0	125.6
26500	58422	171.9	138.2	126.7	171.9	138.2	126.7	172.0	138.3	126.7	172.0	138.3	126.8
27000	59525	173.5	139.5	127.9	173.5	139.5	127.9	173.6	139.6	128.0	173.6	139.6	128.0
27500	60627	175.1	140.8	129.1	175.1	140.8	129.1	175.2	140.9	129.2	175.3	140.9	129.2
28000	61729	176.7	142.1	130.3	176.7	142.1	130.3	176.8	142.2	130.3	176.9	142.2	130.4
28500	62832	178.2	143.4	131.4	178.3	143.4	131.5	178.4	143.5	131.5	178.4	143.5	131.6
29000	63934	179.7	144.6	132.6	179.8	144.7	132.6	179.9	144.7	132.7	179.9	144.8	132.7
29500	65036	181.2	145.9	133.7	181.3	145.9	133.8	181.4	146.0	133.8	181.4	146.2	133.9
30000	66139	182.7	147.1	134.9	182.8	147.2	134.9	182.8	147.2	135.0	182.9	147.7	135.0
30500	67241	184.2	148.4	136.0	184.2	148.4	136.1	184.3	148.6	136.1	184.4	149.1	136.2
31000	68343	185.6	149.6	137.1	185.7	149.7	137.2	185.8	150.0	137.2	185.8	150.6	137.3
31500	69446	187.1	150.8	138.3	187.1	150.9	138.3	187.2	151.4	138.4	187.3	152.0	138.4
32000	70587	188.5	152.0	139.4	188.6	152.3	139.4	188.6	152.8	139.4	188.7	153.4	139.5

Correct speeds by 0.5 knots per 4% MAC change in CG location - for CG forward of 30% MAC increase the target speed
-for CG aft of 30% MAC decrease the target speed

Tolerance +/- 3 knots for the shaker speeds ; +/- 2 knots for the clean pusher speeds

STALL SPEEDS – FLAPS 20 / GEAR UP / CG AT 30% MAC - KIAS													
AIRCRAFT WEIGHT		Pressure altitude - feet											
		12000 feet			13000 feet			14000 feet			15000 feet		
Kg	Lb	Trim	Shaker	Pusher	Trim	Shaker	Pusher	Trim	Shaker	Pusher	Trim	Shaker	Pusher
20500	45195	119.1	95.9	87.1	119.1	95.9	87.1	119.1	95.9	87.2	119.1	95.9	87.2
21000	46297	120.5	97.1	88.3	120.5	97.1	88.3	120.6	97.1	88.3	120.6	97.1	88.3
21500	47399	121.9	98.2	89.4	122.0	98.2	89.4	122.0	98.3	89.4	122.0	98.3	89.4
22000	48502	123.4	99.4	90.5	123.4	99.4	90.5	123.4	99.4	90.5	123.4	99.4	90.5
22500	49604	124.8	100.5	91.6	124.8	100.5	91.6	124.8	100.5	91.6	124.8	100.6	91.6
23000	50706	126.1	101.6	92.7	126.2	101.6	92.7	126.2	101.7	92.7	126.3	101.7	92.8
23500	51809	127.5	102.7	93.7	127.5	102.8	93.7	127.6	102.8	93.8	127.8	102.8	94.0
24000	52911	128.9	103.8	94.8	128.9	103.9	94.8	129.1	103.9	94.9	129.3	103.9	95.2
24500	54013	130.2	104.9	95.8	130.2	105.0	95.9	130.5	105.0	96.1	130.8	105.0	96.4
25000	55116	131.5	106.0	96.9	131.7	106.0	97.0	132.0	106.1	97.3	132.3	106.1	97.5
25500	56218	132.9	107.1	97.9	133.2	107.1	98.2	133.5	107.1	98.4	133.8	107.2	98.7
26000	57320	134.3	108.1	99.0	134.6	108.2	99.3	134.9	108.2	99.5	135.2	108.2	99.8
26500	58422	135.7	109.2	100.1	136.0	109.2	100.4	136.4	109.2	100.7	136.7	109.3	100.9
27000	59525	137.1	110.2	101.2	137.5	110.3	101.5	137.8	110.3	101.8	138.1	110.3	102.1
27500	60627	138.5	111.3	102.3	138.9	111.3	102.6	139.2	111.3	102.9	139.6	111.3	103.2
28000	61729	139.9	112.3	103.4	140.3	112.3	103.7	140.6	112.3	104.0	141.0	112.4	104.3
28500	62832	141.3	113.3	104.5	141.6	113.3	104.8	142.0	113.3	105.1	142.4	113.4	105.4
29000	63934	142.6	114.3	105.5	143.0	114.3	105.8	143.4	114.4	106.2	143.8	114.4	106.5
29500	65036	144.0	115.3	106.6	144.3	115.3	106.9	144.7	115.3	107.2	145.1	115.4	107.6
30000	66139	145.3	116.3	107.7	145.6	116.3	108.0	146.0	116.3	108.3	146.5	116.4	108.7
30500	67241	146.6	117.3	108.7	147.0	117.3	109.0	147.4	117.3	109.4	147.8	117.3	109.7
31000	68343	147.9	118.2	109.8	148.3	118.3	110.1	148.7	118.3	110.4	149.1	118.3	110.8
31500	69446	149.2	119.2	110.8	149.6	119.2	111.1	150.0	119.2	111.5	150.5	119.3	111.9
32000	70587	150.5	120.1	111.8	150.9	120.2	112.2	151.3	120.2	112.6	151.8	120.2	113.0

Correct speeds by 0.5 knots per 4% MAC change in CG location - for CG forward of 30% MAC increase the target speed
-for CG aft of 30% MAC decrease the target speed

Tolerance +/- 3 knots for the shaker speeds ; +2/-5 knots for the 20 flap pusher speeds

STALL SPEEDS – FLAPS 45 / GEAR DOWN / CG AT 30% MAC - KIAS													
AIRCRAFT WEIGHT		Pressure altitude - feet											
		12000 feet			13000 feet			14000 feet			15000 feet		
Kg	Lb	Trim	Shaker	Pusher	Trim	Shaker	Pusher	Trim	Shaker	Pusher	Trim	Shaker	Pusher
20500	45195	114.0	89.6	83.7	114.0	89.6	83.7	114.1	89.7	83.7	114.1	89.8	83.7
21000	46297	115.4	90.7	84.8	115.4	90.8	84.8	115.4	90.9	84.8	115.5	90.9	84.8
21500	47399	116.8	91.8	85.8	116.8	91.9	85.9	116.8	92.0	85.9	116.8	92.1	85.9
22000	48502	118.1	92.9	86.9	118.1	93.0	86.9	118.2	93.1	86.9	118.2	93.2	87.0
22500	49604	119.5	94.0	88.0	119.5	94.1	88.0	119.5	94.2	88.0	119.6	94.3	88.1
23000	50706	120.8	95.1	89.0	120.8	95.2	89.0	120.9	95.3	89.1	121.0	95.4	89.2
23500	51809	122.1	96.2	90.0	122.2	96.3	90.1	122.3	96.4	90.2	122.4	96.5	90.3
24000	52911	123.4	97.3	91.0	123.5	97.4	91.1	123.6	97.5	91.2	123.7	97.6	91.3
24500	54013	124.7	98.3	92.1	124.8	98.4	92.2	125.0	98.5	92.3	125.1	98.7	92.4
25000	55116	126.0	99.4	93.1	126.2	99.5	93.2	126.3	99.6	93.3	126.4	99.8	93.5
25500	56218	127.3	100.4	94.2	127.5	100.5	94.3	127.6	100.7	94.4	127.7	100.8	94.5
26000	57320	128.6	101.5	95.2	128.8	101.6	95.3	128.9	101.8	95.4	129.0	101.9	95.5
26500	58422	129.9	102.5	96.2	130.1	102.6	96.3	130.2	102.8	96.4	130.3	103.0	96.6
27000	59525	131.2	103.5	97.2	131.3	103.7	97.3	131.5	103.9	97.4	131.6	104.0	97.6
27500	60627	132.5	104.6	98.2	132.6	104.7	98.3	132.8	104.9	98.5	132.9	105.1	98.6
28000	61729	133.7	105.6	99.2	133.9	105.7	99.3	134.0	105.9	99.4	134.3	106.1	99.6
28500	62832	135.0	106.6	100.2	135.1	106.8	100.3	135.3	106.9	100.4	135.6	107.1	100.7
29000	63934	136.1	107.6	101.1	136.3	107.8	101.3	136.5	108.0	101.4	136.8	108.1	101.7
29500	65036	137.3	108.6	102.1	137.5	108.8	102.2	137.8	108.9	102.5	138.1	109.0	102.7
30000	66139	138.5	109.6	103.0	138.7	109.8	103.2	139.0	109.9	103.5	139.4	110.0	103.8
30500	67241	139.7	110.6	104.0	139.9	110.7	104.2	140.3	110.9	104.5	140.6	110.0	104.8
31000	68343	140.8	111.6	104.9	141.2	111.7	105.2	141.5	111.8	105.5	141.9	111.9	105.8
31500	69446	142.0	112.5	105.9	142.4	112.6	106.2	142.7	112.7	106.5	143.1	112.9	106.8
32000	70587	143.2	113.5	106.9	143.6	113.6	107.1	144.0	113.7	107.5	144.3	113.8	107.8

Correct speeds by 0.5 knots per 4% MAC change in CG location - for CG forward of 30% MAC increase the target speed
-for CG aft of 30% MAC decrease the target speed

Tolerance +/-3 knots for the shaker speeds ; +2/-5 knots for the flaps 45 pusher speeds