QCX
Avro
CF105
R-7-0400-44
Iss-3

FILE IN VAULT

C-105 MK 1 Report # 7-0400-44
J75 P3 Engines ISSUE 3

34

WEIGHT SUMMARY & C.G. POSITION

N.A.E. Mar. 1/57

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Report no.: QCX-AVRO-CF105-R-7-0400-44-ISS-3

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by (Name): Michel W. Drapeau

(Dept.): A/DND Coordinator, Access to Information

Date: Dec. 7, 1992

R. Auger
Signature

Classification cancelled / changed to: UNCLASSSIFIED

By authority of: DRDA 7/DARFT 5-8/DAS Eng 6-4-5

Date: 5 Nov 1992

Signature: B. Aubrey

Unit / Rank / Appointment: DSIS 3, Secretary CRAD HQ DRP

Date: March 1st 1957
Aircraft: C-105 MK 1 with J75 P3 Engines 1st A/C

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Report # 7-0400-44
Sheet # 1-1 Issue 3
Prepared By: K. Griffin
Checked By: E. Burnett

INTRODUCTION

The following is a Weight & C.G. Summary for the 1st C-105 MK 1 Aircraft with J75 P3 Engines, based on the latest weight estimates available on February 28th, 1957. All Weight & C.G. changes are relative to Issue 2 of February 1st, 1957.

NOTE: This summary does NOT apply for the 2nd and subsequent Mk 1 Aircraft See context below.

GENERAL

a) Pratt & Whitney J75 P3 Engines comprise the Power Plant for the 1st Aircraft. J75 P5 Engines, which are partially redesigned versions of the P3 Engines, are to be installed on the 2nd and subsequent MK 1 Aircraft. (J75 P3 Engines = 6,175 lb each; J75 P5 Engines = 5,950 lb each)

b) An Instrument Package carrying Flight Test instrumentation will be installed, this also varies between first and subsequent aircraft.

c) An interim Radio & Radar system is installed.

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1. STRUCTURE

	WEIGHT (lb)
a) Wing:	
I/Wing complete - miscellaneous production drawing changes, inclusion of actual weights of some machinings etc.	+ 13
Weight Change Increase Ref. 2-1	+ 13
b) Fin & Rudder:	
Fin - redesign elevator jack pick-up, some actual weights etc.	+ 4
Weight Change Increase Ref. 2-1	+ 4
c) Fuselage to Sta. 255"	
Radome - production drawing estimates of attachment ring etc.	- 4
Formers - miscellaneous production drawing changes	+ 3
Weight Change Decrease Ref. 2-2	- 1
d) Fuselage Sta. 255" - 485"	
Miscellaneous Items - all joint items at 255" & 485" now treated separately (see below)	- 13
Weight Change Decrease Ref. 2-2	- 13
e) Duct Bay Sta. 485"-591.65"	
Lower Panel - all joint items at 591.65" treated separately (see below)	- 12
Weight Change Decrease Ref. 2-2	- 12

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Date: March 1st, 1957
Aircraft: C-105 MK 1 with
J75 P3 Engines
1st A/C

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Checked By: E. Burnett

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1. STRUCTURE (Continued) — WEIGHT (lb)

f) Engine Bay Sta. 591.65"-742.5"

Longerons - joint straps called up on "Marry-up" drawings treated separately (see below) — - 11

Weight Change Decrease — - 11
Ref. 2-2

g) Rear Fuselage Sta. 742.5" Aft.

Fixed R.F. - production drawing estimates of entire structure — - 6

Weight Change Decrease — - 6
Ref. 2-3

h) Fuselage Joints

This is a new sub-section to include all items of "Marry-Up" of Fuselage components i.e. items not readily assigned to the above structural sub-divisions. Items of Fin and Wing "Marry-up" are already included in the structure weights of these groups.

Fuselage Marry-Up* - not previously considered as a separate group — + 52
(* Actual Weight change per A/C = 52-11-12-13 = + 16 lb/A/C see above Structural breakdown)

Weight Change Increase — + 52
Ref. 2-3

TOTAL STRUCTURE WEIGHT INCREASE — + 26

2. LANDING GEAR

No Weight Change.

N. B. A redesigned shortening mechanism is to be introduced on the Main U/C. Dowty estimate that this may save 50 lb in weight. However, it may not be available for the 1st A/C, although it is an interchangeable feature, and the heavier weight will currently be retained here.

3. POWER PLANT & SERVICES

Engine Controls - production drawing estimates — + 1
Fire Extinguishing System - production drawing estimates — - 5
Accessory Gear Boxes on Fuselage- Heat Exchangers called-up here (see also Equipment Group) — + 21
Some production drawing changes, some oil lines etc. previously omitted — + 22

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Continued.

Date: March 1st, 1957
Aircraft: C-105 MK 1 with
J75 P3 Engines
1st Aircraft

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3. POWER PLANT & SERVICES (Cont'd.)

		WEIGHT (lb)
Alternator Drives - Specification Weight decreased from 69 to 55 lb each, checked by actual weight at 55 lb.		- 14
Gear Boxes on Engine - Miscellaneous minor changes		+ 2
TOTAL POWER PLANT & SERVICES INCREASE		+ 27

Ref. 2-4

N.B. J75 P3 Engines on 1st A/C only, 2nd and subsequent A/C have J75 P5 Engines which are 225 lb/engine lighter than the P3 version.

4. FLYING CONTROLS GROUP

Mechanical Controls - redesign of rudder bearings and bellcranks		+ 6
F/C Hydraulics - Spec. Weights were recorded for all servos, now some actual weights obtainable		+ 20
Manufactured weights of pumps - allowance too low		+ 28
Filter element retainers now steel		+ 5
Actual weights of accumulators & compensators target weights were previously recorded		+ 23
Steel piping replacing Al., actual weights of end fittings and couplings etc. etc.		+ 27
TOTAL FLYING CONTROLS INCREASE		+ 109

Ref. 2-5

Pending Flight Test requirements a "Buzz Damping" system may be installed on the first aircraft. Provisions for this installation are already included in the Structure Group. The "Buzz Damper" system weights are not currently recorded but they incur a weight penalty of 134 lb if necessary.

5. EQUIPMENT GROUP

Oil & Hydraulic Fluid Cooling - heat exchangers now with Acc. Gear Boxes (see Engine Group)		- 22
Emergency Lowering Main & Nose Gear - this is to be installed on the 1st A/C only.		+ 13
Interim Radio & Radar - deletion of RΘ units and true air speed pressure ratio transducer and amplifier		- 58
Emergency Power Pack - initial allowance too high		- 3
Utility Hydraulics - re-issues of production drawings reduction in comp. target weight and fluid		- 10
Miscellaneous piping changes, actual Wts. etc.		0
Brake Parachute - production drawing estimates, socket now in struct.		- 7
Electrics - Addition of brake parachute solenoid valve		+ 1
TOTAL EQUIPMENT GROUP DECREASE		- 86

Ref. 2-5

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6. OPERATIONAL LOAD

	WEIGHT (lb.)
Engine Oil Trapped - More detailed estimate in piping etc.	+ 4
TOTAL OPERATIONAL LOAD INCREASE	+ 4

Ref. 2-6

SUMMARY

Weight Change - Aircraft Weight Empty

Structure	+ 26 lb.
Power Plant & Services	+ 27 lb.
Flying Controls	+ 109 lb.
Equipment	- 86 lb.
	+ 76 lb.

Weight Change - Operational Load Less Fuel

Trapped Oil	+ 4 lb.

Weight Change - Operational Weight Empty - (A/C less Fuel)

Issue 2	Issue 3	
45,112 lb.	45,192 lb.	= + 80 lb.

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1st A/C

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DETAILED WEIGHT CHANGES TO 7-0400-44 Issue 2

WEIGHT CHANGES

			WEIGHT (lb)
Wing:			
+	8.40	Ribs I/W - Actual Weight of Rib # 4 M/S to C/S forward section.	
-	1.46	Strut. Pick-Ups I/W - minor design changes and error in calcs. of engine mounting pick-ups.	
+	8.64	Structure for Main U/C - re-estimate of U/C pivot assys.	+ 2.90
		details of Rib # 24 allowance prev.	+ 5.74
		An actual weight was obtained of the Main U/C pick-up fittings - this was as estimated	-
			+ 8.64
+	3.84	Centre Line Joints - detailed estimate of hardware on the C/L joint Aux. Spar to Main Spar	
-	3.86	Wing to Fuselage Joint - production drawing estimates of seal from Sta. 359-485.	
+	6.04	F/Spar to M/Spar Strut. - production drawing estimates 2 pt. refuelling door	- 5.54
		Actual Weights of Fuselage Side Rib Aft.	+ 10.29
		Addition bracket transfer pump tank #4	+ 1.29
			+ 6.04
-	9.07	Main Spar to R/Spar Strut. - re-estimate of posts based on obtained actual weights	+ 4.02
		Error in previous estimate	- 13.09
			- 9.07
+	12.53		

I/Wing Skins - Actual weights have been checked and the estimates currently recorded tally with the actual weight at nominal thickness. However, some skins notably those machined at AVRO are considerably above nominal tolerances, excess weight being of the order of 6 lb/panel - Thus with a set of 12 similarly machined AVRO manufactured skins excess weight could be as much as 70 lb/A/C.

Fin & Rudder:			
+	4.33	Fin - redesign of jack pick-up	+ 1.46
		Actual weight of hinge brackets	+ 0.79
		Marry-up - re-estimated.	+ 2.08
			+ 4.33
+	4.33		

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DETAILED WEIGHT CHANGES TO 7-0400-44 Issue 2

WEIGHT CHANGES

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WEIGHT (lb)

Fuselage Fwd. Sta. 255"

- 3.85	Radome - Production drawing estimates of attach. ring, brushing etc.	
+ 2.51	Formers F.F. - Miscellaneous amendments to production drawings, equipment bracketry etc. added	
- 1.34		

Centre Fuselage Sta. 255" - 485"

- 12.50	Miscellaneous Items C.F. - the joints at 255" and 485" were included here - now see separate section on fuselage joints below.	
- 12.50		

Duct Bay Sta. 485"- 591.65"

- 12.33	Lower Panel D.B. - miscellaneous changes to brackets etc.	+ 1.52
	Joint to E.B. - now separate below	- 13.85
		- 12.33
- 12.33		

Engine Bay Sta. 591.65" - 742.5"

- 11.30	Longerons - Joint straps now included with D.B. to E.B. joint - see separate joint section below	
- 11.30		

Rear Fuselage Sta. 742.5" Aft.

+ 5.13	Formers Fixed R.F. - Production drawing estimates of Former Sta. 803 and addition of 'U' bolts for latches.	
- 15.99	Tunnel Fixed R.F. - redesign of straps and rails, fwd. seal now with engine tunnel, Fwd. end of tunnel skin Sta. 744.5" was assumed Sta. 742.5".	
+ 12.54	Fairing under Rudder - Production drawing estimates also parabrake socket added (see also equipment group) Upper I/B Longerons also included here.	
- 0.33	Skins Fixed R.F. - Production Drawing estimate	
- 1.06	Engine Access Doors - error in previous calculation of hinge weight .	

continued.

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DETAILED WEIGHT CHANGES TO 7-0400-44 Iss. 2

WEIGHT CHANGES

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Rear Fuselage Sta. 742.5" Aft. (Cont'd.)

			WEIGHT (lb.)
- 5.72	Longerons & Torque Box	- Upper I/B now with centre fairing	- 6.15
		Lower I/B & O/B doubler titanium was Al.	+ 3.83
		Upper O/B diaphs. with elevator fillet fairing	- 2.16
		Changes to centre beam	- 0.95
		Miscellaneous changes	- 0.29
			- 5.72
- 5.43			

Joint Fuselage

This is a new sub-section to include all items of Marry-up of Fuselage components i.e. items not readily assigned to the above structural sub-divisions. Items of Fin and of Wing Marry-up are already included within the structural weights of those groups. Previously the weight of these marry-up items was included with one or other of the mating components.

+ 8.14	Joint F.F. to C.F.	- new report - an allowance was previously in Miscellaneous Struct. C.F. (see Struct. Sta. 255"-485")
+ 5.00	Joint C.F. to D.B.	- new report - an allowance was previously in Miscellaneous Struct. C.F.
+ 9.52	Joint Air Intakes to F.F.	- was included with air intakes structure. This structure is currently being re-estimated and it is felt that joint allowances etc. were inadequate, hence this new report.
+ 25.08	Joint D.B. to E.B.	- new report, allowances were previously in Lower Panel D.B. and Longerons E.B. (see relevant sections)
+ 4.43	Joint R.F. to E.B.	- new report, was included in Rear Fuselage Weight.
+ 52.17		

Power Plant & Services

+ 1.46	Engine Controls	- detailed estimate to production drawings	
- 5.06	Fire Extinguishing System *	- first detailed estimate to production drawings.	
+ 43.08	Access Gear Boxes on Fuselage	- addition of heat exchangers called up here (see also equipment group)	+ 20.98
		Constant speed drive & gear box oil lines on Fuselage omitted.	+ 8.56
		Engine Oil Lines, not fixed on engine were erroreously omitted	+ 10.35
		Miscellaneous production drawing changes	+ 3.19
			+ 43.08

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continued.

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Aircraft: C-105 MK 1 with J75 P3 Engines 1st A/C

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DETAILED WEIGHT CHANGES TO 7-0400-44 Iss. 2

WEIGHT CHANGES			WEIGHT (lb)
Power Plant & Services (Cont'd.)			
- 124.00	Service Accessories	- Alternator Drives now called up with Gear Box installation on Engines	
+ 111.25	Gear Boxes on Engine	- Actual weights of starters	- 1.72
		Addition of Alternator Drives (see above) (Spec. Weight 55 lb was 62 lb)	+ 110.00
		Miscellaneous other changes	+ 2.97
			+ 111.25
+ 26.73			

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N.B. 1) J75 P3 Engines on 1st Aircraft only, 2nd and subsequent A/C have J75 P5 Engines which are 225 lb/engine lighter than the P3 version.

2)* Additional fire protection will be installed on the 1st A/C, the bottles being mounted within the instrument package. For details of weight involved see Equipment Group on Summary Sheets.

3) The fuel system will incorporate both proportioners and a selection system. The weight recorded is to existing production drawings.

Flying Controls Group

+ 5.62	Mechanical Flying Controls	- redesign of rudder bearings and and bellcranks.	
+ 68.44	F/Controls Hydraulics	- Actual weights of accumulators and conpensators - target weights were previously recorded.	+ 22.90
		Increase in servos (based on actual weights of elevator servos etc.)	+ 7.00
		Increase in weights of pumps, manufacturer's weight quotes, previously only allowances	+ 28.00
		Miscellaneous changes to piping etc.	+ 10.54
			+ 68.44
+ 16.87	F/C Hydraulics I/W	- Servos actual weights were Spec. weights	+ 4.00
		Piping Steel was Aluminum	+ 11.80
		Miscellaneous minor changes	+ 1.07
			+ 16.87
+ 9.07	F/C Hydraulics O/W	- Servos actual weights were Spec. weights	+ 4.00
		Filters - element retainer now Steel	+ 3.72
		piping etc. - some Steel was Al. but actual weights of end fittings etc. also incorporated.	+ 1.35
			+ 9.07

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DETAILED WEIGHT CHANGES TO 7-0400-44 Iss. 2

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WEIGHT CHANGES		WEIGHT (lb)
Flying Controls Group (Cont'd.)		
+ 8.84	Rudder Hydraulics - Servo weight increased from 4 lb to 9 lb.	+ 5.00
	Filter element retainer Steel	+ 1.09
	Steel piping replacing Al.	+ 1.57
	Miscellaneous changes valves etc.	+ 1.18
		+ 8.84
+ 108.84		
Equipment Group		
+ 2.05	Utility Hydraulic F.F. - Actual weights of swivels, addition of valves, piping changes etc.	
- 1.71	Utility Hydraulic C.F. - some piping changes, actual weights of pressure switches, couplings etc.	
+ 4.87	Utility Hydraulic D.B. - Addition of Emergency Power Pack (was included in Electrics see below)	+ 19.01
	Reduction in compensator target weight and fluid	- 10.03
	Changes to piping, coupling etc. etc.	- 4.11
		+ 4.87
- 0.88	Utility Hydraulic E.B. - General revisions to drawing re-issues.	
+ 4.80	Utility Hydraulic I/W - Redesign of swivel assys. addition of flow control valve and	+ 1.70
	restrictor	+ 1.80
	piping rerouted etc.	+ 1.30
		+ 4.80
+ 8.53	Emergency Lowering Main U/C - for 1st A/C only	
+ 4.38	Emergency Lowering Nose U/C - for 1st A/C only	
- 22.00	Electrics D.B. - delete emergency power pack, called up with hydraulics-see above	
- 22.00	Oil & Hydraulic Fluid Cooling - deleted, remaining heat exchangers now incorporated in Engines Group where they are called up with accessories Gear Box installation.	
+ 1.36	Electrics R.F. - new report - to include solenoid valve for brake parachute.	
- 7.31	Brake Parachute - production drawing estimates, socket (approx. 6 lb) now included with structure, see Rear Fuselage Group.	
- 57.75	Interim Radio & Radar - deletion of RO units and True Air speed pressure ratio transducer and amplifier.	
- 85.66		

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J75 P3 Engines
1st A/C

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DETAILED WEIGHT CHANGES TO 7-0400-44 Iss. 2

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WEIGHT CHANGES		WEIGHT (lb)
Operational Load		
+ 3.84	Engine Oil Trapped - more detailed estimate in piping etc.	
+ 3.84		
+ 79.88	TOTAL WEIGHT CHANGES	

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WEIGHT AND C.G. SUMMARY

DESCRIPTION	WEIGHT lb	H. ARM ins.	V. ARM ins.
STRUCTURE	18,479.86	563.77	137.62
Wing	10,024.94	643.63	142.11
Fin & Rudder	1,029.70	754.74	209.56
Fuselage Structure: Fwd. Sta. 255"	2,547.84	180.68	128.61
Sta. 255"-485"	1,652.18	379.44	130.02
Sta. 485"-591.65"	1,001.05	533.92	104.67
Sta. 591.65"-742.5"	1,402.24	660.72	107.45
Sta. 742.5 Aft.	769.74	800.41	129.11
Marry-Up	52.17	470.59	103.77
UNDERCARRIAGE - Retracted	2,612.33	488.81	134.66
Main Undercarriage	1,959.62	539.48	141.00
Main U/C Doors & Fairings	294.36	539.29	136.01
Nose Undercarriage	333.81	170.81	99.70
Nose U/C Door & Fairing	24.54	162.24	88.23
POWER PLANT & SERVICES	14,231.21	654.45	120.18
Engines & Accessories	12,557.91	664.92	119.80
Gear Box Installation on Fuselage	280.14	601.46	102.53
Gear Box & Starter on Engine	263.07	591.77	104.40
Engine Controls	32.43	375.76	118.62
Engine De-Icing	70.37	562.80	115.09
Fire Extinguishing System	70.46	702.44	134.83
Engine Mountings	199.32	635.71	128.02
Fuel System	757.51	543.10	135.69
FLYING CONTROLS GROUP	1,819.56	687.03	139.99
Mechanical Flying Controls	942.92	688.24	148.66
Hydraulic Flying Controls	876.64	685.72	130.67
EQUIPMENT FIXED & REMOVABLE	7,080.57	385.28	110.60
Instruments	46.07	163.68	138.70
Probe	23.00	9.74	108.00
Cockpit Pressure Sealing	5.00	186.00	130.00
Oxygen System	43.44	227.72	142.18
Air Conditioning System	738.02	336.49	134.76
Surface Finish	100.00	591.52	140.20
Hydraulics Main System	597.49	498.76	116.66
Cabin Insulation	11.91	179.24	130.00
Brake Parachute	62.38	769.41	143.24
Electrical System	1,098.71	418.26	112.88
Low Pressure Pneumatics	39.01	478.47	127.28
Intake De-icing Boots	51.84	197.02	118.00
Canopy Actuation	62.05	222.11	154.47
Cabin Consoles	17.45	174.76	124.34
Ejector Seats	186.00	201.10	136.25
Interim Radio & Radar	704.63	322.57	123.34
Instrument Pack Structure	670.61	385.90	94.71
Instrumentation - 1st A/C	2,447.00	389.50	95.00
Additional Fire Protection - 1st A/C	154.17	425.05	102.89
Emergency Landing Gear Lowering	12.91	458.83	128.60
Radome Anti-icing	8.88	51.49	125.00
AIRCRAFT WEIGHT EMPTY	44,223.53	565.02	127.60

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Date: March 1st, 1957
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WEIGHT AND C.G. SUMMARY

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DESCRIPTION		WEIGHT lb.	H. ARM ins.	V. ARM* ins.	C.G. Position % M.A.C.
USEFUL LOAD (Less Fuel)		968.02	354.76	132.64	
Crew		430.00	194.00	136.50	
Oil		134.23	608.92	115.68	
Alcohol - Radome de-icing		22.00	93.00	138.00	
Engine Fire Extinguishinge Fluid		25.00	730.00	129.00	
Residual Fuel		218.40	553.98	134.04	
Oxygen Charge		13.39	259.69	159.91	
Water for Air Conditioning		125.00	268.00	132.00	
Operational Weight Empty	U/C Up	45,191.55	560.52	127.71	34.39
	U/C Down		562.69	124.13	34.99
Maximum Internal Fuel (2,544 gals. @ 7.8 lb/gal.)		19,843.00	538.88	144.32	
A.U.W. Max. Internal Fuel	U/C Up	65,034.55	553.92	132.78	32.57
	U/C Down		555.42	130.29	32.98

* A/C datum is considered to be 120" above an arbitrary ground line.

Above figures are for the Aircraft in the unballasted condition.

If the most aft point on the C.G. Envelope is to be ballasted to 31% M.A.C. Then the 1,382 lb of ballast at Sta. 89.16, as currently provided for on Former 68.5 and the Shear Panel, is necessary, plus a further 140 lb. on the Shear Panel (i.e. Total of 1,522 lb.).

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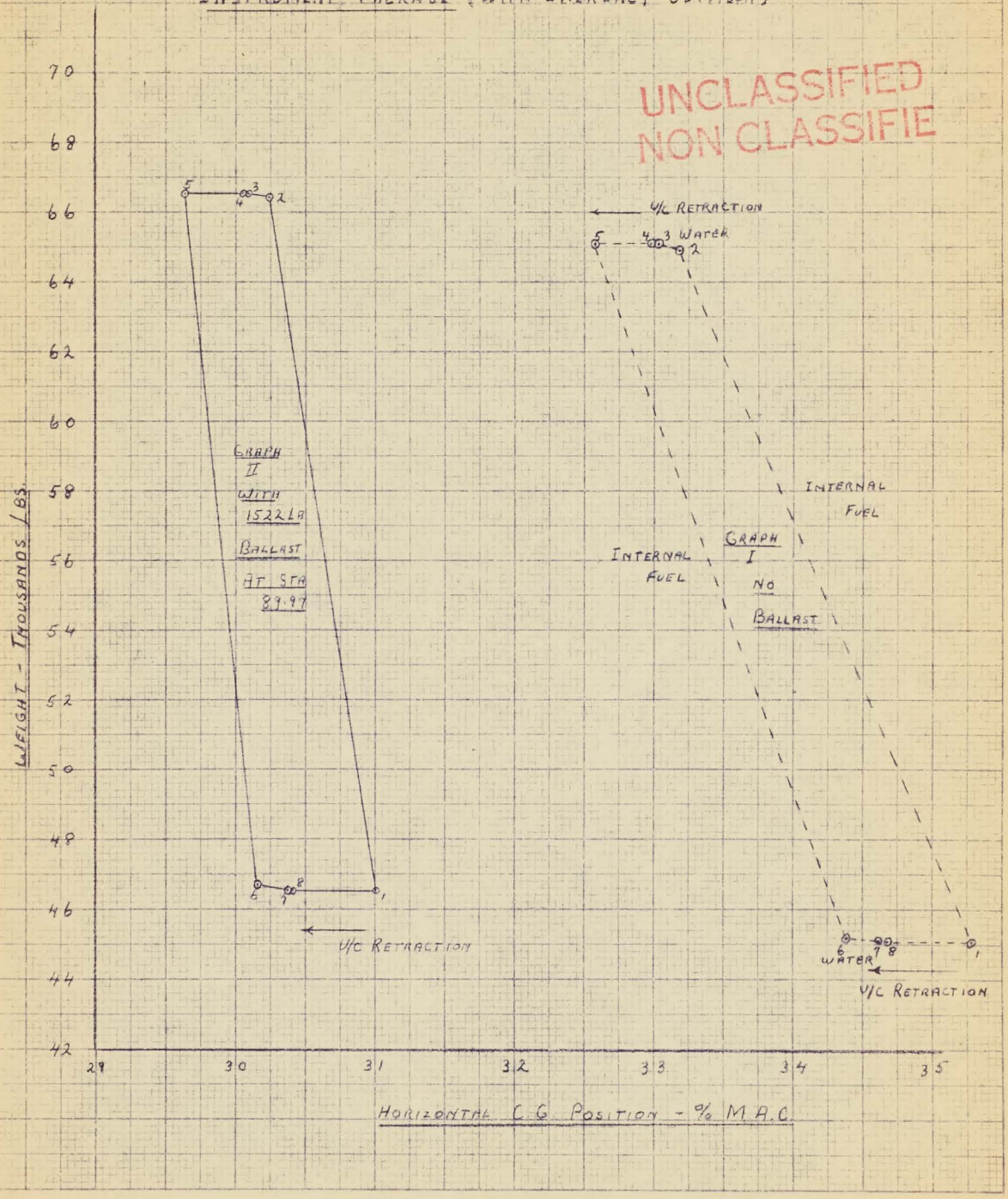
REPORT NO. 7-8400-44-3
BY: J. McCurrie
DATE MAR. 1/57

HORIZONTAL C.G. ENVELOPE
C105 MK1 1ST A/C FLIGHT CONDITIONS
WITH J75 P3 ENGINES (2ND + SUBSEQUENT A/C HAVE J75 P5 ENGINES)
INTERIM RADIO + RADAR
FUEL SYSTEM PROPORTIONERS
INSTRUMENT PACKAGE (WITH EMERGENCY JETTISON)



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AVRO AIRCRAFT LTD.
MALTON, ONT.

PROJECT C-105 MK 1

WEIGHT AND C. OF G BY FUNCTIONAL G COMPONEN

	DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H.
	TOTAL WING GROUP	1000000			
	OUTER WING	1010000			
14	OUTER WING SKINS	1010001	64	9288970	
14	POSTS AND INTERCOSTALS	1010002	64	249373	
14	OUTER WING SPAR	1010003	64	4029370	
14	OUTER WING RIBS	1010004	64	1345669	
14	AILERON CONTROL BOX	1010006	64	3859477	
3	RIB 12	1010007	64	746664	
14	O W AILERON JACK FITTING	1010009	64	104672	
14	AILERON JOINTS AND FAIRING	1010010		329378	
75	BUZZ DAMP STRUC PROV O W	1010011	64	87075	
				200400	
	AILERON	1020000			
17	AILERON STRUCTURE	1020001	74	3486679	
75	BUZZ DAMP STRUC PROV AIL	1020002	74	63073	
				35496	
20	ELEVATOR	1030000	82	4490075	
20	ELEVATOR MARRY UP	1030000		159773	
75	BUZZ DAMP STRUC PROV ELEV	1030001	82	74074	
				47237	
	INNER WING	1040000			
	MAIN U C STRUCTURE	1040001	62	3382357	
12	FRONT SPAR I W	1040002	62	1098548	
12	MAIN SPAR I W	1040003	62	1545656	
12	FWD CENTRE SPAR I W	1040004	62	541059	
12	AFT CENTRE SPAR I W	1040005	62	36375	
12	REAR SPAR I W	1040006	62	804870	
	I W STRUCTURE F S TO M S	1040007	62	10418549	
	I W STRUCTURE M S TO R S	1040008	62	1497960	
12	STRUCTURE AFT OF REAR SPAR	1040009	62	3198471	
12	ELEVATORCONTROLBOX I W	1040010	62	4271772	
16	TRANSP JOINT MARRY UP	1040011		706563	
	CENTRE LINE JOINTS	1040012	62	6374666	
12	INNER WING SKINS	1040013	62	21798062	
	STRUT PICK UP FITTINGS I W	1040014	62	542256	
	RIBS 1 TO 9 INNER WING	1040016	62	5259661	
12	DORSAL FAIRINGS	1040017	62	576458	
12	RIB 10	1040018	62	1104463	
	FUSELAGE HINGE JOINT I W	1040019	62	1381262	
16	TRANSP JOINT	1040020	62	1310063	
	FUSELAGE HINGE JOINT	1040021		374052	

EIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

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	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
	1000000						
	1010000						
	1010001	64	92889	70647	13598	65623292	12631046
LS	1010002	64	24937	32381	3419	1825823	334536
	1010003	64	40293	70073	13636	28234514	5494353
	1010004	64	13456	69506	13650	9352727	1836744
	1010006	64	38594	77411	13540	29876001	5225628
	1010007	64	7466	64930	13783	4847674	1029039
TING	1010009	64	1046	72791	13670	761394	142988
AIRING	1010010		3293	78726	13224	2592447	435466
O W	1010011	64	87	07570	0 13810	658590	120147
			200400			143772462	27249947
	1020000						
	1020001	74	34866	79213	13556	27618405	4726435
AIL	1020002	74	63	07313	9 1381	460776	8700
			35496			28079181	4735135
	1030000	82	44900	75523	14260	33909827	6402740
	1030000		15977	38101	4260	1178746	227732
ELEV	1030001	82	74	07445	0 14200	550930	105080
			47237			35639503	6735552
	1040000						
	1040001	62	33823	57782	13984	19543606	4729808
	1040002	62	10985	48356	14267	5311907	1567230
	1040003	62	15456	56570	14280	8743459	2207117
	1040004	62	5410	59950	14403	3243295	779202
	1040005	62	36	37654	78 14329	2381435	521146
	1040006	62	80	48704	07 14451	5666355	1163016
M S	1040007	62	104185	49856	14395	51942474	14997431
R S	1040008	62	14979	60964	14572	9131798	2182740
R SPAR	1040009	62	31984	71884	15020	22991379	4803997
W	1040010	62	42717	72500	14327	30969825	6120065
P	1040011		7065	36211	3876	4494824	980339
	1040012	62	63746	61161	5006	42146305	9565725
	1040013	62	217980	62503	14461	136244039	31522088
GS I W	1040014	62	5422	56793	14330	3079316	776973
NG	1040016	62	52596	61202	14521	32189804	7637465
	1040017	62	5764	58240	15971	3356954	920568
	1040018	62	11044	63683	13835	7033151	1527937
I W	1040019	62	13812	62104	13790	8577804	1904675
	1040020	62	131 00	63071	13710	8262301	1796010
	1040021		374	05279	6 14309	1974570	535157

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WEIGHT AND C. OF G BY FUNCTIONAL COMPONE

PROJECT C-105 MK 1

	DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H
	TOTAL FUSELAGE GROUP	3000000			
	FUSELAGE BASIC STRUCTURE	3010000			
	RADOME	3010001	51	17728	
3	RADAR NOSE ACCESS DOORS	3010002	51	8002	
3	RADAR NOSE STRUCTURE	3010003	51	12225	
3	SKIN F F	3010004	52	109491	
4	SKIN C F	3010005	54	210483	
5	SKIN D B	3010006	56	58805	
5	SKIN E B	3010007	58	174066	
	FORMERS F F	3010011	52	100931	
4	FORMERS C F	3010012	54	277863	
5	FORMER D B	3010013	56	74575	
5	LIGHT FORMERS E B	3010014	58	134356	
5	HEAVY FORMERS E B	3010015	58	211596	
3	LOWER LONGERONS F F	3010016	52	67911	
5	LONGITUDINAL MEMBERS E B	3010017	58	11047	
	LONGERON E B	3010018	58	69056	
5	TOP LONGERONS E B	3010019	58	6386	
3	LOWER SHEAR PANEL F F	3010020	52	29582	
5	TOP WING LONGERONS D B	3010021	56	6875	
3	LONGERONS C F	3010022	52	532	
3	LONGERONS C F	3010023	54	138134	
5	LONGERONS D B	3010025	56	105695	
4	ELECTRONICS BAY STRUCTURE	3010026	54	35702	
5	LONGITUDINAL BEAMS D B	3010027	56	63425	
4	RADAR ACCESS DOOR C F	3010028	54	21082	
5	MAIN FRAME AT STN 538 77	3010029	56	59665	
5	DIVE BRAKE ACCOM STRUCTURE	3010030	56	36345	
3	COCKPIT DECKING	3010031	52	179821	
4	DUCT C F	3010032	54	332863	
5	DUCT D B	3010033	56	315045	
3	CANOPY ARCH F F	3010034	52	64852	
3	CANOPY ARCH C F	3010035	52	19702	
5	ACCESS PANEL STIFFNERS	3010036	56	38655	
3	NOSE U C SUPPORT STRUCTURE	3010037	52	28682	
3	CREW BULKHEADS	3010038	52	121242	
4	EQUIPMENT BAY STRUCTURE	3010039	54	61502	
3	WINDSCREEN	3010041	52	127541	
5	SERV ACCESS DOORS AND PNLS	3010042	58	64546	
5	TORSION BOX E B	3010043	58	57666	
4	DORSAL FAIRING AIR OUTLET	3010044	54	20612	
5	INTERMEDIATE FORMERS E B	3010045	58	52246	
5	ENGINE ACCESS DOORS E B	3010046	58	145796	
4	SEALING MISSILE BAY	3010047	54	6973	
	MISCELLANEOUS ITEMS C F	3010048	54	3033	
4	FLOOR C F	3010049	54	131893	
3	BULKHEAD AT STN 120	3010050	52	28681	
3	BULKHEAD AT STA 255	3010051	52	104182	
4	BULKHEAD AT STA 485	3010052	54	111294	
5	ENG TUNNEL E B	3010054	58	461286	

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	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
K	301000554		20359	39339	14536	8009027	2959384
	301000562		57	43176	40	11575	1013065	664752
7 36	301000598		5	09713	50	11435	363172	58204
	301000615		50	97413	52	14205	2107711	724029
TOR	301000625		19	65334	41	16400	657116	322260
ARCH	301000635		20	74257	02	15350	533059	318359
	301000645		26	57301	86	10436	802042	277285
	301000655		82	84772	80	9910	6401875	820944
	301000665		97	89771	50	13100	7552214	1282359
F	301000675		51	22771	60	13790	3952135	706324
R F	301000685		26	06781	30	15380	2036068	400803
	301000695		92	90779	20	13630	7238768	1266227
D R F	301000705		27	99771	70	12570	2159988	351834
F	301000715		277	45821	54	12868	22793627	3570227
V R F	301000725		113	39835	73	13578	9476342	1539609
E B	301000735		9	17664	19	10272	609062	94194
D B	301000755		2	13524	02	13330	111616	28393
B	301000765		76	06545	65	9005	4150214	684920
	301000775		50	54554	57	8790	2802797	444247
	301000 78		8	14255	00	12000	207570	97680
F F	301000 79		9	52220	00	12000	209440	114240
	301000 80		5	00485	00	9800	242500	49000
	301000 81		25	08584	78	9150	1466628	229482
50	301000 82		4	43742	50	11500	328928	50945
			620495			290371300	74454132
	302000072		11328	50799	9082	5754511	1028809
			11328			5754511	1028809
	3030000						
	303010055		73192	21034	12000	15395205	8783040
			73192			15395205	8783040
PIES	3040000						
	304010053		23725	17543	15906	4162077	3773699
			23725			4162077	3773699
	304020053		13782	23258	16214	3205418	2234613
			13782			3205418	2234613

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SHEET 4-8

REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
508000154		12114	40225	14187	4872857	1718613
508000256		14210	53710	10984	7632191	1560826
508000358		4638	65604	12071	3042714	559853
508000462		44187	57024	14443	25197195	6381928
508000 5		602	5704	9592	395538	57744
		75751			41140495	10278964

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IGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

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SHEET 4-11

	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
	7080000						
	708000152		455	169	13 12869	76954	58554
	708000559		5659	8209	4 14437	4645699	816990
	708000662		124	6202	2 14500	76907	17980
			6238			4799560	893524
	7090000						
						UNCLASSIFIED	
						NON CLASSIFIE	
	7091400						
	709140151		129	9285	12000	11978	15480
	709140252		2966	1997	7 11200	592518	332192
	709140354		1304	4187	8 11000	546089	143440
	709140455		1274	2198	4 12000	280076	152880
	709140556		6515	5337	5 9200	3477381	599380
	709140658		64	5950	0 9200	38080	5888
	709140983		352	7975	4 30000	280734	105600
	709140862		8909	5411	11 13900	4820749	1238351
C	709141091		330	1860	0 9800	61380	32340
	7091411		2002	5858	3 10000	1172832	200200
	7091412		13746	3347	3 11234	4601199	1544226
			37591			15883016	4369977
	709150052		1524	8154	64 11095	2357951	1691766
			15248			2357951	1691766
	709160054		7359	4549	1 10717	3347683	788664
			7359			3347683	788664
	709170058		670	6794	4 11597	455225	77700
	7091701		11632	5620	7 11472	6537998	1334423
			12302			6993223	1412123
	709180083		83	8955	0 28840	74327	23937
			83			74327	23937
	709190062		2336	6205	3 14500	1449558	338720
	7091901		112	6294	6 13561	70500	15188
	709190292		74	5160	0 13700	38184	10138
			2522			1558242	364046
	709200055		5090	2205	9 13832	1122803	704049
			5090			1122803	704049
	709210056		26989	5185	5 10253	13995146	2767182
			26989			13995146	2767182