

ARROW 2
Prod. A/C

Report # 7-0400-34
Issue 16

UNCLASSIFIED
SECRET

WEIGHT & C.G. SUMMARY

RCAF

Feb. 1/58

AVRO AIRCRAFT LIMITED
INTER-DEPARTMENTAL MEMORANDUM

Ref. 5865/11/J
Date February 1st, 1958
To See Distribution
From Mr. E. F. Burnett
Subject ARROW 2 PRODUCTION A/C WEIGHT & C.G. SUMMARY - Report # 7-0400-34 Iss. 16

Attached is a copy of Weight and C.G. Summary Report # 7-0400-34
Issue 16, dated February 1st, 1958 for your retention.

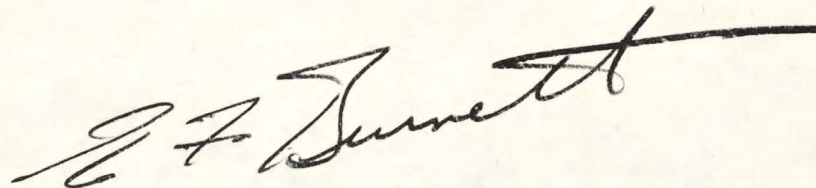
This report is revised monthly and is issued complete on the
1st of each month.

Classification cancelled/changed to

UNCLASSIFIED

by authority of _____ (date) _____

Signature _____ Rank _____



amc.

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I N D E X

Sheet #

Content

1-1 to 1-4

Introductory notes and explanation
of Weight Changes.

2-1 to 2-2

Weight & C.G. Summaries

3

Horizontal C.G. plot showing basic
fixed points on flight envelope.
The variation of C.G. with fuel
used has been omitted until such
time as a fully approved fuel
sequencing is established.

4-1 to 4-15

I.B.M. Detail Sheets of Weights
and C.G.'s.

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INTRODUCTION & WEIGHT CHANGES

The following is a Weight & C.G. Summary of the Arrow 2 Production Aircraft, based on the latest weight estimates available.

All Weight & C.G. changes are relative to issue 15 of January 1st, 1958.

The early Arrow 2 Aircraft # 25206 etc. will not be as this summary designates, but will be flight test aircraft with Instrumentation, Astra Minus Radar, Missile Pack Trial Installation and various equipment Trial Installations. Weight statements for these aircraft will be issued at a later date.

GENERAL:

- a) Orenda PS 13 Engines comprise the Power Plant (4,500 lb each, brochure weight, excluding Nose Bullet and Input Frame).
- b) A package containing 4 "semi-submerged" Sparrow II Missiles (432 lb each) forms the current Armament.
- c) The R.C.A. Astra I Radar System is installed. The basis for the weight and C.G. breakdown is from the latest information received from R.C.A., dated October 4th, 1957. No Sparrow III Auxiliaries are carried in the production aircraft.

Where later weights have been received from Minneapolis-Honeywell these have been incorporated. Allowances have also been added for the missile firing system, junction boxes and some AVRO installed antennae.

Initially it was understood that the R.C.A. weight was for the complete system installed, now, however, it appears that only intercompartment cables were allowed for by R.C.A. not junction boxes etc.

The Infra-red Tracker System seeker head is allowed for in its Fin Pod location. (Total weight of installed system = 3,249.5 lb, including missile actuation and firing system).

In addition to the above the Minneapolis-Honeywell M.H. 64 Damping System is installed.

Arrow 2 Aircraft # 25206 to # 25208 and # 25211 will have the "Astra Minus" System (Navigational and Communication equipment only).

- d) A considerable number of Arrow 1 parts, assemblies and equipment have now been weighed. Where these weights apply to the Arrow 2 Aircraft, they have been recorded in the Arrow 2 records.

On the I.B.M. Sheets in this report, immediately preceeding the item title, will be found a number varying from 0 to 100. This is the percentage actual weight recorded in that report.

1. STRUCTURE

WEIGHT (lb)

a) Wings:

No Weight Change.

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INTRODUCTION & WEIGHT CHANGES

1. STRUCTURE (Continued)

WEIGHT (lb)

b) Fin & Rudder:

Fin I. R. Pod - Initial allowance made for seeker mounting
pod

+ 10.75
+ 10.75

Weight Increase Fin

c) Front Fuselage fwd. Sta. 255"

Radome - new design approx. 12" shorter and walls .348" thick,
were .38" thick.

- 18.71

Radar Nose Structure - addition of thrust angles on frame
Sta. 82.25" to 84.25" for ballast
installation

+ 0.42

Top Longerons - incorporation of E.C.N's and production
drawing estimate of transverse beam
Sta. 246.24"

+ 0.98

Aft. Upper Shear Panel - Arrow 2 production drawing
estimates

- 0.73

Air Intakes - Actual weight of tip support casting and
incorporation of design for production split
Front Fuselage Decrease

+ 3.84
- 14.20

d) Centre Fuselage Sta. 255" to 485"

Bulkhead Sta. 485" - Actual weight obtained of Vickers
release mechanism for drop tank

+ 1.10

Fuselage Fuel Tank - miscellaneous production drawing
changes, alterations to dished
panel assys. etc.

+ 2.34
+ 3.44

Centre Fuselage Increase

e) Duct Bay Sta. 485"-591.65"

Dive Brake Accommodations - addition of stiffeners etc to
Refuel and Limiter Access Door

+ 0.51

Dive Brakes - modifications to inner skin

+ 0.34

modifications to main lever design

+ 0.66

O/Skin and doublers - aluminum were
magnesium

+ 5.40

Duct Bay Increase

+ 6.91

f) Engine Bay Sta. 591.65" to 742.5"

No Weight Change

g) Rear Fuselage Sta. 742.5 Aft.

O/Skins fixed R.F. - production drawing estimates made

+ 3.23

Formers Fixed R.F. - production drawing estimates of "U"
bolt assys. etc.

- 2.35

Tailcones - production drawings of some components now
estimated, buttstraps at Sta. 814" were
omitted in error when scheme drawing estimates
were made

+ 14.22

Rear Fuselage Increase

+ 15.10

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INTRODUCTION & WEIGHT CHANGES

1. STRUCTURE (Continued)

WEIGHT (lb)

h) Fuselage "Marry-Up"

No Weight Change.

TOTAL STRUCTURAL INCREASE

+ 22.00

2. LANDING GEAR

Main Undercarriage - information from Messrs. Dowty is to the effect that the hoped for 25 lb/leg savings on the shortening mechanism has not been realized.

+ 33.32

LANDING GEAR INCREASE

+ 33.32

3. POWER PLANT & SERVICES

No Weight Change.

4. FLYING CONTROLS GROUP

No Weight Change.

In A/C # 25201 boosters have been added at the elevator and aileron quadrants to overcome excessive friction within the system. These together with associated valves, filters and piping account for a weight increase of approx. 77 lb. Some similar system of boosters will have to be built into the Arrow 2 Flying Control Hydraulic System but no information pertaining to details of the installation is yet available. The probable weight increase will be of the same order as that on A/C # 25201.

5. EQUIPMENT GROUP

Probe - amendment of estimate to include manufacturer's quote of sensor weight

+ 0.25

Radio & Radar Removable - R.C.A. previously omitted some antennae from their list; ARA 25 Antenna

+ 18.00

ARN 6 Loop Antenna

+ 8.50

Minneapolis-Honeywell have supplied weights for

parts sub-contracted to them: Stable platform and rack

+ 19.50

Platform repeater and rack

+ 11.00

Miscellaneous other equipment changes

+ 11.60

continued.

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INTRODUCTION & WEIGHT CHANGES

5. EQUIPMENT GROUP (Continued)

WEIGHT (lb)

Radio & Radar Fixed - Addition of missile firing system
cables from pack to cockpit + 19.60
Junction boxes were not allowed for
in R.C.A.'s previous installed weight
of Astra I, these are: R 1 + 36.20
R 2 + 18.50
R 3 + 2.70
further probable junction box + 5.00

Sparrow Pack Electronics Fixed - production drawings of
Trial Installation pack boxes,
installations and cables have been
evaluated and where applicable similar
allowances made for a production pack
system.

+ 63.61

EQUIPMENT GROUP INCREASE

+ 214.46

SUMMARY

Weight Change - Aircraft Basic Weight

Structure	+ 22.00 lb
Landing Gear	+ 33.32 lb
Equipment	+ 214.46 lb
	+ 269.78 lb

Weight Change Operational Weight Empty

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45,610.22 lb

45,880.00 lb

+ 269.78 lb

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WEIGHT & C.G. SUMMARY

<u>DESCRIPTION</u>	<u>WEIGHT</u> <u>lb</u>	<u>H. ARM</u> <u>ins.</u>	<u>V. ARM</u> <u>ins.</u>
STRUCTURE	19,066.88	567.04	137.43
Wings	10,012.03	642.54	142.22
Fin & Rudder	1,034.75	754.31	209.80
Fuselage - fwd. Sta. 255"	2,559.40	184.19	128.60
Sta. 255"-485"	1,695.27	375.45	130.63
Sta. 485"-591.65"	1,125.95	538.12	105.32
Sta. 591.65"-742.5"	1,550.20	661.04	110.51
Sta. 742.5" Aft.	1,036.95	805.24	128.71
"Marry-Up"	52.33	467.60	103.84
LANDING GEAR - RETRACTED	2,575.63	487.91	134.86
Main Landing Gear	1,934.94	539.49	141.00
Main Gear Doors & Fairings	282.34	537.60	138.37
Nose Landing Gear	333.81	170.80	99.70
Nose Gear Door & Fairing	24.54	162.24	88.23
POWER PLANT & SERVICES	10,800.67	671.41	121.32
Engines & Accessories PS 13	9,186.78	687.95	121.16
Gear Box & Drives on Fuselage	281.84	601.70	102.49
Engine Controls	32.43	375.76	118.61
Gear Box Starter & Drives on Engine	315.45	615.98	105.24
Engine Nose Bullet (Orenda Supplied)	70.00	587.17	116.00
Fire Extinguishing System	65.46	700.45	134.21
Engine Mountings	132.38	666.82	136.52
Fuel System	716.33	530.91	134.48
FLYING CONTROLS GROUP	1,792.80	683.95	140.43
Mechanical Flying Controls	944.53	684.69	148.25
Hydraulic Flying Controls	848.27	683.13	131.72
EQUIPMENT FIXED & REMOVABLE	8,855.26	332.16	113.98
Instruments	46.07	163.68	138.70
Probe	15.25	-23.71	108.00
Cockpit Pressure Sealing	5.00	186.00	130.00
Oxygen System	26.07	240.54	156.70
Ejector Seats	339.06	204.43	134.10
Air Conditioning System	856.00	333.49	134.98
Hydraulics Main System	640.81	504.22	117.77
Cockpit Insulation	14.31	187.48	132.00
Drag Chute	91.07	786.68	143.19
Electrical System	1,276.26	434.44	112.66
Low Pressure Pneumatics	56.94	421.96	128.47
Surface Finish	100.00	591.52	140.20
Intake De-icing Boots	88.00	195.82	118.00
Canopy Actuation	64.92	221.99	154.35
Cabin Consoles	17.38	174.63	124.32
Radar Door Actuation	10.00	268.00	95.00
MH 64 Damping System	180.15	471.27	135.69
Radio & Radar Removable	2,079.90	207.28	108.22
Radio & Radar Fixed	767.00	231.73	116.90
Sparrow Pack Structure	890.19	381.67	97.60
Sparrow Pack Mechanisms	551.12	374.40	99.12
Sparrow Pack Hydraulics	331.94	373.52	99.00
Sparrow Pack Electronics Removable	185.50	331.91	100.00
Sparrow Pack Electric & Electronics fixed	217.11	335.24	110.00
Sparrow Pack Air Conditioning	5.21	305.50	102.50

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WEIGHT & C.G. SUMMARY

DESCRIPTION		WEIGHT lb	H. ARM ins.	V. ARM ins.	M.A.C. %
AIRCRAFT BASIC WEIGHT	U/C Up	43,091.24	545.07	128.54	
	U/C Down		547.31	124.83	
USEFUL LOAD (less fuel)		2,788.76	377.69	104.73	
Crew		390.00	194.00	136.50	
Oil		138.97	636.92	110.57	
Engine Fire Extinguisher Fluid		25.00	730.00	129.00	
Residual Fuel		218.40	553.98	134.04	
Missiles		1,728.00	389.29	88.30	
Oxygen Charge		13.39	259.68	159.91	
Water for Air Conditioning		275.00	268.00	131.75	
Operational Weight Empty	U/C Up	45,880.00	534.90	127.09	27.32
	U/C Down		537.01	123.61	27.91
Operational Weight Empty Less Missiles	U/C Up	44,152.00	540.60	128.61	28.90
	U/C Down		542.80	124.99	29.50
Normal Combat Mission Fuel * (2,237 gal. @ 7.8 lb/gal.)		17,450.00	-	-	-
Normal Combat Weight *		63,330.00	-	-	-
Half Combat Mission Fuel * (1,118.5 gal. @ 7.8 lb/gal.)		8,725.00	-	-	-
Combat Weight (half Mission Fuel)*		54,605.00	-	-	-
Maximum Internal Fuel (2,492 gal. @ 7.8 lb/gal.)		19,438.00	541.85	144.16	
A.U.W. Maximum Internal Fuel	U/C Up	65,318.00	536.97	131.98	27.89
	U/C Down		538.45	129.53	28.30
Maximum External Fuel (500 gals. @ 7.8 lb/gal + drop tank)		4,248.00	521.84	60.67	
A.U.W. Maximum Internal and External Fuel	U/C Up	69,566.00	536.05	127.63	27.64
	U/C Down		537.44	125.33	28.02

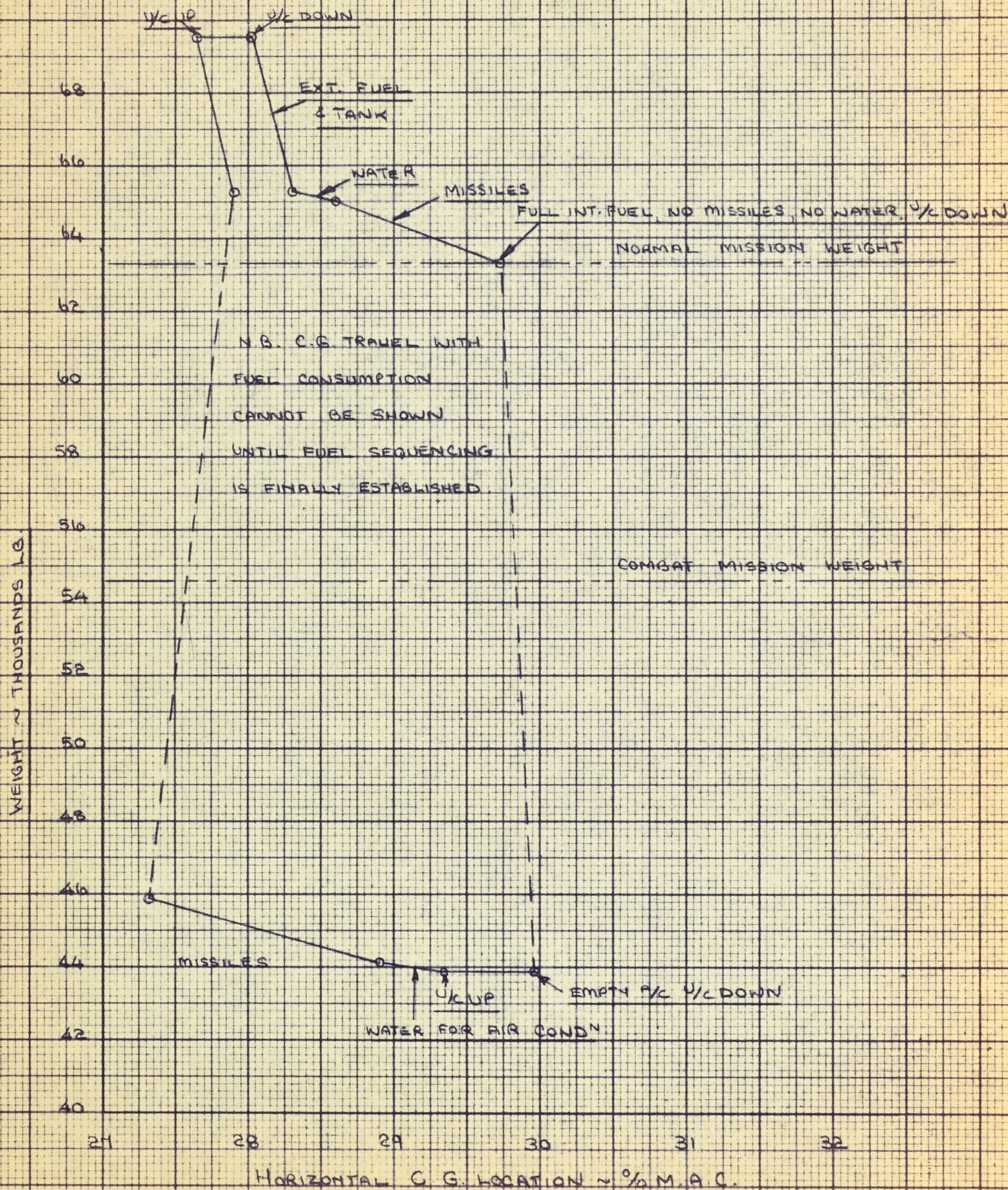
- N.B. 1) Aircraft Datum = 120" above an arbitrarily chosen ground line.
- 2) * Fuel weights in accordance with latest data issued by Aerodynamics November 19th, 1957. Centres of Gravity have temporarily been omitted until a fuel sequencing system is finally established.
- 3) With the increase of 270 lb in Operational Weight Empty the Normal Combat Mission fuel has increased by a further 80 lb.

REPORT: T-0400-34-16

BY: Kathleen Lyffee

DATE: Feb 1st 1958

HORIZONTAL C.G. PLOT OF FIXED POINTS ON ARROW 2 FLIGHT ENVELOPE



AVRO AIRCRAFT LTD.

MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL CO

PROJECT Arrow 2 Prod. A/C

DESCRIPTION		REFERENCE NO.				COMP. NO.	WEIGHT
TOTAL WING GROUP		1	0	0	0	0	
OUTER WING		1	0	1	0	0	
100	OUTER WING SKINS	1	0	1	0	0	925
100	POSTS AND INTERCOSTALS	1	0	1	0	0	24
100	OUTER WING SPARS	1	0	1	0	0	398
100	OUTER WING RIBS	1	0	1	0	0	134
18	AILERON CONTROL BOX	1	0	1	0	0	375
100	RIB 12	1	0	1	0	0	76
100	O W AILERON JACK FITTING	1	0	1	0	0	10
AILERON JOINTS AND FAIRING		1	0	1	0	0	32
							1975
AILERON		1	0	2	0	0	
100	AILERON STRUCTURE	1	0	2	0	0	336
							336
97	ELEVATOR MARRY UP	1	0	3	0	0	15
97	ELEVATOR	1	0	3	0	0	449
							464
INNER WING		1	0	4	0	0	
79	MAIN U C STRUCTURE	1	0	4	0	0	330
16	INNER WING SPARS	1	0	4	0	0	410
I W STRUCTURE F S TO M S		1	0	4	0	0	1074
I W STRUCTURE M S TO R S		1	0	4	0	0	149
STRUCT AFT OF REAR SPAR		1	0	4	0	0	316
40	ELEVATOR CONTROL BOX I W	1	0	4	0	0	428
25	TRANSP JOINT MARRY UP	1	0	4	0	0	70
36	CENTRE LINE JOINTS	1	0	4	0	0	590
INNER WING SKINS		1	0	4	0	0	2242
17	STRUT PICK UP FITTINGS	1	0	4	0	0	127
8	RIBS 1 TO 9 INNER WING	1	0	4	0	0	486
74	DORSAL FAIRINGS I W	1	0	4	0	0	
100	RIB 10	1	0	4	0	0	108
FUSELAGE HINGE JOINT I W		1	0	4	0	0	138
25	TRANSP JOINT	1	0	4	0	0	129
FUSELAGE HINGE JOINT		1	0	4	0	0	37
74	DORSAL FAIRINGS C A	1	0	4	0	0	60
							6701
LEADING EDGE INNER WING		1	0	5	0	0	221
							221

HT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

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SHEET 4-1 to 4-1

	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
	1000000						
	1010000						
	10100001	64	92910	70646	13597	65637199	12632973
	10100002	64	24367	32071	3410	1783323	326668
	10100003	64	39258	70118	13636	27526924	5353221
	10100004	64	13456	69506	13650	9352727	1836744
	10100006	64	37920	77409	13508	29353493	5122234
	10100007	64	76266	48731	3832	4947215	1054828
G	10100009	64	10467	27911	3670	761394	142988
ING	10100010		32937	87261	3224	2592447	435466
			197945			141954722	26905122
	1020000						
	10200001	74	33600	79213	13556	26615568	4554816
			33600			26615568	4554816
	1030000						
	10300000	82	15977	73810	14260	1178746	227732
	10300000	82	44900	75523	14260	33909827	6402740
			46497			35088573	6630472
	1040000						
	10400001	62	33071	57757	13983	19100817	4624318
	10400002	62	41010	58072	14318	23815327	5871812
S	10400007	62	10749	84992	41440	53667302	15486162
S	10400008	62	14979	60964	14572	9131798	2182740
	10400009	62	31639	72041	14887	22793052	4710098
W	10400010	62	42838	72470	14328	31044699	6137829
	10400011		70656	36211	3876	4494824	980339
	10400012	62	59069	66246	15029	39130850	8877480
	10400013	62	22420	46244	01447	139992978	32446803
	10400014	62	12740	61711	14584	7861981	1858002
	10400016	62	48618	61173	14513	29741089	7055930
	10400017	62	9548	28016	150	45866	15343
	10400018	62	10800	63683	13835	6877764	1494180
W	10400019	62	13812	62104	13790	8577804	1904675
	10400020	62	12942	63071	13710	8162649	1774348
	10400021		37405	27961	4309	1974570	535157
	10400023		60335	70251	6034	3440318	967331
			670153			409853688	96922547
	1050000	62	22138	46841	14423	10369661	3192964
			22138			10369661	3192964

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT_____

[illegible]

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT_____

[illegible]

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT _____

DESCRIPTION		REFERENCE NO.				COMP. NO.	WEIGHT			H. ARM
TOTAL FUSELAGE GROUP		3	0	0	0	0	0	0	0	
FUSELAGE BASIC STRUCTURE		3	0	1	0	0	0	0		
RADOME		3	0	1	0	0	0	1	51	159 44 39 9
RADAR NOSE STRUCTURE C A		3	0	1	0	0	0	2		263 120 0
RADAR NOSE STRUCTURE R N		3	0	1	0	0	0	3	51	169 99 95 8
SKIN F F		3	0	1	0	0	0	4	52	82 64 192 9
SKIN C F		3	0	1	0	0	0	5	54	220 43 367 2
SKIN D B		3	0	1	0	0	0	6	56	61 35 534 7
SKIN E B		3	0	1	0	0	0	7	58	164 89 669 0
FORMERS C F		3	0	1	0	0	1	2	54	287 49 375 2
6	FORMERS D B	3	0	1	0	0	1	3	56	73 31 535 3
8	LIGHT FORMERS E B	3	0	1	0	0	1	4	58	110 41 667 3
8	HEAVY FORMERS E B	3	0	1	0	0	1	5	58	198 58 660 0
LOWER LONGERONS F F		3	0	1	0	0	1	6	52	67 72 184 9
INNER LONGERON E B		3	0	1	0	0	1	7	58	71 84 652 3
BOTTOM LONGERONS E B		3	0	1	0	0	1	8	58	69 19 658 2
TOP LONGERONS E B		3	0	1	0	0	1	9	58	6 38 666 0
LOWER SHEAR PANEL		3	0	1	0	0	2	0	52	31 54 234 2
TOP WING LONGERONS D B		3	0	1	0	0	2	1	56	4 98 538 9
LONGERONS C F		3	0	1	0	0	2	2	52	53 25 29 9
LONGERONS C F		3	0	1	0	0	2	3	54	138 13 411 1
LONGERONS F D B		3	0	1	0	0	2	4	54	12 58 487 1
LONGERONS A D B		3	0	1	0	0	2	5	56	85 95 529 2
ELECTRONICS BAY STRUCTURE		3	0	1	0	0	2	6	54	50 48 274 9
32	LONGITUDINAL BEAMS D B	3	0	1	0	0	2	7	56	66 17 520 0
RADAR ACCESS DOOR C F		3	0	1	0	0	2	8	54	21 08 274 4
72	MAIN FRAME AT STN 538 77	3	0	1	0	0	2	9	56	59 80 538 7
DIVE BRAKE ACCOMMODATIONS		3	0	1	0	0	3	0	56	37 19 503 5
38	TOP LONGERONS F F	3	0	1	0	0	3	1	52	187 46 194 3
DUCT C F		3	0	1	0	0	3	2	54	315 52 358 3
FLOATING DUCT D B		3	0	1	0	0	3	3	56	432 15 552 6
23	CANOPY ARCHES	3	0	1	0	0	3	4	52	81 53 226 9
ACCESS PANELS		3	0	1	0	0	3	6	56	32 58 533 7
66	NOSE U C SUPPORT STRUCTURE	3	0	1	0	0	3	7	52	33 43 210 2
CREW BULKHEADS		3	0	1	0	0	3	8	52	122 40 205 9
EQUIPMENT BAY STRUCTURE		3	0	1	0	0	3	9	54	60 05 285 1
59	WINDSCREEN	3	0	1	0	0	4	1	52	129 33 138 1
SERV ACCESS DOORS AND PNLS		3	0	1	0	0	4	2	58	59 29 668 3
DORSAL FAIRING FWD		3	0	1	0	0	4	4	54	29 45 289 2
INTERMEDIATE FORMERS		3	0	1	0	0	4	5	58	46 06 729 4
ENGINE ACCESS DOORS E B		3	0	1	0	0	4	6	58	107 35 646 4
SEALING MISSILE BAY		3	0	1	0	0	4	7	54	55 59 296 1
MISCELLANEOUS ITEMS C F		3	0	1	0	0	4	8	54	37 43 370 0
ARMAMENT BAY ROOF		3	0	1	0	0	4	9	54	124 18 383 6
BULKHEAD AT STA 120		3	0	1	0	0	5	0	52	29 80 120 0
BULKHEAD AT STA 255		3	0	1	0	0	5	1	52	107 42 255 0
12	BULKHEAD STA 485	3	0	1	0	0	5	2	54	127 36 485 0
ENGINE TUNNEL E B		3	0	1	0	0	5	4	58	613 18 656 7
FUSELAGE FUEL TANK		3	0	1	0	0	5	5	54	225 24 394 4
COCKPIT FLOOR		3	0	1	0	0	5	6	52	57 96 176 6

AND C. OF G BY FUNCTIONAL GROUP COMPONENT

REPORT NO. _____

SHEET _____

REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
30000000						
30100000						
3010000151		15944	3990	11070	636166	1765001
30100002		263	12000	11200	31560	29456
3010000351		16999	9582	11326	1628844	1925307
3010000452		8264	19296	12301	1594621	1016555
3010000554		22043	36727	14417	8095733	3177939
3010000656		6135	53476	11175	3280753	685586
3010000758		16489	66905	11036	11031965	1819726
3010001254		28749	37520	13317	10786625	3828504
3010001356		7331	53531	11441	3924358	838740
3010001458		11041	66734	11662	7368101	1287601
3010001558		19858	66067	10922	13119585	2168891
3010001652		6772	18493	9045	1252346	612527
3010001758		7184	65234	9213	4686411	661862
3010001858		6919	65825	9779	4554432	676609
3010001958		638	66605	13911	424940	88752
3010002052		3154	23427	8900	738888	280706
3010002156		498	53899	13550	268417	67479
3010002252		53	25295	15250	13406	8083
3010002354		138	13411	12289	5678801	1697480
3010002454		1258	48717	10700	612860	134606
3010002556		8595	52923	9761	4548732	838958
3010002654		5048	27491	9332	1387746	471079
3010002756		6617	52001	9130	3440906	604132
3010002854		2108	27448	8976	578604	189214
3010002956		5980	53877	10383	3221845	620903
3010003056		3719	50351	9339	1872554	347317
3010003152		18746	19435	14763	3643285	2767472
3010003254		315	5235839	12969	11307921	4091979
3010003356		432	1555264	11717	23882338	5063502
3010003452		8153	22698	16041	1850568	1307823
3010003656		3258	53375	9673	1738958	315146
3010003752		3343	21049	9186	703668	307088
3010003852		12240	20555	12367	2515932	1513721
3010003954		6005	28510	13540	1712026	813077
3010004152		12933	13815	15008	1786694	1940985
3010004258		5929	66837	9255	3962766	548729
3010004454		2945	28920	16400	851694	482980
3010004558		4606	72947	11213	3359939	516471
3010004658		10735	64644	9044	6939533	970873
3010004754		559	29616	11074	165553	61904
3010004854		374	37000	12500	138380	46750
3010004954		124	1838364	12193	4764042	1514127
3010005052		2980	12000	11511	357600	343028
3010005152		10742	25500	11980	2739210	1286892
3010005254		12736	48500	10335	6176960	1316266
3010005458		613	1865674	12016	40269983	7367971
3010005554		22524	39445	14529	8884592	3272512
3010005652		5796	17687	11569	1025139	670539

AVRO AIRCRAFT LTD.
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WEIGHT AND C. OF G BY FUNCTION COM

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DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT
DORSAL OVER FUEL TANK	301006154		41
DEFLECTOR SHIELD	301006254		20
SHEAR PANEL BELOW NAV ARCH	301006352		20
PACK MOUNTING STRUCTURE	301006454		24
ENG ACCESS DOORS FIXED R F	301006559		93
TUNNEL FIXED R F	301006659		130
SKIN AND INTERCOSTAL R F	301006759		55
FAIRING UNDER RUDDER R F	301006859		27
FORMERS FIXED R F	301006959		105
LONGERONS C BEAM FIXED R F	301007059		25
REMOVABLE NACELLES R F	301007159		491
CNTR STRUC STING REMOV R F	301007259		107
MISC ITEMS STRUCTURE E B	301007358		9
MTG BRKTS SIDE PANEL D B	301007556		1
FORMERS LOWER PANEL D B	301007656		74
LOWER PANEL D B	301007756		50
JOINT F F TO C F	3010078		8
JOINT AIR INTAKES TO F F	3010079		9
JOINT C F TO D B	3010080		5
JOINT D B TO E B	3010081		25
FUS JOINT AT STA 742 50	3010082		4
DROP TANK MTG STRUCT D B	301008356		11
STRUCT AT ENG ACCESS DOORS	301008558		65
MISC STRUCTURE F F	301008652		5
ENG RAILS ATTACHM TO FORM	301008758		28
COCKPIT FORMERS	301009252		102
			6730
DIVE BRAKES	302000072		117
DIVE BRAKES C A	3020001		4
			121
AIR INTAKES	3030000		
AIR INTAKES	303010055		758
			758
PILOTS AND NAVIG CANOPIES	3040000		
76 PILOTS CANOPY	304010053		242
			242
NAVIGATORS CANOPY	304020053		166
			166

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

REPORT NO. _____

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	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
TANK	301006154		4138	41310	14206	1709408	587844
	301006254		2045	33739	16400	689963	335380
NAV ARCH	301006352		2001	25689	15352	514037	307194
CTURE	301006454		2470	29234	10308	722080	254608
FIXED R F	301006559		9326	77366	9867	7215153	920196
	301006659		13054	77180	13177	10075077	1720126
TAL R F	301006759		5579	77281	13693	4311507	763932
DER R F	301006859		2767	78223	15590	2164430	431375
	301006959		10509	77990	13734	8195969	1443306
FIXED R F	301007059		2519	77159	12810	1943635	322684
S R F	301007159		49147	82589	12761	40590016	6271649
REMOV R F	301007259		10794	83412	13644	9003491	1472733
RE E B	301007358		9126	66401	10278	605577	93735
REL D B	301007556		1905	51866	13066	98545	24825
EL D B	301007656		7416	54432	9015	4036677	668552
	301007756		5054	55457	8790	2802797	444247
	3010078		8552	5500	12000	218025	102600
TO F F	3010079		9522	2000	12000	209440	114240
	3010080		5004	8500	9800	242500	49000
	3010081		2508	58478	9150	1466628	229482
742 50	3010082		4187	4250	11500	310365	48070
UCT D B	301008356		1133	58576	8848	663666	106248
SS DOORS	301008558		6537	64089	9261	4189498	605392
	301008652		5521	8750	11500	103500	63480
TO FORM	301008758		2854	68741	11362	1961868	324271
	301009252		10261	18329	12076	1880739	1239118
			673070			329480571	81301135
	302000072		11790	50884	9049	5999224	1066877
	3020001		4064	8794	9374	198104	38058
			12196			6197328	1104935
	3030000						
	303010055		75886	21057	11831	15979315	8978073
			75886			15979315	8978073
CANOPIES	3040000						
	304010053		24208	17686	15915	4281427	3852703
			24208			4281427	3852703
	304020053		16650	23200	16200	3862800	2697300
			16650			3862800	2697300

AVRO AIRCRAFT LTD.
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PROJECT _____

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AND C. OF G BY FUNCTIONAL GROUP COMPONENT

REPORT NO. _____

SHEET _____

REFERENCE NO.				COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT				V. MOMENT			
4000000															
4010000															
401010092					193494	53949	14100	104388078				27282654			
					193494			104388078				27282654			
401020062					28234	53760	13837	15178598				3906739			
					28234			15178598				3906739			
4020000															
402010091					33381	17080	9970	5701475				3328086			
					33381			5701475				3328086			
402020052					2454	16224	8823	398137				216516			
					2454			398137				216516			

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DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H.
ENGINE GROUP	5000000			
PS 13 ENGINES	5010000		91722868	
			917228	
PS 13 ENGINES SERV ACCESS	5010100		145063	
			1450	
ACC GEAR BOX ON FUS D B	502000156		452457	
ACC GEAR BOX ON FUS E B	502000258		2366060	
			28184	
ENGINE CONTROLS	5030000			
ENGINE CONTROLS F F	503000152		145816	
ENGINE CONTROLS C F	503000254		26430	
ENGINE CONTROLS D B	503000356		50849	
ENGINE CONTROLS E B	503000458		101363	
			3243	
STARTER AND ENG GEAR BOX	5040000		3154561	
			31545	
ENGINE ANTI ICING	5050000		700058	
			7000	
FIRE EXT SYSTEM	5060000			
55 ENG FIRE EXT SYSTEM ENG	506000158		640070	
55 ENG FIRE EXT SYSTEM D B	506000256		14655	
			6546	
ENGINE MTGS AND BRACKETS	5070000			
ENGINE MOUNTS	5070001		842167	
ENGINE MTG ACCESSORIES	5070002		481764	
			13238	
FUEL SYSTEM	5080000			

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INCE NO.		COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
00000							
00000			917228	68803	12119	631080381	111158861
			917228			631080381	111158861
0100			1450	63819	10390	925376	150655
			1450			925376	150655
00001	56		4524	57875	9607	2618265	434621
00002	58		23660	60609	10372	14340089	2454015
			28184			16958354	2888636
00000							
00001	52		1458	16129	12476	235161	181900
00002	54		264	30813	11789	81346	31123
00003	56		508	49991	13459	253954	68372
00004	58		1013	63982	10194	648138	103265
			3243			1218599	384660
00000							
00000			31545	61598	10524	19431089	3319796
			31545			19431089	3319796
00000			7000	58717	11600	4110190	812000
			7000			4110190	812000
00000							
00001	58		6400	70381	13414	4504384	858496
00002	56		1465	53181	13749	80764	20074
			6546			4585148	878570
00000							
00001			8421	67834	14106	5712301	1187866
00002			4817	64669	12857	3115106	6193.2
			13238			8827407	1807188
00000							

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SHEET.

COMP. NO.		WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
1	54	10713	40111	14010	4297091	1500891
2	56	14955	54070	10558	8086169	1578949
3	58	685	64414	12612	441236	86392
4	62	43900	55421	14428	24329819	6333892
5		626	65901	9594	412540	60058
6		754	61525	9658	463899	72821
		71633			38030754	9633003

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NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
000						
001	52	9523	16499	11530	1571200	1098002
002	54	954	38948	11764	371564	112229
005	83	12423	78817	22159	9791436	2752813
006	62	40670	71737	14376	29175438	5846719
007	64	30237	77068	13562	23303051	4100742
008		64670	982	14338	458544	92623
		94453			64671233	14003128
000						
001	56	23325	7442	9668	1339547	235458
002	58	39076	64784	11143	25314996	4354239
003	59	48758	75	10824	36420	5196
004	62	26264	70328	14737	18470946	3870526
005	64	11701	74076	13577	8667633	1588645
006	83	54067	6183	20881	4118453	1128827
		84827			57947995	11172891

AVRO AIRCRAFT LTD.
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WEIGHT AND C. OF G BY FUNCTION COMP

PROJECT _____

DESCRIPTION		REFERENCE NO.			COMP. NO.	WEIGHT	
FIXED EQUIPMENT GROUP		70000000					
INSTRUMENTS		70100000					
INSTRUMENTS		70100001			52		440
NAVIC TABLE AND STOWAGE		70100004			52		20
							460
COCKPIT SEALING		70200000			52		50
							50
OXYGEN SYSTEM		70300000					
OXYGEN SYSTEM		70300001			52		260
							260
AIR CONDITIONING SYSTEM		70400000					
AIRCONDITIONING SYST F F		70400001			52		1232
AIRCONDITIONING SYST C F		70400002			54		5752
AIRCONDITIONING SYST D B		70400003			56		207
AIRCONDITIONING SYST C A		70400005					1236
AIRCONDITIONING SYST ENC		70400006					125
AIRCONDITIONING SYST I W		70400007			62		6
							8560
HYDRAULICS MAIN SYSTEM		70500000					
14	UTILITY HYDRAULICS F F	70500001			52		841
31	UTILITY HYDRAULICS C F	70500002			54		427
20	UTILITY HYDRAULICS D B	70500003			56		2733
21	UTILITY HYDRAULICS E B	70500004			58		724
24	UTILITY HYDRAULICS I W	70500005			62		1351
14	UTILITY HYDR NOSE U C	70500006			91		32
24	UTILITY HYDR MAIN U C	70500007			92		298
							6408
CABIN INSULATION		70700000			52		143
							143
BRAKE PARACHUTE		70800000					
BRAKE PARACHUTE F F		70800001			52		45
BRAKE PARACHUTE R F		70800005			59		852

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REPORT NO. _____

SHEET _____

REFERENCE NO.				COMP. NO.	WEIGHT		H. ARM		V. ARM		H. MOMENT		V. MOMENT	
70000000														
70100000														
70100001				52	4407	16112	13909				710056		612970	
70100004				52	200	22000	13000				44000		26000	
					4607						754056		638970	
70200000				52	500	18600	13000				93000		65000	
					500						93000		65000	
70300000														
70300001				52	2607	24054	15670				627088		408517	
					2607						627088		408517	
70400000														
70400001				52	12321	22460	11998				2767297		1478274	
70400002				54	57523	29290	13798				16848487		7937024	
70400003				56	2074	51417	12569				1066389		260681	
70400005					12366	56545	13703				6992355		1694513	
70400006					1255	67000	13900				840850		174445	
70400007				62	61	51779	15751				31585		9608	
					85600						28546963		11554545	
70500000														
70500001				52	8415	20016	10853				1684346		913280	
70500002				54	4272	43480	10431				1857466		445612	
70500003				56	27338	55692	11077				15225079		3028230	
70500004				58	7240	60647	10852				4390843		785685	
70500005				62	13511	55304	14234				7472123		1923156	
70500006				91	325	19033	9521				61857		30943	
70500007				92	2980	54325	14100				1618885		420180	
					64081						32310599		7547086	
70700000				52	1431	18748	13200				268284		188892	
					1431						268284		188892	
70800000														
70800001				52	455	16913	12869				76954		58554	
70800005				59	85288	22051	4394				7010442		1227520	

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PROJECT _____

DESCRIPTION		REFERENCE NO.				COMP. NO.	WEIGHT		H
BRAKE PARACHUTE I W		70800006	62				1246		
							9107		
ELECTRICAL SYSTEM		70900000							
ELECTRICAL WIRING R N		70900001	51				129		
ELECTRICAL WIRING F F		70900002	52				2966	11	
ELECTRICAL WIRING C F		70900003	54				2354	31	
ELECTRICAL WIRING A I		70900004	55				1274	21	
ELECTRICAL WIRING D B		70900005	56				9015	51	
ELECTRICAL WIRING E B		70900006	58				645		
ELECTRICAL WIRING I W		70900008	62				8909	51	
ELECTRICAL WIRING FIN		70900009	83				3527		
ELECTRICAL WIRING NUC		70900010	91				3301		
ELECTRICAL WIRING ENG		70900011					2002	60	
ELECTRICAL WIRING C A		70900012					1374	63	
ELECTRICS F F		70900013	52				1524	81	
ELECTRICS C F		70900014	54				8709	41	
ELECTRICS E B		70900015	58				6706		
ELECTRICS ENG		70900016					1863	25	
ELECTRICS C A		70900017					7186		
ELECTRICS FIN		70900018	83				8389		
ELECTRICS I W		70900019	62				2336	62	
ELECTRICS CAW		70900020					1126		
ELECTRICS MUC		70900021	92				7451		
20	ELECTRICS A I	70900022	55				4900	22	
ELECTRICS D B		70900023	56				3098	95	
ELECTRICS R F		70900024	59				1368		
WINDSCREEN DEMISTING		70900025	52				3564	19	
SPARROW ELECTRICS F F		70900026	52				2541	18	
SPARROW ELECTRICS C F		70900027	54				6027		
							1276	26	
L P PNEUMATICS		71000000							
24	L P PNEUMATICS F F	71000001	52				2255	19	
18	L P PNEUMATICS C F	71000002	54				6713		
L P PNEUMATICS D B		71000003	56				4185		
L P PNEUMATICS E B		71000004	58				1526	68	
L P PNEUMATICS FIN		71000005	83				6407		
L P PNEUMATICS R N		71000006	51				124		
L P PNEUMATICS S P		71000007	94				6029		
							5694		
INTAKE DE ICING		71200000	55				8800	19	
							8800		
RADIO AND RADAR FIXED		71400000							

AVRO AIRCRAFT LTD.
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WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

REPORT NO.

PROJECT.

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DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
RADIO AND RADAR FIXED R N	7140000151		20900	8999	10000	1880791	2090000
RADIO AND RADAR FIXED F F	7140000252		12700	18977	10945	2410079	1390015
RADIO AND RADAR FIXED C F	7140000354		19000	26782	10042	5088580	1907980
RADIO AND RADAR FIXED D B	7140000456		1800	51200	10000	921600	180000
RADIO AND RADAR FIXED F IN	7140000583		4700	79123	26004	3718781	1222188
RADIO AND RADAR FIXED C A	71400006		17600	21329	12364	3753904	2176064
			76700			17773735	8966247
29 CANOPY ACTUATION	7160000052		6492	22199	15435	1441159	1002040
			6492			1441159	1002040
CABIN CONSOLES	7170000052		1738	17463	12432	303507	216068
			1738			303507	216068
RADAR DOOR ACTUATION	7180000054		1000	26800	9500	268000	95000
			1000			268000	95000
SURFACE FINISH F F	7190000152		363	18744	12200	68041	44286
SURFACE FINISH CANOPY	7190000253		642	20218	15900	12940	10176
SURFACE FINISH C F	7190000354		1400	37197	12455	520758	174370
SURFACE FINISH 2NTAKES	7190000455		408	22798	12020	93016	49042
SURFACE FINISH D B	7190000556		377	53828	11200	202932	42224
SURFACE FINISH E B	7190000658		443	66701	11200	295485	49616
SURFACE FINISH R F	7190000759		648	80362	13175	520746	85374
SURFACE FINISH I W	7190000862		315	160144	14400	1895137	453744
SURFACE FINISH O W	7190000964		106	770650	13590	753836	145005
SURFACE FINISH O W L EDGE	719001065		319	63948	13526	203994	43148
SURFACE FINISH AILERON	719001174		353	79190	13556	279541	47853
SURFACE FINISH ELEVATOR	719001282		566	75523	14260	427460	80712
SURFACE FINISH FIN	719001383		639	74663	20837	477097	133148
SURFACE FINISH RUDDER	719001484		202	81279	21431	164184	43291
			10000			5915167	1401989

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

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WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

REPORT NO. _____

SHEET _____

		REFERENCE NO.				COMP. NO.	WEIGHT		H. ARM	V. ARM	H. MOMENT		V. MOMENT	
R	N	714000	0151				20900	8999	10000		1880791		2090000	
F	F	714000	0252				12700	18977	10945		2410079		1390015	
C	F	714000	0354				19000	26782	10042		5088580		1907980	
D	B	714000	0456				1800	51200	10000		921600		180000	
F	I	714000	0583				4700	79123	26004		3718781		1222188	
C	A	714000	06				17600	21329	12364		3753904		2176064	
							76700				17773735		8966247	
		716000	0052				6492	22199	15435		1441159		1002040	
							6492				1441159		1002040	
		717000	0052				1738	17463	12432		303507		216068	
							1738				303507		216068	
		718000	0054				1000	26800	9500		268000		95000	
							1000				268000		95000	
		719000	0152				363	18744	12200		68041		44286	
		719000	0253				64202	18159	00		12940		10176	
		719000	0354				1400	37197	12455		520758		174370	
S		719000	0455				408	22798	12020		93016		49042	
		719000	0556				377	53828	11200		202932		42224	
		719000	0658				443	66701	11200		295485		49616	
		719000	0759				648	80362	13175		520746		85374	
		719000	0862				315	16014	14400		1895137		453744	
		719000	0964				106	77065	013590		753836		145005	
EDGE		719000	1065				319	63948	13526		203994		43148	
N		719000	1174				353	79190	13556		279541		47853	
OR		719000	1282				566	75523	14260		427460		80712	
		719000	1383				639	74663	20837		477097		133148	
		719000	1484				202	81279	21431		164184		43291	
							10000				5915167		1401989	

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL GROUP
COMPONENT

PROJECT _____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. AR
REMOVABLE EQUIPMENT GROUP	8000000			
77 EJECTOR SEATS	8010100	52	33906	204
			33906	
RADAR REMOVABLE	8020100			
RADAR REMOVABLE R N	8020101	51	103930	88
RADAR REMOVABLE F F	8020102	52	20910	184
RADAR REMOVABLE C F	8020103	54	60770	272
RADAR REMOVABLE D B	8020104	56	7550	514
RADAR REMOVABLE F I N	8020105	63	3500	730
RADAR REMOVABLE C A	8020106		3830	552
RADAR REMOVABLE E B	8020107	58	4500	735
RADAR REMOVABLE I #	8020108	62	3000	550
			207990	
DAMPING SYSTEM	8030000			
DAMPING SYSTEM F F	8030101	52	784	172
DAMPING SYSTEM C F	8030102	54	2303	322
DAMPING SYSTEM E B	8030103	58	3696	32
DAMPING SYSTEM I W	8030104	62	6070	537
DAMPING SYSTEM O W	8030105	64	9574	8
DAMPING SYSTEM R N	8030106	51	287	73
DAMPING SYSTEM C A	8030107		8107	496
			18015	
SPARROW PACK	8050000			
SPARROW PACK STRUCTURE	8050100	94	89019	381
			89019	
SPARROW PACK MECHANISMS	8050200	94	55112	374
			55112	
SPARROW PACK HYDRAULICS	8050300	94	33194	373
			33194	
SP PACK ELECTRONICS FIXED	8050400	94	21711	335
			21711	

PROJECT_____

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

[illegible]

REPORT NO. _____

SHEET _____

[illegible]

WEIGHT AND C. OF G BY FUNCTIONAL G COMPONENT

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. A.
OPERATIONAL LOAD	90000000			
CREW MEMBERS	9010000052		39000	194
			39000	
ENGINE OIL	90200000			
ENGINE OIL DRAINABLE	90200001		9290	652
ENGINE OIL TRAPPED ENG	90200002		1773	636
ENGINE OIL TRAPPED D B	9020000356		1925	580
ENGINE OIL TRAPPED E B	9020000458		909	599
			13897	
SPARROW MISSILES	9030000094		172800	389
			172800	
OXYGEN CHARGE	90400000			
OXYGEN CHARGE F F	9040000152		72204	
OXYGEN CHARGE C F	9040000254		1267	262
			1339	
ENGINE FIRE EXT FLUID	90600000		2500	730
			2500	
RESIDUAL FUEL	90700000			
RESIDUAL FUEL C F	9070000154		4680	394
RESIDUAL FUEL I W	9070000262		17160	597
			21840	
WATER FOR AIR CONDITIONING	9100000054		26000	268
UNUSABLE WATER FOR AIRCOND	9100000154		1500	267
			27500	

WEIGHT AND C. OF G BY

FUNCTIONAL GROUP COMPONENT

REPORT NO.

SHEET

ENGINEERING

FLIGHTING
AIR COND