

QC
Avro
C
204
184
184

QCX
Avro
CF105
R-7-0400-44
Iss-16

FILE IN VAULT

UNCLASSIFIED / NON-CLASSIFIED
WEIGHT / NON-CLASSIFIED
SECRET
A/C 21201
Report 7-0400-44
Issue 16
WEIGHT / NON-CLASSIFIED
A.J. Crust
April 1/58



National Research Council
Canada

C.I.S.T.I.

Aeronautical and

Mechanical

Engineering Library

Conseil national de recherches
Canada

I.C.I.S.T.

Bibliothèque

d'aéronautique

et de génie mécanique

TO
A

DATE

JAN. 09 1993

Report no.: QCX - AVRO - CF105- R-7-0400-44-Iss-16

has been ☐ downgraded to : _____

☒ de-classified

by (Name): Michel W. Drapeau

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

Date: Dec. 7, 1992

R. Auger
Signature

~~SECRET~~ UNCLASSIFIED

AVRO AIRCRAFT LIMITED
INTER-DEPARTMENTAL MEMORANDUM

Ref: 7717/11/J
Date: 1 April, 1958
To: See Distribution
From: E.F. Burnett
Subject: ARROW 1 A/C 25201 WEIGHT & C.G. SUMMARY - Report #7-0400-44 Issue 16

Attached is a copy of Weight and C.G. Summary, Report #7-0400-44 Issue 16, dated April 1, 1958, for your retention.

This report, based on A/C 25201, will be superseded on May 1, 1958 by Report #7-0400-64 Issue 1, which is based on A/C 25202 and 25203.

All future Weight & Balance reporting on A/C 25201 will be done on "Weight Statement for Flight Test", forms and will be issued to those concerned.

Classification cancelled / changed to: UNCLASSIFIED

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

E.F. Burnett
E.F. Burnett

EFB/ag

Messrs:	J.C. Floyd	F. Brame	D. Inglis
	R.N. Lindley	W. Czerwinski	D. Moore
	R. Marshall	J. Lucas	R. Cairns
	C.V. Lindow	S. Kwiatkowski	G. Eves
	J.W. Ames	A. Cornish	
	B.C. Alford	J. Hodge	
	D. Wade	C. Marshall	
	D.N. Scard	J. Zurakowski	
	J.P. Booth	A. Crust (6) for RCAF	



54280

UNCLASSIFIED / NON CLASSIFIÉ

SECRET
UNCLASSIFIED / NON CLASSIFIÉ

Aircraft: ARROW 1
Date: 1 April, 1958

Report #7-0400-44
Issue 16

I N D E X

<u>Sheet</u>	<u>Content</u>
1-1 to 1-7	Introductory notes and explanations of Weight Changes.
2-1 to 2-3	Weight & C.G. Summaries
3	Horizontal C.G. Envelopes for Flight conditions with fuel proportioners used.
4-1 to 4-15	I.B.M. Detail Sheets of Weight & C.G.'s.

N.B. The C.G. Envelope for A/C 25201 with fuel sequencing has been omitted until a fully approved sequencing is established.

UNCLASSIFIED / NON CLASSIFIÉ

Aircraft: ARROW 1
Date: 1 April, 1958

Report # 7-0400-11
Issue 16
Sheet 1-1

UNCLASSIFIED
SECRET
NON CLASSIFIE

INTRODUCTION & WEIGHT CHANGES

The following is a Weight & C.G. Summary for the first Arrow I Aircraft #25201, with J75 P3 Engines based on the latest information available. All Weight & C.G. changes are relative to issue 15 of March 1st, 1958.

NOTE:

- 1) This summary does not apply for A/C 25202 and 25203 which will have J75 P5 Engines, nor for Aircraft 25204 and 25205 which are for full Astra I trial installations etc.
- 2) The summary herein is for the aircraft complete to drawings, not in the condition encountered for first flight.
For first flight there was full Radar Nose ballast as originally designed (1397 lb), 507 lb additional nose ballast, 160 lb ballast & Dummy in Navigators seat, and some shortages in the Pack Instrumentation.
The required c.g. for this flight was 28% M.A.C.

In this summary the aircraft is ballasted such that the aft C.G. shall not exceed 31% M.A.C. which is the theoretical aft limit.

- 3) This is the final summary to be issued on A/C 25201. (see also notes H and K).

GENERAL

- a) Pratt & Whitney J75 P3 Engines comprise the Power Plant for Aircraft #25201. J75 P5 Engines, which are partially redesigned versions of the J75 P3 Engines, are to be installed on A/C 25202 and subsequent Arrow I Aircraft. (J75 P3 Engines = 6,175 lb each, J75 P5 Engines = 5,950 lb each)
- b) The Instrument Package containing Flight Instrumentation is installed, the packages for A/C 25201 to 25203 differing from those for A/C 25204 and 25205. A/C 25203 is also to have a weapon pack trial installation eventually.

The weight recorded here is Flight Test Department's estimate of cable & instruments - for first flight there were shortages to this weight and an actual weight of the pack to be installed was obtained.

A relatively detailed estimate of other proposed Flight Test Installations throughout the Aircraft has been made. These installations amount to 1,457 lb (figure partially confirmed by Actual Weights of some cable assys.).

- c) Emergency lowering for the landing gear and hydraulic actuation to close nose wheel door with landing gear extended also additional Fire Protection, all installed on the first aircraft are allowed for in this summary.
- d) An Interim Radio & Radar System with Minneapolis-Honeywell MH64 Damping System is installed. Currently there is no Doppler or Tacan installation, though provision for future installation of Doppler, which is not yet available, is made.

UNCLASSIFIED / NON CLASSIFIE

Aircraft: ARROW 1
Date: April 1st, 1958

Report # 7-0400-14
Issue 16
Sheet #1-2

UNCLASSIFIED / NON CLASSIFIÉ
SECRET

INTRODUCTION & WEIGHT CHANGES (Cont'd)

GENERAL (Cont'd)

- e) The original design of tailcones & stinger are recorded (manufactured, however, in St. Steel not titanium as shown on drawings); the redesigned versions will be fitted to the Aircraft at a later date.

When Mk. 1A Tailcones are fitting the ensuing weight changes will be:

Tailcones	+ 139.84 lb/A/C
Stonger	= 29.72
Net change	+ 110.12 lb/A/C

- f) Pending further flight testing it may be necessary to install a "Buzz Damping" system on the first aircraft. Provisions for this installation are already included in the Structural weight as modifications to the Control boxes. For the first flight the control surfaces were unmodified, if the need for Dampers is proven, a modified set of control surfaces will be made available.

The following weight penalties ensue:

Ailerons	+ 11.68 lb/a/c
Elevators	+ 11.07 lb/a/c
Rudder	+ 8.78 lb
Equipment	+ 123.97 lb
	+ 155.50 lb

- g) Note exactly as March 1st
- h) Several weighings of A/C 25201 have been made and the results obtained show good agreement with the estimated weights as recorded in this report. However, at no time has it yet been possible to obtained a dry weight of the complete aircraft.

A considerable number of actual weights of parts have, however, been obtained. Structural weights have checked within 0.5% of estimates of subassemblies etc. Equipment (most of which is now actual weight) has shown a consistant increase averaging about 11% over manufacturer's quotations or initial specification weights (excluding Engines & Gear Boxes). Preceeding the report titles on the I.B.M. Tabulation sheets, will be found a number varying from 0 to 100, this is the percentage of actual weight recorded within the report.

A summary of actual weights obtained so far is as follows:-

Structure	75.12 %
Landing Gear	98.75 %
Power Plant	92.97 %
Flying Controls	83.85 %
Equipment	24.83 %

70.66
i.e. % of the Basic Weight of A/C 25201.

UNCLASSIFIED / NON CLASSIFIÉ

Aircraft: ARROW 1
Date: 1 April, 1958

Report 7-0400-1
Issue 16
Sheet #1-3

UNCLASSIFIED / NOW CLASSIFIED
SECRET

INTRODUCTION & WEIGHT CHANGES

GENERAL (Cont'd)

- j) The aircraft is ballasted such that the c.g. on a flight envelope (using fuel proportions) does not travel aft of 31% M.A.C.

For first flight a c.g., with landing gear retracted, of 28.15% M.A.C. was obtained as required (see also introductory note #2).

- k) All outstanding drawings, reissues, trial installations etc pertaining to A/C 25201 have now been estimated. Some of the weight changes appear trivial, but all recorded here.

This issue of report 7-0400-44 now closes the monthly weight reports on A/C 25201. In future this aircraft will be covered by Weight Statements for Flight Testing.

On May 1, 1958, a statement will be issued for A/C 25202 & 25203. This will be report No. 7-0400-64 Issue 1.

1. STRUCTURE

WEIGHT lb

a) Wing

Aileron - due to failure of trailing edge on test, the aileron has been split at rib #4A, an additional rib introduced and the space between packed with sponge rubber strips.	+	6.12
Wing to Fus. Joint - Addition of small flexible hoses and some hardware changes	+	0.78
<u>Wing Weight Increase</u>	+	<u>6.90</u>

b) Fin & Rudder

No weight change

c) Fuselage Fwd Sta. 255"

Structure fwd Sta 120 ins - addition of coupling to joint at Sta 120 ins	+	0.19
Winscreen - addition of shims for installation	+	0.54
Lower Longeron - addition of .072" Al channels to shear web from Sta 214 - 255, etc.	+	1.23
Bulkhead Sta. 255 - addition of packing, rubbing strip etc.	+	0.44
Cockpit Floor - Prod. drg. reissues, bracketry added to accomodate F/cont. hydraulic changes	+	1.77

UNCLASSIFIED / NOW CLASSIFIED

Aircraft: ARROW 1
Date: April 1, 1958

Report 7-0100-144
Issue 16
Sheet #1-4

UNCLASSIFIED / NON CLASSIFIED
SECRET

INTRODUCTION & WEIGHT CHANGES

1. <u>STRUCTURE (Cont'd)</u>	<u>WEIGHT (lb)</u>
c) <u>Fuselage Fwd Sta. 255" (Cont'd)</u>	
Canopy Arches - Misc. changes on ECNs etc	+ 1.98
Air Intakes - Misc. E.C.N.s incorporated	+ 0.21
Crew's Bulkheads - Stiffener 7/16" Al added on Pilot's bulkh'd,	+ 0.57
equipment bracketry added etc.	+ 1.28
Formers FF. - addition of attachment for elevator feel and trim unit	+ 0.53
Misc. Items - alterations & additions to systems bracketry	+ 1.39
Lower Shear Panel - addition of small electrical brackets	+ 0.12
<u>Front Fuselage Increase</u>	<u>+ 10.25</u>
d) <u>Centre Fuselage Sta 255 - 485"</u>	
Skin CF - addition of brackets fittings	+ 0.81
Bulkhead Sta 485 - addition of brackets	+ 0.09
Sealing Missile Bay - addition of brackets & doublers to fwd seal	+ 0.46
Armament Bay Roof - addition of systems bracketry	+ 1.10
Equipment Bay Structure - equip. mtg bracketry changes	+ 0.61
Radar Access Door - brackets for micro-switch mountings added etc	+ 0.22
Longerons - actual weight obtained - some redesign since last estimate was made	+ 5.87
Integral Fuel Tanks - addition of union & cap on doors insulation "Bestobel" added on bulkhead 317 etc	+ 0.37
all other estimates revised, E.C.N.'s incorporated etc, many minor changes	+ 1.73
Duct CF - Outer plates fwd .04 were .032 Al rolled section & one .02 top hat superceded by a .032 channel	+ 5.99
	+ 1.07
<u>Centre Fuselage Increase</u>	<u>+ 18.32</u>
e) <u>Duct Bay Sta 485 -591.105 ins</u>	
Lower Panel - addition of .07 steal strap from Sta 486 to Sta 538	+ 1.86
misc. other hardware changes etc	+ 0.25
Access Doors - minor prod. drg. changes	+ 0.10
Duct - misc. E.C.N.s incorporated since time of actual weighing of this component	+ 0.30
<u>Duct Bay Increase</u>	<u>+ 2.51</u>

UNCLASSIFIED / NON CLASSIFIED

Aircraft: ARROW 1
Date: April 1, 1958

Report 7-0400-44
Issue 16
Sheet #1-5

UNCLASSIFIED / NON CLASSIFIÉ
SECRET

INTRODUCTION & WEIGHT CHANGES

1. STRUCTURE (Cont'd)

WEIGHT (lb)

f) Engine Bay Sta 591.65 - 742.5 ins

Engine Access Doors - addition of seal around No. 2 door	+	0.80
Torsion Box - minor changes to brackets etc	+	0.04
Misc Items - mtg. bracket air duct changed	+	0.04
Engine Tunnel - addition of A1 bar stiffeners & associated changes, tube elbow added to air duct, assy	+	3.13

Engine Bay Increase + 3.93

g) Rear Fuselage Sta. 742.5 ins. Aft

Now weight change

h) Fuselage Joints

Joint Air Intakes to F.F. - shims added	+	1.40
Joint C.F. to D.B. - hardware changes	+	0.20

Fuselage Joints Increase + 1.60

TOTAL STRUCTURAL INCREASE + 43.51

2. LANDING GEAR

Main Landing Gear - Most items for joints are Dowty supplied, however, some bolts etc for joints to Wing are AVRO supplied & these have been previously omitted in error

+ 2.67

TOTAL LANDING GEAR INCREASE + 2.67

UNCLASSIFIED / NON CLASSIFIÉ

Aircraft: ARROW 1
Date: 1 April, 1958

Report 7-0400-44
Issue 16
Sheet #1-6

UNCLASSIFIED / NON CLASSIFIÉ
SECRET

INTRODUCTION & WEIGHT CHANGES

3. POWER PLANT & SERVICES

WEIGHT (lb)

Accessories Gear Boxes on Fws. - act. Wt. of oil tank	
de-aerater (2 off)	- 1.50
additional gauges	+ 1.00
Misc. hardware alterations	
etc.	+ 1.66
Accessories Gear Boxes on Eng - Oil waste drain altered &	
other minor piping changes	+ 0.82
Fire Extinguishing System - minor changes to clamps &	
hardware	+ 0.07
Fuel System - actual weight of differential pressure valves	+ 2.50
gate valve mechanism - manual operation	+ 3.52
Steel pipes for power plant waste fuel	
drain added etc.	+ 10.22
Misc. other changes & act. wts. of equip	+ 3.41
<u>TOTAL POWER PLANT GROUP INCREASE</u>	<u>+ 21.70</u>

4. FLYING CONTROLS GROUP

Mechanical Flying Controls - rudder cable tension regulator	
added, elevator feel & trim	
unit redesigned and moved to	
fwd quadrant from aft quadrant.	
Alterations also made to nose	
wheel steering cables & brackets	
There is an appreciable C.G.	
shift fwd of approx. 8" for	
the whole system	+ 8.50
F/Cont. Hydraulics Fus - full production drawing ests.	
made of booster installation in fwd	
fuselage (Initial allowance of	
77 lb was too light). Production	
drawings also estimated for	
installation of surge damping	
accumulators. Elevator servos	
moved fwd etc.	+ 59.17
<u>FLYING CONTROLS INCREASE</u>	<u>+ 67.67</u>

UNCLASSIFIED / NON CLASSIFIÉ

Aircraft: ARROW 1
Date: April 1, 1958

Report 7-0400-177
Issue 16
Sheet #1-7

UNCLASSIFIED / NON CLASSIFIED

INTRODUCTION & WEIGHT CHANGES

5. <u>EQUIPMENT GROUP</u>	<u>WEIGHT (lb)</u>
Oxygen System - actual wt. of O ₂ converter obtained	- 3.67
Utility Hydraulics FF - addition of shock mount at air charging valve	+ 0.76
Flow control valve added	+ 0.54
check valve added	+ 0.53
Piping changes etc associated with flow regulator in nose gear circuit	+ 2.65
Utility Hydraulics CF - misc. changes to 1st A/C only. No account is taken of the Ram Air Turbine piping	+ 3.06
Utility Hydraulics EB - Actual wt. of pressure regulator valve 10.22 lb target wt. was 55lb.	+ 4.72
redesign of p.r. valve mtg.	+ 0.41
misc. other changes	+ 0.26
Canopy Actuation - actual wt. obtained of Idler lever	+ 0.94
Ejector Seats - gas generator on seat was previously omitted - this was not installed on seat at time of weighing of seat	+ 3.88
Emergency Fire Protection - no allowance was previously made for associated electrics	+ 2.78
hoses replace rigid tubing, some rerouting etc.	+ 11.12
<u>TOTAL EQUIPMENT INCREASE</u>	+ 28.01

SUMMARY

Weight Change - Aircraft Basic Weight

Structure	+ 43.51
Landing Gear	+ 2.67
Power Plant	+ 21.70
Flying Controls	+ 67.67
Equipment	+ 28.01
	+ 163.56

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

UNBALLASTED CONDITION

<u>Issue 15</u>	<u>Issue 16</u>	
48,061.59	48,225.15	+ 163.56 lb

UNCLASSIFIED / NON CLASSIFIED

Aircraft: ARROW 1
Date: April 1, 1958

Report 7-0400-14
Issue 16
Sheet #2-1

UNCLASSIFIED / NON CLASSIFIED
SECRET

WEIGHT & C.G. SUMMARY

DESCRIPTION	WEIGHT LB	H. ARM ins.	V. ARM ins
STRUCTURE	18,642.16	561.38	137.48
Wings	9,980.26	642.83	142.26
Fin & Rudder	1,025.85	754.34	209.31
Fuselage Fwd Sta 255"	2,661.52	181.74	128.18
Sta 255 - 485"	1,670.36	380.23	130.70
Sta 485 - 591.65"	1,010.63	533.81	104.49
Sta 591.56 - 742.5"	1,437.06	660.97	107.30
Sta 742.5" aft	802.17	802.05	129.06
"Marry-Up"	54.31	462.81	104.25
LANDING GEAR - RETRACTED	2,609.23	488.30	134.90
Main Landing Gear	1,966.41	539.55	141.01
Main Gear Doors & Fairings	282.34	537.60	138.37
Nose Landing Gear	333.81	170.81	99.70
Nose Gear Door & Fairing	26.67	161.77	88.25
POWER PLANT & SERVICES	14,413.51	652.74	120.33
Engine Accessories J75 P3	12,562.29	664.92	119.78
Gear Box & Drives on Fuselage	276.70	603.71	103.24
Gear Box & Starter on Engine	287.12	589.12	105.57
Engine Controls	32.43	375.76	118.62
Engine Nose Bullets	70.58	562.75	115.07
Fire Extinguishing System	65.53	700.45	134.21
Engine Mountings	206.21	635.04	127.71
Fuel System	912.65	537.27	135.48
FLYING CONTROLS GROUP	2,014.15	653.56	137.19
Mechanical Flying Controls	952.63	679.03	147.59
Hydraulic Flying Controls	1,061.52	630.70	127.85
EQUIPMENT FIXED & REMOVABLE	9,625.08	403.28	113.47
Instruments	46.07	163.68	138.70
Probe	15.00	-38.14	108.00
Cockpit Pressure Sealing	5.00	186.00	130.00
Ejector Seats	342.94	204.50	134.11
Oxygen System	22.40	252.82	156.03
Air Conditioning System	822.07	339.45	134.46

Cont'd

UNCLASSIFIED / NON CLASSIFIED

UNCLASSIFIED / NON CLASSIFIÉ
SECRET

Aircraft: ARROW 1
Date: April 1, 1958

Report 7-0400-44
Issue 16
Sheet #2-2

WEIGHT & C.G. SUMMARY

DESCRIPTION (Cont'd)	WEIGHT lb	H. ARM ins	V. ARM ins	
Surface Finish	100.00	591.52	140.20	
Cockpit Insulation	14.31	187.48	132.00	
Drag Chute	90.99	786.18	143.17	
Low Pressure Pneumatics	54.65	433.30	129.37	
Electrical System	1,126.18	415.86	112.91	
Intake Deicing boots	88.00	195.82	118.00	
Canopy Actuation	65.86	222.01	154.36	
Console Panels	17.45	174.76	124.34	
MH64 Damping	99.08	450.83	140.34	
Interim Radio & Radar	647.34	341.86	124.39	
Hydraulics Utility System	654.93	503.19	117.65	
Emergency Landing Gear Lowering	12.91	458.83	128.60	
Nose U/C Door Actuation	33.59	202.56	97.89	
Instrument Pack Structure	686.80	385.81	94.68	
Pack Instrumentation (A/C 25201)	3,048.00	394.00	95.00	
Flight Test Installation	1,456.73	488.48	128.90	
Additional Fire Protection	174.78	417.06	107.61	
AIRCRAFT BASIC WEIGHT	U/C Up 47,304.13 U/C Down	556.94 559.01	127.21 123.79	
USEFUL LOAD (less fuel)	921.02	366.58	132.34	
Crew	390.00	194.00	136.50	
Engine Fire Extinguisher 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	140.00	268.00	132.00	
Oil	134.23	608.92	115.68	
DESCRIPTION	WEIGHT LB	H. ARM	V. ARM	% M.A.C.
BALLAST	815.00	85.12	116.50	
Operational Wt. Empty	U/C Up 49,040.15 U/C Down	545.52 547.52	127.13 123.83	30.25 30.81
Max. Int. Fuel (2,508 gals at 7.81lb/gal)	19,562.00	540.99	144.09	
A.U.W. Max. Int. Fuel	U/C Up 68,602.15 U/C Down	544.23 545.66	131.97 129.61	29.90 30.29

UNCLASSIFIED / NON CLASSIFIÉ

UNCLASSIFIED / NON CLASSIFIÉ
~~SECRET~~

Aircraft: ARROW 1
Date: April 1, 1958

Report 7-0400-44
Issue 16
Sheet #2-3

N.B.

- 1) Aircraft Datum is considered to be 120" above an arbitrarily chosen ground line.
- 2) The above figures are for the Aircraft in the BALLASTED condition such that the aft c.g. on the horizontal c.g. envelope, using fuel proportioners, does not exceed 31% M.A.C. i.e. 303 lb on Former Sta. 68.5 and 512 lb on the Shear Panel.

These figures are theoretical only and are not to be confused with that ballast which is actually installed on A/C 25201 (reference Introductory note 2).

UNCLASSIFIED / NON CLASSIFIÉ

REPORT NO: T-0400-44 Issue 16

DATE: April 1st 1958

BY: Kathleen Lyffue

SHEET: 3

HORIZONTAL C.G. ENVELOPE

ARROW I - $\frac{1}{2}$ 25201

NORMAL FLIGHT CONDITIONS

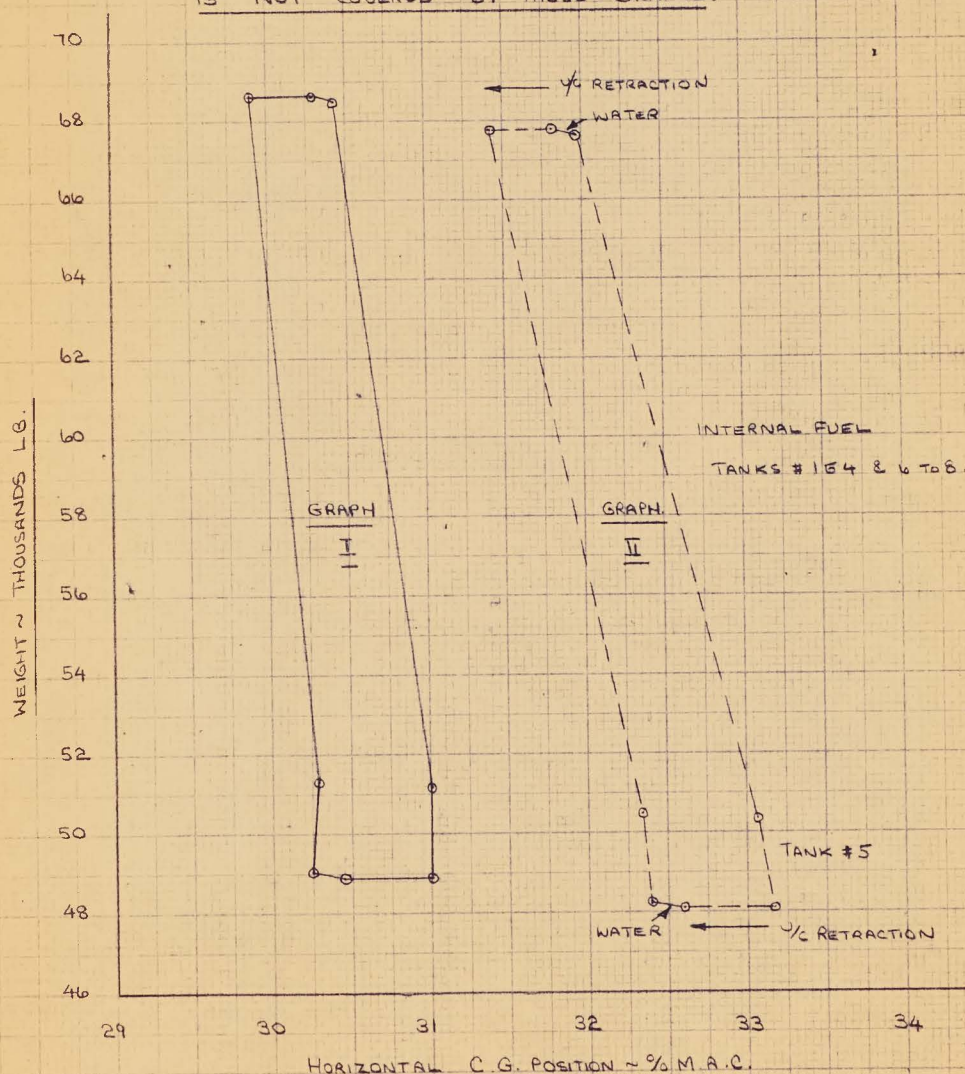
FUEL SYSTEM PROPORTIONERS USED

UNCLASSIFIED / NON CLASSIFIED

GRAPH I ~ $\frac{1}{2}$ BALLASTED SUCH THAT AFT CG DOES NOT EXCEED 3% M.A.C.

GRAPH II ~ NO BALLAST

N.B. THE CONDITION REQUESTED & FULFILLED FOR FIRST FLIGHT IS NOT COVERED BY THESE GRAPHS.



UNCLASSIFIED / NON CLASSIFIED

PROJECT Arrow 1 A/C 25201

WEIGHT AND C. OF G BY

PROJECT Arrow 1 A/C 25201

DESCRIPTION		REFERENCE NO.	COMP. NO.	WEIGHT	H. A
TOTAL WING GROUP		1000000			
OUTER WING		1010000			
100	OUTER WING SKINS	10100001	64	92910706	
100	POSTS AND INTERCOSTALS	10100002	64	2436732	
100	OUTER WING SPARS	10100003	64	3925870	
100	OUTER WING RIBS	10100004	64	13456695	
98	AILERON CONTROL BOX	10100006	64	37530774	
100	RIB 12	10100007	64	7626648	
100	O W AILERON JACK FITTING	10100009	64	1046727	
	AILERON JOINTS AND FAIRING	10100010		3293787	
	BUZZ DAMP STRUC PROV O W	10100011	64	800758	
				198355	
AILERON		1020000			
95	AILERON STRUCTURE	10200001	74	34212792	
				34212	
97	ELEVATOR	10300000	82	44900755	
97	ELEVATOR MARRY UP	10300000		1597738	
				46497	
INNER WING		1040000			
96	MAIN U C STRUCTURE	10400001	62	33071577	
100	FRONT SPAR I W	10400002	62	11110484	
100	MAIN SPAR I W	10400003	62	15106565	
100	FWD CENTRE SPAR I W	10400004	62	5364600	
100	AFT CENTRE SPAR I W	10400005	62	3666654	
100	REAR SPAR I W	10400006	62	7667703	
100	I W STRUCTURE F S TO M S	10400007	62	106904499	
100	STRUCTURE MS TO R S	10400008	62	14979609	
100	STRUCTURE AFT OF REAR SPAR	10400009	62	32212718	
40	ELEVATOR CONTROL BOX	10400010	62	42838724	
25	TRANSP JOINT MARRY UP	10400011		7065636	
100	INNER WING JOINTS	10400012	62	63471662	
100	SKINS M S TO R S	10400013	62	219038624	
100	STRUT PICK UP FITTINGS	10400014	62	5391567	
100	RIBS 1 TO 9 INNER WING	10400016	62	51204612	
74	DORSAL FAIRING I W	10400017	62	95482	
100	RIB 10	10400018	62	10800636	
77	WING TO FUS JOINT I W	10400019	62	12628616	
65	TRANSPORT JOINT O W TO I W	10400020	62	12942630	
77	WING TO FUS JOINT C A	10400021		3818529	
	BUZZ DAMP STRUC PROV I W	10400022	62	552741	
74	DORSAL FAIRING C A	10400023		6033570	
				665954	

EIGHT AND C. OF G BY

FUNCTIONAL GROUP
COMPONENT.

UNCLASSIFIED / NON-CLASSIFIED

REPORT NO. 7-0400-44 Iss 16

April 1, 1958

SHEET 4-1 to 4-15

	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
	1000000						
	1010000						
	1010001	64	92910	70646	13597	65837199	12632973
LS	1010002	64	24367	3207	13410	1783323	326666
	1010003	64	39258	70118	13636	27526924	5353221
	1010004	64	13456	69506	13650	9352727	1836744
	1010006	64	37530	77409	13508	29051598	5069552
	1010007	64	76266	4873	13832	4947215	1054828
TING	1010009	64	10467	2791	13670	761394	142988
AIRING	1010010		32937	8726	13224	2592447	435466
O W	1010011	64	8007	5828	13680	606624	109440
			198355			142259451	26961880
	1020000						
	1020001	74	34212	79234	13556	27107536	4637779
			34212			27107536	4637779
	1030000	82	44900	75523	14260	33909827	6402740
	1030000		15977	73810	14260	1178746	227732
			46497			35088573	6630472
	1040000						
	1040001	62	33071	57757	13983	19100817	4624318
	1040002	62	11110	48428	14260	5380351	1584286
	1040003	62	15106	56570	14280	8545464	2157137
	1040004	62	53646	60098	14415	3223657	773221
	1040005	62	36666	5492	14450	2400937	529737
	1040006	62	76677	70374	14420	5395575	1105581
M S	1040007	62	10690	44997	14403	53423136	15397383
	1040008	62	14979	60964	14572	9131798	2182740
R SPAR	1040009	62	32212	71829	15020	23137557	4838242
	1040010	62	42838	72470	14328	31044699	6137829
	1040011		70656	3621	13876	4494824	980339
	1040012	62	63471	66222	15046	42031766	9549847
	1040013	62	21903	86246	14464	136780469	31681656
GS	1040014	62	53915	6766	14330	3060255	772530
VG	1040016	62	51204	61287	14499	31381395	7424068
	1040017	62	95482	80	16150	45866	15343
	1040018	62	10800	63683	13835	6877764	1494180
	1040019	62	12628	61681	13811	7789077	1744053
TO I W	1040020	62	12942	63071	13710	8162649	1774348
	1040021		38185	2984	14301	2022929	546012
I W	1040022	62	55274	150	14200	409308	78384
	1040023		60335	7025	16034	3440318	967331
			665954			407280611	96358565

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

PROJECT_____

DESCRIPTION		REFERENCE NO.	COMP. NO.	WEIGHT	H. A.
100	FIN BUZZ DAMP STRUC PROV FIN	201000083	83	85170749	
12	FIN TO WING MARRY UP	201000183	183	185680	
		2010002		4830685	
				90185	
95	RUDDER	202000084	84	1240081	
				12400	

AVRO AIRCRAFT LTD.
MALTON, ONT.

**WEIGHT AND C. OF G BY FUNCTIONAL
COMPONE**

PROJECT _____

	DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H.
	TOTAL FUSELAGE GROUP	30000000			
	FUSELAGE BASIC STRUCTURE	30100000			
100	RADOME	30100001	51	18100	3
100	RADAR NOSE ACCESS DOORS	30100002	51	8008	9
	NOSE STRUCTURE FWD STA 120	30100003	51	12207	9
	SKIN F F	30100004	52	11054	19
88	SKIN C F	30100005	54	21263	37
	SKIN D B	30100006	56	5937	53
3	SKIN E B	30100007	58	17725	66
	FORMERS F F	30100011	52	10717	18
100	FORMERS C F	30100012	54	27824	37
	FORMERS D B	30100013	56	7491	53
	LIGHT FORMERS E B	30100014	58	13501	66
72	HEAVY FORMERS E B	30100015	58	21890	66
	LOWER LONGERONS F F	30100016	52	6969	18
	LONGITUDINAL MEMBERS E B	30100017	58	11067	70
75	LOWER LONGERON E B	30100018	58	6842	65
	TOP LONGERONS E B	30100019	58	638	66
	LOWER SHEAR PANEL F F	30100020	52	2952	23
	TOP WING LONGERONS D B	30100021	56	498	53
66	LONGERONS C F	30100023	54	14453	41
43	LONGERONS F D B	30100024	54	1258	48
43	LONGERONS A D B	30100025	56	8655	52
	ELECTRONICS BAY STRUCTURE	30100026	54	3570	27
59	LONGITUDINAL BEAMS D B	30100027	56	6570	52
	RADAR ACCESS DOOR C F	30100028	54	2160	27
72	MAIN FRAME AT STN 538 77	30100029	56	5980	53
	DIVE BRAKE ACCOMMODATIONS	30100030	56	3620	50
48	TOP LONGERONS F F	30100031	52	19253	19
100	DUCT C F	30100032	54	33475	37
97	DUCT D B	30100033	56	31663	54
22	CANOPY ARCH	30100034	52	8659	22
4	ACCESS PANELS D B	30100036	56	3964	54
66	NOSE U C SUPPORT STRUCTURE	30100037	52	3343	21
3	CREW BULKHEADS	30100038	52	12903	20
51	EQUIPMENT BAY STRUCTURE	30100039	54	6211	28
86	WINDSCREEN	30100041	52	13057	13
33	SERVICE ACCESS DOORS	30100042	58	6704	66
	TORSION BOX E B	30100043	58	6046	61
	DORSAL FAIRING AIR OUTLET	30100044	54	2143	29
66	INTERMEDIATE FORMERS	30100045	58	5154	69
3	ENGINE ACCESS DOORS	30100046	58	14739	62
	SEALING MISSILE BAY	30100047	54	743	31
100	MISCELLANEOUS ITEM C F	30100048	54	392	37
98	ARMAMENT BAY ROOF	30100049	54	13326	38
	BULKHEAD AT STA 120	30100050	52	3144	12
	BULKHEAD STA 255	30100051	52	10473	25
100	BULKHEAD STA 485	30100052	54	11254	48
	ENGINE TUNNEL	30100054	58	4788	66
100	INTEGRAL FUS FUEL TANK CF	30100055	54	21168	39

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

[illegible]

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

PROJECT _____

DESCRIPTION		REFERENCE NO.	COMP. NO.	WEIGHT
ENGINE GROUP		5000000		
99 ENGINE J 75		5010000		12527076
J 75 ENGINE SERV ACCESS		5010100		35226
ACC GEAR BOXES ON FUS D B		502000156		44455
ACC GEAR BOXES ON FUS E B		502000258		232256
ENGINE CONTROLS		5030000		
36 ENGINE CONTROLS F F		503000152		14581
36 ENGINE CONTROLS C F		503000254		2643
36 ENGINE CONTROLS D B		503000356		5084
36 ENGINE CONTROLS E B		503000458		10136
83 GEARBOX AND STARTER ON ENG		5040000		287125
91 ENGINE ANTI ICING		5050000		70585
FIRE EXT SYSTEM		5060000		
FIRE EXTING SYSTEM D B		506000256		1465
FIRE EXTING SYSTEM E B		506000358		64077
ENGINE MTGS AND BRACKETS		5070000		
64 ENG MOUNTING AND BRKTS		5070001		146536
ENGINE MTGS ACCESSORIES		5070002		52026
ENGINE MTGS ACCESSORIES CA		5070003		7666
FUEL SYSTEM		5080000		

PROJECT_____

WEIGHT AND C. OF G BY FUNCTIONAL
COMPOUND[illegible]

AVRO AIRCRAFT LTD.
MALTON, ONT.

**WEIGHT AND C. OF G BY FUNCTIONAL
COMPON**

PROJECT _____

DESCRIPTION			REFERENCE NO.	COMP. NO.	WEIGHT
FLYING CONTROLS GROUP			6000000		
MECHANICAL CONTROLS			6010000		
50	MECHANICAL CONTROLS F F		6010001	52	109961
	MECHANICAL CONTROLS C F		6010002	54	12134
70	MECHANICAL CONTROLS FIN		6010005	83	124237
72	MECHANICAL CONTROLS I W		6010006	62	397487
45	MECHANICAL CONTROLS O W		6010007	64	302377
	MECHANICAL CONTROLS C A		6010008		6467
					95263
FLYING CONTROLS HYDRAULICS			6020000		
31	FLYING CONT HYDRAULICS D B		6020001	56	32435
31	FLYING CONT HYDRAULICS E B		6020002	58	468146
31	FLYING CONT HYDRAULICS R F		6020003	59	487
77	FLYING CONT HYDRAULICS I W		6020004	62	274447
72	FLYING CONT HYDRAULICS O W		6020005	64	120607
59	FLYING CONT HYDRAULICS FIN		6020006	83	55977
31	FLYING CONT HYDRAULICS R N		6020008	51	35001
31	FLYING CONT HYDRAULICS F F		6020009	52	55061
31	FLYING CONT HYDRAULICS C F		6020010	54	19203
					106152

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

PROJECT_____

PROJECT_____

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENTS

PROJECT_____

[illegible]

