

QCX
Avro
CF105
R-7-0400-34
Iss-23

FILE IN VAULT

Arrow Report: 7-0400-34
Prod. A/C Issue : 23

WEIGHT & C.G. SUMMARY

CONFIDENTIAL

1 Sept/58



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Report no.: QCX - AVRO - CF105 - R-7-0400-34-ESS.23

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

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AVRO AIRCRAFT LIMITED
INTER-DEPARTMENTAL MEMORANDUM

Ref: 3222/11/J
Date: 1 September, 1958
To: See Distribution
From: E.F. Burnett - Weight Supervisor
Subject: Arrow 2 Production A/C Weight and C.G. Summary Report: 7-0400-34 Issue 23

Attached is a copy of Weight and C.G. Summary Report 7-0400-34 Issue 23 dated September, 1958, for your retention.

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

Classification ~~cancelled~~ ^{confirmed as} 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 *ppky*
E.F. Burnett

EFB/ag
cc: 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 D. Brownridge
J.W. Ames A. Cornish
B.C. Alford T. Roberts
D. Wade C. Marshall
D.N. Scard J. Zurakowski
A.R. Buley A. Crust (6 copies for R.C.A.F.)



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Prod. A/C
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I N D E X

<u>Sheet</u>	<u>Content</u>
1-1 to 1-4	Introductory notes and explanation of Weight changes.
2-1 to 2-2	Weight & C.G. Summary
3	Horizontal C.G. Plot showing basic fixed points on flight envelope. The possible variations of C.G. with fuel used has been omitted until such time as fully approved fuel sequencing is established.
4-1 to 4-15	I.B.M. Detail sheet of Weight and C.G.'s

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Sheet : 1-1

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Introduction & Weight Changes

The following is a Weight & C.G. Summary of the Arrow 2 Production Aircraft, serial No. 25237 and subsequent, based on the latest weight estimates available. All Weight & C.G. changes are relative to Issue 22 of August 1st, 1958.

Early Arrow 2 Aircraft ie 25206 to 25236, will not be as this summary designates, but will be Flight Test Vehicles with Instrumentation, missile pack trials, some aircraft will have "Astra Minus" etc. etc. Appropriate weight statements will be issued at a later date.

General:

- a) Orenda PS13 Engines comprise the Power Plant (4,800 lb each, revised weight, excluding Nose Bullet, Input Frame and AVRO installed accessories).
- 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 unit weights quoted herein are as received from R.C.A. in their weight statement dated June 5th, 1958. This includes the Infra Red Tracker system seeker head installed in its Fin Pod location.

(Total weight of the installed system is 3336 lb, including Missile actuation and firing systems).

In addition to the above, Minneapolis-Honeywell MH64 Damping system is installed.

Arrow 2 Aircraft 25206 to 25208, and some later serial numbers will have the "Astra Minus" system (Navigational and Communication equipment only).

- d) Where actual weights of Arrow I parts that apply to Arrow 2 Aircraft have been obtained, these weights have been recorded in the Arrow 2 records, some weights for Arrow 2 parts have also been obtained.

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

- e) To increase the long range capabilities of the Aircraft tailcone plugs have been introduced to restrict the exhaust area. Provision for carrying these plugs, which are jettisonable, will be made on all Mk 2 A/C. The plug may be installed for any mission, but would probably be jettisoned prior to combat. It is only recorded in this report for a ferrying mission.

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1. Structure

Weight lb

a) Wings

I/W F/Spar to M/Spar Struct - prelim. estimate of the wt.
increase due to increase in
Stringer gauges in the
redesign of tanks #3 & #4. + 12.00

Wing Weight Increase + 12.00

b) Fin & Rudder

No weight change.

c) Fuselage Fwd Sta 255 ins

Misc. Items F.F. - addition of foot guards beneath the
instrument panels to protect projecting
instruments. + 5.14

Crews Bulkheads - Nav. seat fitting now machined was
fabricated + 0.11

Additional stiffener & bracketry on Pilot's
bulkhead + 3.08

Jack retraction bracket now Steel was Alum. + 1.35

Front Fuselage Increase + 9.68

d) Centre Fuselage Sta 255 - 485 ins

Electronics Bay Struct. - Prodn. drgs est. of side doors in
which latches have replaced Camlocs + 1.86

Bulkhead Sta 485 ins - addn of brackets & clips for fuel
lines and electric cables + 0.75

Centre Fuselage Increase + 2.61

e) Duct Bay Sta 485-591.65 ins

Centre Panel Aft - misc. prodn. drg. changes to brackets,
stiffeners etc. + 0.46

Lower Panel Fwd - redesign for A/C 25209 & subsequent, alts.
to mtg. brkts. & fuel vent fairings + 2.30

Access Panels - redesign of electrics access door &
modification to refuel & limiter door 0.85

Drop Tank Mtg Struct - redesign of main housing casting
error in earlier calculations - 1.12
- 1.80

Duct Bay Decrease - 1.01

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1. Structure (Cont'd)

Weight lb

f) Engine Bay Sta 591.65 - 742.5 ins

Bottom Panel Aft - added mtg brackets etc. prodn. drg reissues + 2.44
Heavy Formers - Prodn. drg. reissues + 0.12

Total Engine Bay Increase + 2.56

g) Rear Fuselage Sta 742.5 ins aft

Tunnel fixed R.F. - insulation is now .006 Al. foil on
outside & 9.6 lb/cu.ft. core was .002
+ .003 Steel foil & 5 lb/cu.ft. core + 3.24
Access Doors R.F. - insulation changed as above + 1.62
Centre Struct & Stinger, remov. - prodn. drg. ests. of
insulation core & foil also
seals, previously wt.
allowances + 4.15

Rear Fuselage Increase + 9.01

h) Fuselage Joints

No weight change.

Total Structural Increase + 34.85

2. Landing Gear

No weight change.

N.B. Early Mk 2 A/C will have a considerably heavier Main Gear (probably about + 55 lb/side) since existing forgings etc. are to be utilized. However for the Mk 2 consolidated design applicable to production A/C it is hoped to maintain the currently recorded wt. of 675 lb/leg (ie incl. drag. stay, less wheel assys.).

3. Power Plant & Services

Fuel System - increase in weight of fuselage bag tanks based on actual weights obtained for Mk 1 tanks. Manufacturer's quoted weights were previously recorded. + 13.18

Total Power Plant Group Increase + 13.18

4. Flying Controls Group

Mechanical Flying Controls - all prod. drg. ests revised to current issues - 0.05

Total Flying Controls Decrease - 0.05

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<u>5. Equipment Group</u>	<u>Weight lb</u>
Air Conditioning - addition of ducting for cooling IR seeker head in fin	+ 12.22
Instruments - 1st est. to Mk 2 data. Earlier ests. were based on Mk 1, all Radio & Radar Equip & elect. panels are included in their appropriate grouping elsewhere -	11.46
Electrics F.F. - first est. to Mk 2 prod. drgs.	- 0.08
Electrics C.F. - first est. to Mk 2 prod. drgs	- 0.28
Anti-skid control unit was erroneously duplicated here.	- 13.50
Electrics Fin - first est. to Mk 2 prod. drgs	- 0.39
<u>Total Equipment Group Decrease</u>	<u>- 13.49</u>

6. Trapped Fuel
No weight change.

7. Operational Load
No weight change.

Summary

Wt Change - Aircraft Basic Weight

Structure	+ 34.85
Power Plant	+ 13.18
Flying Controls	- 0.15
Equipment	- 13.49
	<u>+ 34.49</u>

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

Issue 22

47,227.45

Issue 23

47,261.94

+ 34.49 lb

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Wt. & C.G. Summary Full Astra I Installed

Description	Weight lb	H. Arm	V. Arm
Structure	19,212.09	566.62	137.30
Wings	10,041.11	642.92	142.18
Fin & Rudder	1,041.35	753.96	208.83
Fuselage Fwd Sta 255 ins	2,599.15	184.59	128.63
Sta 255 - 485 ins	1,714.59	375.78	129.90
Sta 485 - 591.65 ins	1,160.24	538.44	105.63
Sta 591.65 - 742.5 ins	1,576.20	659.72	110.71
Sta 742.5 ins aft	1,036.81	806.89	129.18
"Marry-Up"	42.64	466.91	109.85
Landing Gear - Retracted	2,681.98	489.14	135.04
Main Landing Gear	2,032.67	538.85	141.00
Main Gear Doors & Fairings	287.98	538.52	138.40
Nose Landing Gear	333.81	170.81	99.70
Nose Gear Door & Fairing	27.52	162.22	88.66
Power Plant & Services	11,446.72	671.83	121.41
Engines Bare FS 13	9,600.00	689.94	121.25
Engine Accessories (Inlet frame etc)	303.04	607.92	119.29
Engine Controls	32.32	379.90	117.49
Gear Box & Drives on Fuselage	293.93	602.67	102.24
Gear Boxes & Starters on Engine	305.20	614.82	105.66
Fire Extinguisher System	73.58	686.35	131.21
Engine Mountings	75.39	671.91	141.52
Fuel System	763.26	529.78	135.19
Flying Controls Group	1,932.26	651.64	138.17
Mechanical Flying Controls	958.44	677.70	147.63
Hydraulic Flying Controls	973.82	626.00	128.86
Equipment Fixed & Remov.	9,110.73	332.34	114.28
Instruments	34.61	167.52	138.92
Probe	15.25	-23.71	108.00
Cockpit Pressure Sealing	5.00	186.00	130.00
Cabin Consoles	17.28	174.66	124.33
Oxygen System	26.07	240.54	156.70
Cockpit Equipment	6.00	187.50	145.00
Ejector Seats	342.94	204.50	134.11
Air Conditioning System	876.31	346.37	136.25
Cockpit Insulation	14.31	187.48	132.00
Hydraulics Utilities System	631.57	503.07	118.31
Sequencing of Nose U/C Door	27.00	200.00	115.00
Mech. Door Stops Main U/C Doors	3.02	516.00	120.00
Anti-skid Control System	37.68	480.00	113.97
Drag Chute	91.07	786.68	143.19
Electrical System	1,254.16	439.96	112.66
Low Pressure Pneumatics	50.08	394.63	126.02
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
Radas Door Actuation	10.00	268.00	95.00
Radio & Radar Remov.	2,110.48	212.15	108.76
Radio & Radar Fixed	880.04	216.54	114.59
MH64 Damping System	186.42	462.33	134.70
Sparrow Pack Structure	906.31	383.90	128.72

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Description	Weight lb	H. Arm	V. Arm	M.A.C. %
Sparrow Pack Mechanisms	557.32	372.64	99.11	
Sparrow Pack Hydraulics	369.70	378.00	104.00	
" " Elec & Electronics Fixed	188.73	336.09	110.00	
Sparrow Pack Air Conditioning	5.21	305.50	102.50	
Sparrow Pack L.P. Pneumatics	24.45	386.92	103.50	
Sparrow Pack Electronics Remov.	186.80	326.19	100.00	
Trapped Fuel	213.80	548.26	141.79	
U/C Up		544.70	128.44	
Aircraft Basic Weight	44,597.58			
U/C Down		546.99	124.65	
Useful Load (Less usable Fuel)	2,664.36	363.22	101.81	
Crew	390.00	194.00	136.50	
Engine Fire Ext Fluid	25.00	730.00	129.00	
Oil	138.97	636.92	110.57	
Oxygen Charge	13.39	259.68	159.91	
Water for Air Conditioning	285.00	267.91	131.56	
Missiles	1,728.00	389.29	88.30	
Missile Cocoons	84.00	390.40	85.80	
U/C Up		534.47	126.94	27.21
Operational Weight Empty	47,261.94			
U/C Down		536.63	123.36	27.80
Normal Combat Mission Fuel ϕ (200 Nav miles = 2290 gals at 7.8 lb/gal)	17,864.00	-	-	
Normal Gross Weight	65,125.94	-	-	
Half Combat Mission Fuel (1145 gals at 7.8 lb/gal)	8,932.00	-	-	
Combat Weight ($\frac{1}{2}$ mission fuel)	56,193.94	-	-	
Max. Internal Fuel (2491 gals at 7.8 lb/gal)	19,433.00	541.85	144.16	
U/C Up		536.62	131.96	27.80
Gross Weight (Max Int. Fuel)	66,694.94			
U/C Down		538.15	129.42	28.22
Max External Fuel (500 gal @ 7.8 lb/gal + drop tank)	4,242.36	520.32	60.79	
Tailcone plugs *	252.00	857.07	128.60	
U/C Up		536.78	127.71	27.84
Max Gross Wt. (Int + Ext fuel)	71,189.30			
U/C Down		538.22	125.33	28.24

* Ref Note e) in Introduction.

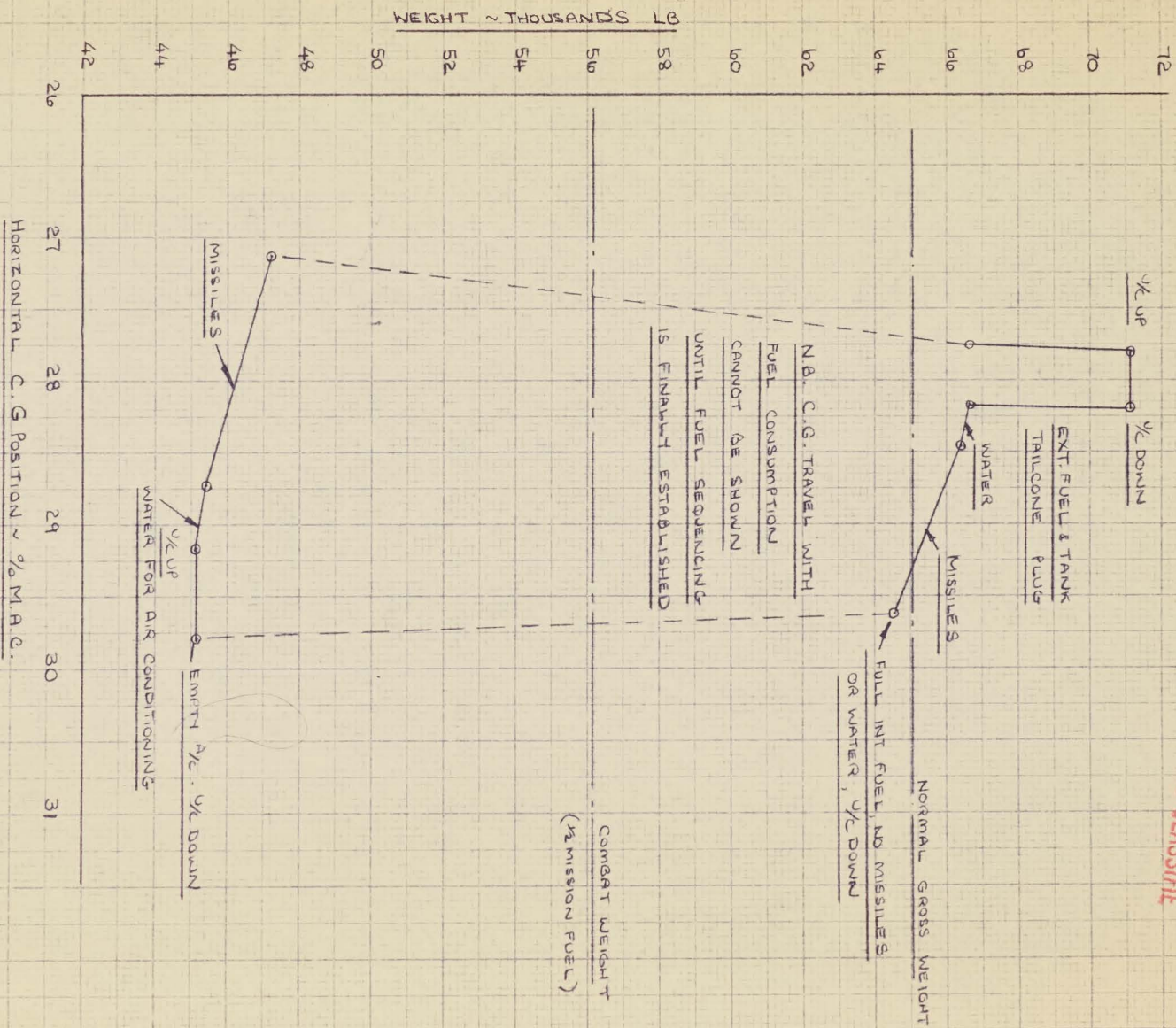
ϕ Fuel weights in accordance with latest data issued by Performance group dated November 19th, 1957. Centres of Gravity have temporarily been omitted until a fuel sequencing system is finally established.

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

REPORT No. 7-0400-34 ISSUE 23
DATE: Sept 1st 1958
SHEET: 3
BY: K. R. Brown & J. W. J.

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WEIGHT AND C. OF G BY FUNCTIONAL COMPONENTS

DESCRIPTION		REFERENCE NO.	COMP. NO.	WEIGHT	H.
TOTAL WING GROUP		1000000			
OUTER WING		1010000			
100	OUTER WING SKINS	10100001	64	9291070	
100	POSTS AND INTERCOSTALS	10100002	64	243673	
100	OUTER WING SPARS	10100003	64	392587	
100	OUTER WING RIBS	10100004	64	1345669	
18	AILERON CONTROL BOX	10100006	64	3792077	
100	RIB 12	10100007	64	762664	
100	O W AILERON JACK FITTING	10100009	64	104672	
	AILERON JOINTS AND FAIRING	1010010		329378	
				197945	
100 AILERON		1020000	74	3360079	
				33600	
20 ELEVATOR		1030000	82	4463875	
20 ELEVATOR MARRY UP		10300001		159773	
				46235	
INNER WING		1040000			
70	MAIN UC STRUCTURE	10400001	62	3331557	
16	INNER WING SPARS	10400002	62	4111258	
5	I W STRUCTURE F S TO M S	10400007	62	10973049	
	I W STRUCTURE M S TO R S	10400008	62	1513060	
	STRUCT AFT OF REAR SPAR	10400009	62	3163972	
40	ELEVATOR CONTROL BOX I W	1040010	62	4283872	
25	TRANSP JOINT MARRY UP	1040011		706563	
38	CENTRE LINE JOINTS	1040012	62	5908366	
	INNER WING SKINS	1040013	62	2510762	
17	STRUT PICK UP FITTINGS	1040014	62	1274061	
8	RIBS 1 TO 9 INNER WING	1040016	62	4861861	
74	DORSAL FAIRINGS I W	1040017	62	9548	
	RIB 10	1040018	62	1080063	
49	FUSELAGE HINGE JOINT I W	1040019	62	1262861	
25	TRANSP JOINT	1040020	62	1294263	
49	FUSELAGE HINGE JOINT	1040021		393553	
74	DORSAL FAIRINGS C A	1040023		603357	
	SHUT OFF VALVE OPERAT MECH	1040024	62	51354	
	LEADING EDGE I W	1040025	62	2213846	
				695461	
LEADING EDGE O W		1050000	65	3087063	
				30870	

IGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

REPORT NO. _____

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SHEET _____

	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
	1000000						
	1010000						
	1010000164		92910	70646	13597	65637199	12632973
	1010000264		24367	3207	13410	1783323	326668
	1010000364		39258	70608	13579	27719289	5330844
	1010000464		13456	69506	13650	9352727	1836744
	1010000664		37920	77409	13508	29353493	5122234
	1010000764		76266	4873	13832	4947215	1054828
ING	1010000964		10467	2791	13670	761394	142988
RING	10100010		32937	8726	13224	2592447	435466
			197945			142147087	26882745
	102000074		33600	79213	13556	26615568	4554816
			33600			26615568	4554816
	103000082		44638	75618	14260	33754363	6365379
	10300001		15977	3810	14260	1178746	227732
			46235			34933109	6593111
	10400000						
	1040000162		33315	57743	13983	19237080	4658436
	1040000262		41112	58060	14318	23869627	5686416
S	1040000762		109730	49924	14391	54781605	15791244
R	1040000862		15130	60868	14563	9209328	2203382
W	1040000962		31639	72041	14887	22793052	4710098
	104001062		42838	72470	14328	31044699	6137829
	1040011		70656	3621	13876	4494824	980339
	104001262		59083	66241	15030	39137170	8880175
	104001362		22510	76272	14469	141202868	32570732
	104001462		12740	61711	14584	7861981	1858002
	104001662		48618	61173	14513	29741089	7055930
	104001762		9548	280	16150	45866	15343
	104001862		10800	63683	13835	6877764	1494180
W	104001962		12628	61688	13790	7789961	1741401
	104002062		12942	63071	13710	8162649	1774348
	1040021		39355	3234	14364	2094758	565223
	1040023		6033	57025	16034	3440318	967331
MECH	104002462		5135	4965	14180	281970	72743
	104002562		22138	46641	14423	10369661	3192964
			695461			422436270	100556116
	105000065		30870	63013	13561	19452113	4186281
			30870			19452113	4186281

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENTS

PROJECT_____

[illegible]

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

PROJECT _____

	DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H
	SKIN D B	3040001	56	62275	5
5	FORMERS D B	3040002	56	73355	5
	TOP LONGERONS	3040003	56	4985	5
	MTG BRKTS SIDE PANEL	3040004	56	1905	5
	LOWER LONGERONS	3040005	56	10301	5
72	MAIN FRAME STA 53B 77	3040006	56	59805	5
	ACCESS PANELS	3040007	56	38745	5
	LOWER PANEL ASSY	3040008	56	21754	5
	DROP TANK MTG STRUCTURE	3040009	56	84158	5
20	LOWER SIDE PANELS FWD	3040010	56	107125	5
	LOWER CENTRE PANEL FWD	3040011	56	27915	5
	LOWER SIDE PANELS AFT	3040012	56	66985	5
	LOWER CENTRE PANEL AFT	3040013	56	26095	5
	FLOATING DUCT D B	3040014	56	45555	5
				103828	
	ENGINE BAY	3050000			
100	TOP LONGERONS	3050001	58	67466	
84	BOTTOM LONGERONS	3050002	58	84326	5
	ENGINE ACCESS DOORS	3050003	58	136046	4
	ENGINE TUNNEL	3050004	58	613246	5
71	ENG RAILS ATTACH TO FORM	3050005	58	290668	
	PANELS AT ENG ACCESS DOORS	3050006	58	111176	5
	BOTTOM CTR PANEL FWD	3050007	58	46106	1
	BOTTOM CTR PANEL CENTRE	3050008	58	412067	
	BOTTOM CTR PANEL AFT	3050009	58	766672	
5	SIDE PANEL FRONT	3050010	58	86056	1
5	SIDE PANEL CENTRE	3050011	58	747467	
32	SIDE PANEL AFT	3050012	58	745372	
41	HEAVY FORMERS	3050013	58	196356	6
				157620	
	REAR FUSELAGE	3060000			
	SKIN OUTER FIXED R F	3060001	59	557977	
	FORMERS FIXED R F	3060002	59	1050977	
	LONGERONS FIXED R F	3060003	59	251977	
	TUNNEL FIXED R F	3060004	59	1099477	
	ENGINE ACCESS DOORS R F	3060005	59	902377	
	FAIRING UNDER RUDDER FIXED	3060006	59	283978	
	REMOV TAILCONES	3060007	59	5130982	
	CENTRE STRUC STING REM R F	3060008	59	1090981	
				103681	
	DIVE BRAKES	3070001	72	117905	0
	D B JOINT TO FUSELAGE	3070002		40648	
				12196	

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENTS

PROJECT _____

[illegible]

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

PROJECT _____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H.
ENGINE GROUP	5000000			
PS 13 ENGINES	5010000		99030468	
			990304	
ACC GEAR BOX ON FUS D B	5020001	56	523357	
ACC GEAR BOX ON FUS E B	5020002	58	2336060	
ACC GEAR BOX ON FUS C A	5020003		80061	
			29393	
ENGINE CONTROLS	5030000			
ENGINE CONTROLS F F	5030001	52	157618	
ENGINE CONTROLS C F	5030002	54	10928	
ENGINE CONTROLS E B	5030004	58	88966	
ENGINE CONTROLS I W	5030005	62	65852	
			3232	
STARTER AND GEARBOX	5040000			
STARTER AND GEARBOX ENG	5040001		3021561	
STARTER AND GEARBOX C A	5040002		30565	
			30520	
FIRE EXT SYSTEM	5060000			
ENG FIRE EXT SYSTEM E B	5060001	58	598571	
ENG FIRE EXT SYSTEM D B	5060002	56	123156	
ENG FIRE EXT SYSTEM ENG	5060003		14267	
			7358	
ENGINE MTGS AND BRACKETS	5070000			
ENGINE MOUNTS	5070001		753967	
			7539	
FUEL SYSTEM	5080000			
17 FUEL SYSTEM C F	5080001	54	1128039	
18 FUEL SYSTEM D B	5080002	56	1573553	
4 FUEL SYSTEM E B	5080003	58	183661	
39 FUEL SYSTEM I W	5080004	62	4728055	
FUEL SYSTEM C A	5080005		19568	
			76326	

WEIGHT AND C. OF G BY FUNCTIONAL
COMPON

PROJECT_____

[illegible]

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENTS

[illegible]

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

PROJECT_____

[illegible]

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY

**FUNCTIONAL
COMPONENT**

PROJECT _____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H.
OPERATIONAL LOAD	9000000			
CREW MEMBERS	9010000	52	39000	19
			39000	
ENGINE OIL	9020000			
ENGINE OIL DRAINABLE	9020001		9290	65
ENGINE OIL TRAPPED ENG	9020002		1773	62
ENGINE OIL TRAPPED D B	9020003	56	1925	58
ENGINE OIL TRAPPED E B	9020004	58	9095	59
			13897	
SPARROW MISSILES	9030000	94	172800	38
			172800	
DISPOSABLE COCOONS	9040000	94	8400	39
			8400	
OXYGEN CHARGE	9050000			
OXYGEN CHARGE F F	9050001	52	7220	
OXYGEN CHARGE C F	9050002	54	12672	
			1339	
ENGINE FIRE EXT FLUID	9060000		25007	73
			2500	
TRAPPED FUEL	9080000			
TRAPPED FUEL C F	9080001	54	2430	41
TRAPPED FUEL D B	9080002	56	6904	99
TRAPPED FUEL I W	9080003	62	18260	56
			21380	
WATER FOR AIR CONDITIONING	9100000	54	26000	26
UNUSABLE WATER FOR AIRCOND	9100001	54	2500	26
			28500	

