

Arrow 2
A/C 25206

Report: 7-0400-82
Issue: 2

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59

1 Oct/58



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Report no.: QCX - AVRO - CF105- R-7-0400-82-135-2

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

AVRO AIRCRAFT LIMITED
INTER-DEPARTMENTAL MEMORANDUM

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Ref: 4399/11/J
Date: 1 October, 1958
To: See Distribution
From: E.F. Burnett - Weight Supervisor
Subject: Arrow 2 - A/C 25206 Weight and C.G. Summary Report: 7-0400-82 Issue 2

Attached is a copy of Weight and C.G. Summary, Report: 7-0400-82 Issue 2 for your retention.

This report will be revised and issued monthly until an actual weighing of the aircraft has been obtained.

Classification cancelled / changed to: UNCLASSIFIED

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

Date: 5 Nov 1992

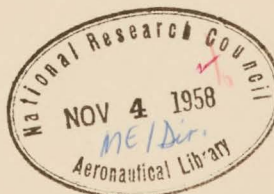
Signature: *E.F. Burnett*

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

E.F. Burnett
E.F. Burnett

EFB/ag

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Aircraft: Arrow 2
A/C 25206
Date : 1 October, 1958

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UNCLASSIFIED
NON CLASSIFIED
Report: 7-0400-82
Issue : 2

I N D E X

<u>Sheet</u>	<u>Content</u>
1-1 to 1-4	Introductory notes and explanations of weight changes relative to Mk 2 A/C 26206 defined in Weight Report 7-0400-82 Issue 1.
2-1 to 2-2	Weight & C.G. Summary
3-1	Horizontal C.G. Plot showing basic fixed points on flight envelope for ballasted Aircraft. The possible variations of C.G. with fuel used have 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

Aircraft: Arrow 2
A/C 25206
Date : 1 October, 1958

~~CONFIDENTIAL~~

Report: 7-0400-82
Issue : 2
Sheet : 1-1

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Introduction & Weight Changes

The following is a Weight and C.G. Summary for Arrow 2 Aircraft No. 25206, based on the latest weight estimates available. All Weight and C.G. changes are relative to issue 1, of this report, dated September 1st, 1958.

Note:

1. This summary is for the Aircraft as at first flight. Future changes eg possible fitment of Weapons Pack etc. will be dealt with as Flight Test Statements at the applicable time, if required.
2. This statement is applicable to Aircraft 25206 only.

General:

- a) Orenda PS 13 Engines comprise the Power Plant. These will be early production versions, weight 4835 lb each, ref. Orenda Engines Ltd. letter AWS/SAW dated August 21, 1958.

- b) An Instrument package containing Flight Test Instrumentation is installed.

Only a preliminary estimate of the contents of the pack is yet available, however the pack will be weighed separately prior to flight and ballasted if necessary, to compensate for equipment shortages.

A reasonably detailed estimate of other Flight Test Installations throughout the Aircraft has been made, these amount to 517 lb.

- c) "Partial Astra" is fitted in this and some other early Mk 2 Aircraft. This comprises Navigational and Communication equipment only.

Minneapolis-Honeywell MH 64 Damping System is also installed.

- d) For early flights of A/C 25206 additional emergency fire extinguishing equipment will be installed.
- e) Where actual weights of Arrow 1 parts that apply to Arrow 2 Aircraft have been obtained, these weights have been recorded in the Arrow 2 records. Some weights of 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.

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.

- f) This issue incorporates a Lucas-Rotax Electrical Power System and the Westinghouse components have been deleted.

Aircraft: Arrow 2
A/C 25206
Date : 1 October, 1958

CONFIDENTIAL
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NON-CLASSIFIED

Report: 7-0400-82
Issue: 2
Sheet: 1-2

1. Structure

Weight lb

a) Wings

Structure Aft. of Rear Spar - deletion of shear plates and shear blocks	-	0.36
Dorsal Fairings - incorporation of actual weights	-	1.02
Rib 10 - Actual weight obtained	-	0.94
<u>Wing Weight Decrease</u>	-	<u>2.32</u>

b) Fin and Rudder - deletion of hinge bracket for damper	-	2.03
additional hardware and brackets	+	1.07
addition seal for L/E & dorsal fairing brackets	+	1.13
<u>Fin and Rudder Weight Increase</u>	+	<u>0.34</u>

c) Fuselage Fwd Sta 255 ins

Cockpit Formers - addition of flying controls and electrical pick up brackets.	+	1.37
Top Longerons F.F. - addition brackets and hardware	+	2.01
Windscreen - addition fibre glass glare shield	+	1.46
Pilots Canopy - addition of brackets	+	0.53
Navigators Canopy - addition of hardware	+	0.21
<u>Front Fuselage Increase</u>	+	<u>5.58</u>

d) Centre Fuselage Sta 255 - 485 ins

No weight change.

e) Duct Bay Sta 485 - 591.65 ins

Lower Forward Side Panels - addition of clips and hardware	+	0.44
Centre Panel Fwd - relative to Prod. A/C access door not hinged deletion of fuel vent	-	1.05
<u>Duct Bay Decrease</u>	-	<u>0.61</u>

f) Engine Bay Sta 591.65 - 742.5 ins No weight change.

g) Rear Fuselage Sta 742.5 in aft

Outer Skins - addition of pulley support for para. brake controls and hardware	+	0.79
Tailcones - addition of skin stiffeners	+	1.43
addition of conduit and clips for electrics	+	1.98
Centre Struct & Stinger - addition of seal and door lock indication	+	0.26
<u>Rear Fuselage Increase</u>	+	<u>4.46</u>

h) Fuselage Joints

Joint Duct Bay to Engine Bay - addition of grounding pad & hardware	+	0.25
Design change addition of heat exchanger mountings previously omitted	+	7.05
<u>Fuselage Joints Increase</u>	+	<u>7.30</u>
<u>Total Structural Increase</u>	+	<u>11.75</u>

Aircraft: Arrow 2
A/C 25206
Date : 1 October, 1958

CONFIDENTIAL

Report: 7-0100-82
Issue : 2
Sheet : 1-3

2. Landing Gear

Weight lb

Main Gear - Design change heavy wheel assemblies now incorporated	+ 16.00
<u>Total Landing Gear Increase</u>	<u>+ 16.00</u>

3. Power Plant and Services

P.S. 13 Engines

a) Iroquois Engine - incorporated at 4835 lb each	+ 70.00
b) Structure - deletion of engine restrictor flaps	- 2.50
addition of minor brackets and hardware	+ 1.46
c) Inlet Frame & Nose Bullet - incorporation of Orenda estimate	- 28.00
d) Power Take-off Gear Box - previous weight assumed identical installation as for J75 engines - now only gear box to adapt diagonal drive shaft is required ref. Orenda.	- 79.55
e) Air Restrictor - Previously considered as an Avro Supplied item and included in Struct - now Orenda supplied.	+ 20.00
f) Pneumatic Starter - Orenda quotes target weight (23.0 lb)	+ 1.00
g) Anti-Icing Lines)	
h) Alternator Support) No previous allowance	+ 14.00
j) Alternator Drive Shaft)	
k) Tacho. Generator) Orenda Quotations	+ 8.00
l) L.P. High Temp. Tacho.)	
m) Installation Constant Speed Drives - both G.E. and Sundstrand quote 70.0 lb each.	- 7.00
n) Installation C.S.U. Oil Lines - first prod. dwg estimate	- 1.15
Accessories Gear Boxes on Fuselage - first prod. dwg. estimate	- 2.06
Starters and Gear Boxes on Engines see para. (d) above.	
<u>Total Power Plant Decrease</u>	<u>- 5.80</u>

4. Flying Controls Group

Flying Controls Hyd. I/W - return lines now steel (CST 162) were aluminum alloy (CST 136) Pressure lines increased in wall thickness now CST 136 were CST 135.	+ 17.24
Flying Controls Hyd. O/W - Arrow 1 filters (steel) now fitted were Arrow 2 aluminum alloy.	+ 12.90
Return lines now steel were allum. alloy)	+ 1.70
Pressure lines increase wall thickness)	
Flying Cont. Hyd. Fin - filter element retainer now steel was al. alloy + return lines now steel pressure lines increase in wall thickness	+ 0.59
	+ 1.16

The above changes necessitated by Stress requirements ref. Assignment X 74.4063.

<u>Total Flying Controls Increase</u>	<u>+ 33.68</u>
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Aircraft: Arrow 2
A/C 25206
Date : 1 October, 1958

UNCLASSIFIED
CONFIDENTIAL
Report: 1-0400-82
Issue : 2
Sheet : 1-4

5. Equipment Fixed and Removable

Weight lb

Oxygen System - first prod. estimate. Quantity gauge duplicated is error already included in Panel E22 Electrics Front Fuselage	-	1.24
Converter act. wt. 12.33 was based on Arrow 1 part (16,00)	-	3.67
Air Conditioning System - addition of cockpit silencers	+	9.91
Utility Hyd. Front Fuse. - incorporation of equip. & piping of the Nose U/C Door Sequencing	+	9.76
Nose U/C Door Sequencing Mech - this report is now cancelled see above	-	27.00

The large weight decrease (-17.24 lb) in the two combined report is due to design refinements and integration into basic Utility Hydraulic System. Previously an Arrow 1 "lash-up" allowance was carried.

Windscreen Demisting - first prod. estimate - deletion of cable allowance now contained in Electrics Cables	-	2.38
Electrics Centre Fus. - design change addition of 3 off Fire Detection Controls Units and resistor to Panel E 5	+	5.46
Elect. Duct Bay - Decrease in clipping	-	1.41
Design change - incorporated Lucas-Rotax Power system instead of Westinghouse Transformer	-	32.00
Rectifier Unit 164 lb (mfr. quote) was 196 lb (mfr. quote).		
Elect. Eng. Bay - design change addition of 2 off current transformer (Lucas-Rotax)	+	3.50
Electrics Wing - first production estimate	-	0.53
Electrics Rear Fus. - addition of clipping for cables associated with tailcone plug jettison circuits	+	0.40
Elect Tailcone Plug Jettison - new report incorporates equipment and wiring for actuation and indication circuits for the explosive bolts		

<u>Total Equipment Group</u>	-	<u>31.11</u>
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6. Tapped Fuel No weight change.

7. Useful Load

Eng. & Acces. Gear Box Oil - addition of separate oil sys. for constant units	+	23.04
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<u>Total Useful Load Increase</u>	+	<u>23.04</u>
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SUMMARY

Weight Change - Aircraft Basic Weight	
Structure	+ 14.75
Landing Gear	+ 16.00
Power Plant	- 5.80
Flying Controls	+ 33.68
Equipment	- 31.11

Total	+ 27.52 lbs
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Weight Change Operational Weight	Empty Operational Load Increase	23.04 lb
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Issue 1	
45,585.20	

Issue 2	
45,756.76	

+ 171.56 lb

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Aircraft: Arrow 2
A/C 25206
Date : 1 October, 1958

Report: 7-0400-82
Issue: 2
Sheet: 2-1
**UNCLASSIFIED
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Weight & C.G. Summary

Description	Weight lb	H. Arm ins	V. Arm ins
Structure	19,216.10	566.50	137.24
Wings	10,038.79	642.93	142.18
Fin and Rudder	1,030.94	754.65	209.00
Fuselage Fwd Sta 255 ins	2,604.20	184.54	128.61
Sta 255 - 485 ins	1,715.13	375.74	129.90
Sta 485 - 591.65 ins	1,159.63	538.46	105.66
Sta 591.65 - 742.5 ins	1,576.20	659.72	110.61
Sta 742.5 in aft	1,041.27	806.98	129.18
"Marry-Up"	49.94	483.56	107.06
Landing Gear - Retracted	2,807.98	491.66	135.31
Main Landing Gear	2,158.67	539.23	141.00
Main Gear Doors & Fairings	287.98	538.52	138.40
Main Landing Gear	333.81	170.81	99.70
Nose Gear Door & Fairing	27.52	162.22	88.66
Power Plant & Services	11,540.92	675.41	121.79
Engines Bare IS 13	9,670.00	690.47	121.21
Engine Accessories (Inlet Frame etc)	388.05	683.99	121.73
Engine Instrumentation (Orenda supplied)	100.00	690.00	121.25
Engine Controls	32.32	379.90	117.49
Gear Box & Drives on Fuselage	291.87	608.57	103.28
Gear Box & Starter on Engine	146.45	601.97	113.57
Fire Extinguisher System basic	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	1,965.94	652.84	138.24
Mechanical Flying Controls	958.44	677.70	147.62
Hydraulic Flying Controls	1,007.50	629.19	129.32
Equipment Fixed and Removable	7,539.63	397.82	114.56
Instruments	34.61	167.52	138.92
Probe	15.25	-23.71	108.00
Cockpit Pressure Sealing	5.00	186.00	130.00
Oxygen System	21.16	259.40	156.88
Cabin Consoles	17.28	174.66	124.33
Ejector Seats	342.94	204.50	134.11
Air Conditioning System	874.00	339.80	135.32
Cockpit Insulation	14.31	187.48	132.00
Hydraulic Utility System	641.33	498.85	118.15
Mechanical Door Stops Main U/C Doors	3.02	516.00	120.00
Anti-skid controls system	37.68	480.00	113.97
Drag Chute	91.07	786.68	143.19
Electrical System	1,235.29	433.94	113.07
Low Pressure Pneumatics	50.08	394.66	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
MH 64 Damping System	99.08	450.83	140.34
Partial Astra System	689.00	343.65	118.32
Instrument Pack Structure	692.00	384.86	93.56
Pack Instrumentation	1,726.00	393.40	95.00
Flight Test Installations	517.00	499.27	130.44
Additional Fire Protection	180.61	398.87	108.63

Aircraft: Arrow 2
A/C 25206
Date : 1 October, 1958

CONFIDENTIAL

UNCLASSIFIED
Report: 7-0400-82
Issue: 2
Sheet: 2-2
NON CLASSIFIE

Description	Weight lb	H. Arm ins	V. Arm ins	MAC %
Trapped Fuel	213.80	548.26	141.79	
U/C Up				
Aircraft Basic Weight	43,284.37	565.13	129.11	
U/C Down				
Useful Load (Less usable fuel)	875.39	567.60	125.05	
Crew	390.00	316.60	130.30	
Engine Fire Ext. Fluid	25.00	194.00	136.50	
Oil	162.00	730.00	129.00	
Oxygen	13.39	638.31	110.89	
Water for Air Conditioning	13.39	259.68	159.91	
BALLAST	285.00	267.91	131.56	
U/C Up	1,597.00	100.00	114.00	
Operational Weight Empty	45,756.76	544.14	128.61	29.87
U/C Down				
Max. Internal Fuel (2491 gals @ 7.8 lb/gal)	19,433.00	546.48	124.76	30.52
U/C Up				
Gross Weight (Max. Int. Fuel)	65,189.76	541.85	144.16	
U/C Down				
Max External Fuel (500 gal. @ 7.8 lb/gal + drop tank)	4,242.36	543.46	133.25	29.68
Tailcones Plugs	252.00	545.10	130.54	30.14
U/C Up				
Max. Gross Weight (Int. +Ext Fuel)	69,684.12	520.32	60.79	
U/C Down				
		857.07	128.60	
		543.18	128.82	29.61
		544.72	126.29	30.03

- N.B. 1. Aircraft datum = 120 in above arbitrarily chosen ground line.
2. Aircraft is ballasted with 1597 lbs at H.A. = 100 in, such that the aft C.G. on a typical flight envelope, excluding any effects of fuel sequencing (see note on sheet 3) does not exceed 31% M.A.C.

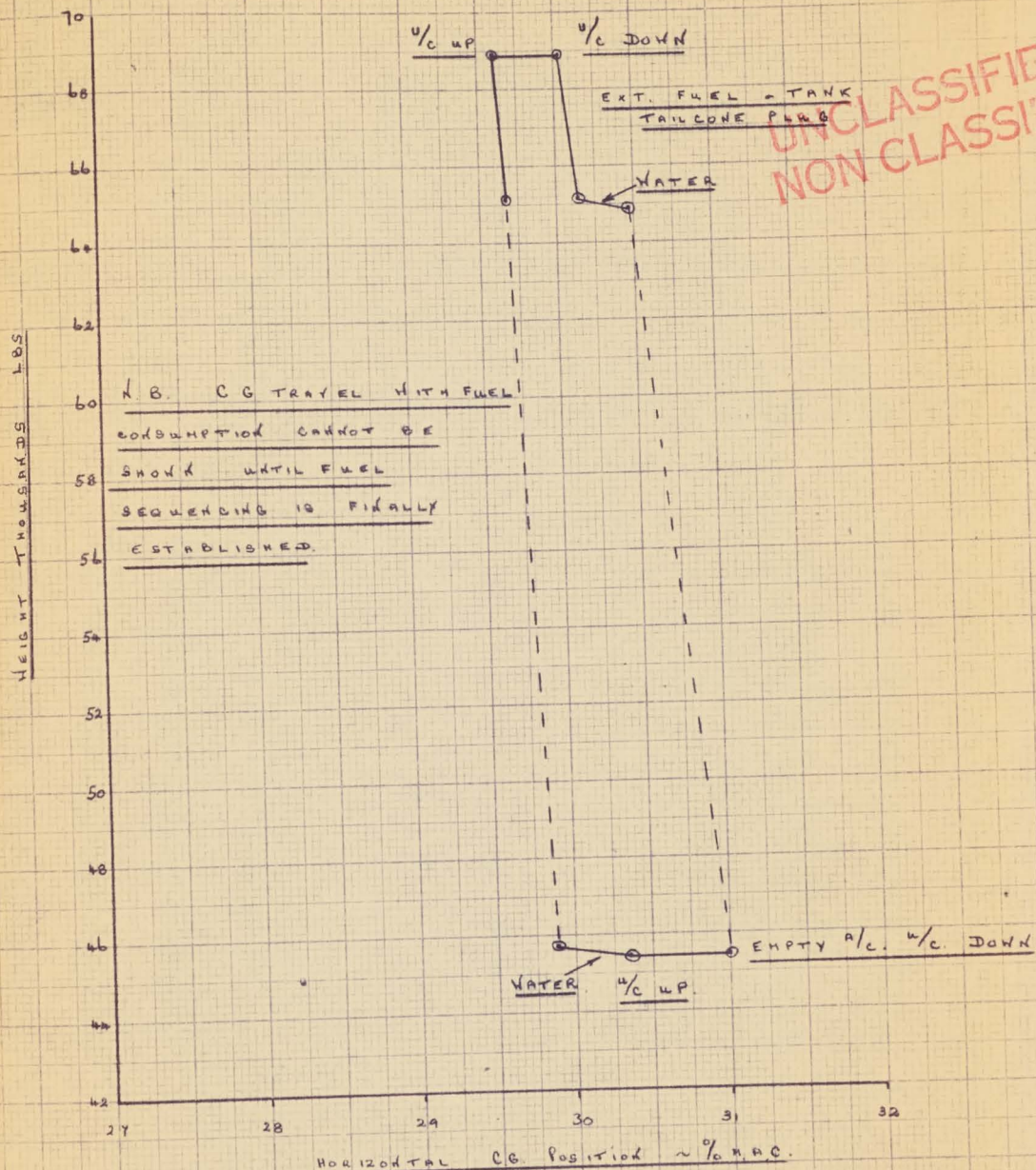
DATE Oct 1st 1950

SHEET 3

BY P. L. French

HORIZONTAL CG PLOT OF FIXED
POINTS ON AERONAUTICAL 2 A/C 25206
FLIGHT ENVELOPE

A/C WITH 1597 LB BALLAST AT STN 100 IN.



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WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT Arrow 2

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM
TOTAL WING GROUP	1000000				
OUTER WING	1010000				
100 OUTER WING SKINS	10100001	64	92910	70646	13597
100 POSTS AND INTERCOSTALS	10100002	64	2436	73207	13410
100 OUTER WING SPARS	10100003	64	39258	70608	13579
100 OUTER WING RIBS	10100004	64	13456	69506	13650
18 AILERON CONTROL BOX	10100006	64	37920	77409	13508
100 RIB 12	10100007	64	76266	64873	13832
100 0 W AILERON JACK FITTING	10100009	64	10467	72791	13670
AILERON JOINTS AND FAIRING	10100010		32937	78726	13224
			197945		
100 AILERON	1020000	74	33600	79213	13556
			33600		
20 ELEVATOR	1030000	82	44638	75618	14260
20 ELEVATOR MARRY UP	10300001		15977	73810	14260
			46235		
INNER WING	1040000				
70 MAIN UC STRUCTURE	10400001	62	33315	57743	13983
16 INNER WING SPARS	10400002	62	41112	58060	14318
5 I W STRUCTURE F S TO M S	10400007	62	109730	49924	14391
I W STRUCTURE M S TO R S	10400008	62	151306	60868	14563
STRUCT AFT OF REAR SPAR	10400009	62	31603	72041	14887
40 ELEVATOR CONTROL BOX I W	10400010	62	42838	72470	14328
25 TRANSP JOINT MARRY UP	10400011		70656	63621	13876
38 CENTRE LINE JOINTS	10400012	62	59083	66241	15030
INNER WING SKINS	10400013	62	225107	62727	14469
17 STRUT PICK UP FITTINGS	10400014	62	12740	61711	14584
8 RIBS 1 TO 9 INNER WING	10400016	62	48618	61173	14513
DORSAL FAIRING I W	10400017	62	11348	270	16150
100 RIB 10	10400018	62	10706	63683	13835
49 FUSELAGE HINGE JOINT I W	10400019	62	12628	61688	13790
25 TRANSP JOINT	10400020	62	12942	63071	13710
49 FUSELAGE HINGE JOINT	10400021		39355	3234	14364
DORSAL FAIRING C A	10400023		5913	56740	15963
SHUT OFF VALVE OPERAT MECH	10400024	62	5135	4965	14180
LEADING EDGE I W	10400025	62	22138	46841	14423
			695229		
LEADING EDGE 0 W	1050000	65	30870	63013	13561
			30870		

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

REPORT NO. 7-0400-82-2

SHEET 4 to 15

	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
	1000000						
	1010000						
	1010001	64	92910	70646	13597	65637199	12632973
TALS	1010002	64	24367	32071	3410	1783323	326668
	1010003	64	39258	70608	13579	27719289	5330844
	1010004	64	13456	69506	13650	9352727	1836744
	1010006	64	37920	77409	13508	29353493	5122234
	1010007	64	7626	64873	13832	4947215	1054828
TTING	1010009	64	10467	27911	3670	761394	142968
FAIRING	1010010		32937	8726	13224	2592447	435466
			197945			142147087	26882745
	1020000	74	33600	79213	13556	26615568	4554816
			33600			26615568	4554816
	1030000	82	44638	75618	14260	33754363	6365379
	1030001		15977	3810	14260	1178746	227732
			46235			34933109	6593111
	1040000						
	1040001	62	33315	57743	13983	19237080	4658436
	1040002	62	41112	58060	14318	23869627	5886416
OMS	1040007	62	109730	49924	14391	54781605	15791244
ORS	1040008	62	15130	60868	14563	9209328	2203382
SPAR	1040009	62	31603	72041	14887	22767117	4704739
X I W	1040010	62	42838	72470	14328	31044699	6137829
UP	1040011		7065	63621	13876	4494824	980339
	1040012	62	59083	66241	15030	39137170	8880175
	1040013	62	22510	76272	14469	141202868	32570732
NGS	1040014	62	12740	61711	14584	7861981	1858002
ING	1040016	62	48618	61173	14513	29741089	7055930
	1040017	62	1134	48270	16150	54545	18250
	1040018	62	10706	63683	13835	6817902	1481175
T I W	1040019	62	12628	61688	13790	7789961	1741401
	1040020	62	12942	63071	13710	8162649	1774348
T	1040021		3935	53234	14364	2094758	565223
	1040023		5913	56740	15963	3355036	943892
AT MECH	1040024	62	5135	4965	14180	281970	72743
	1040025	62	22138	46841	14423	10369661	3192964
			695229			422273870	100517220
	1050000	65	30870	63013	13561	19452113	4186281
			30870			19452113	4186281

AVRO AIRCRAFT LTD.
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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	V. ARM
	TOTAL FUSELAGE GROUP	3000000				
	RADAR NOSE STRUCTURE	3010000				
	RADOME	3010001	51	159.58	3992	1107
	RADAR NOSE STRUCTURE C A	3010002		270	12000	1120
	RADAR NOSE STRUCTURE R N	3010003	51	170.32	9583	1132
				332.60		
	FRONT FUSELAGE STRUCTURE	3020000				
	SKIN F F	3020001	52	82.64	19296	1230
	COCKPIT FORMERS	3020002	52	105.63	18259	1204
	LOWER LONGERONS F F	3020003	52	68.37	18460	904
31	TOP LONGERONS F F	3020004	52	189.47	19430	1476
66	NOSE U C SUPPORT STRUCT	3020005	52	33.43	21049	918
	CREW BULKHEADS	3020006	52	130.63	20558	1238
	BULKHEAD STA 120	3020007	52	31.10	12000	1147
	BULKHEAD STA 255	3020008	52	109.21	25500	1192
	COCKPIT FLOOR	3020009	52	58.81	17695	1156
	SHEAR PANEL BELOW NAV ARCH	3020010	52	20.26	25697	1535
5	MISC STRUCTURE F F	3020011	52	10.66	18455	1243
	LOWER SHEAR PANEL	3020012	52	31.41	23423	890
22	CANOPY ARCHES	3020013	52	85.53	22594	1602
58	WIND SCREEN	3020014	52	132.85	13828	1500
				1090.00		
	CENTRE FUSELAGE STRUCTURE	3030000				
	SKIN C F	3030001	54	221.12	36736	1442
	FORMERS C F	3030002	54	287.49	37520	1331
5	BULKHEAD STA 485	3030003	54	128.15	48500	1033
66	LONGERONS C F	3030004	54	144.53	41038	1214
	STR BELOW LOWER LONGERONS	3030005	54	48.36	27455	929
	RADAR ACCESS DOOR	3030006	54	24.18	27908	901
	FWD DORSAL FAIRING	3030008	54	29.69	28927	1640
	DEFLECTOR SHIELD	3030009	54	20.45	33739	1640
	DORSAL OVER FUEL TANK	3030010	54	41.38	41310	1420
	PACK MTG STRUCTURE	3030011	54	22.80	29289	1028
	SEALING MISSILE BAY	3030012	54	55.92	29616	1107
	MISC ITEMS C F	3030013	54	12.16	37000	1250
	ARAMENT BAY ROOF	3030014	54	124.32	38370	1142
	FUSELAGE FUEL TANK	3030015	54	226.65	39429	1453
	DUCT C F	3030016	54	318.67	35898	1296
	EQUIPMENT BAY STRUCTURE	3030017	54	59.59	28506	1354
				1715.13		
	DUCT BAY STRUCTURE	3040000				

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT _____

DESCRIPTION		REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM
	SKIN D B	3040001	56	6227	53483	1122
5	FORMERS D B	3040002	56	7335	53530	1143
	TOP LONGERONS	3040003	56	498	53899	1355
	MTG BRKTS SIDE PANEL	3040004	56	190	51866	1306
	LOWER LONGERONS	3040005	56	10301	52236	991
72	MAIN FRAME STA 538 77	3040006	56	5980	53877	1038
	ACCESS PANELS	3040007	56	3874	52818	997
	LOWER PANEL ASSY	3040008	56	217	54557	890
	DROP TANK MTG STRUCTURE	3040009	56	841	58554	88
20	LOWER SIDE PANELS FWD	3040010	56	10756	50854	926
	LOWER CENTRE PANEL FWD	3040011	56	2686	51389	889
	LOWER SIDE PANELS AFT	3040012	56	6698	56934	886
	LOWER CENTRE PANEL AFT	3040013	56	2609	56600	879
	FLOATING DUCT D B	3040014	56	455.55	55363	1171
				1037.67		
	ENGINE BAY	3050000				
100	TOP LONGERONS	3050001	58	674	66778	1392
84	BOTTOM LONGERONS	3050002	58	8432	65911	997
	ENGINE ACCESS DOORS	3050003	58	13604	64040	905
	ENGINE TUNNEL	3050004	58	61324	65622	1211
71	ENG RAILS ATTACH TO FORM	3050005	58	2906	68763	1136
	PANELS AT ENG ACCESS DOORS	3050006	58	11117	65021	925
	BOTTOM CTR PANEL FWD	3050007	58	4610	61780	891
	BOTTOM CTR PANEL CENTRE	3050008	58	4120	67078	923
	BOTTOM CTR PANEL AFT	3050009	58	7666	72063	955
5	SIDE PANEL FRONT	3050010	58	8605	61609	1169
5	SIDE PANEL CENTRE	3050011	58	7474	67063	1192
32	SIDE PANEL AFT	3050012	58	7453	72146	1218
41	HEAVY FORMERS	3050013	58	19635	66058	1096
				157620		
	REAR FUSELAGE	3060000				
	OUTER SKINS FIXED	3060001	59	5658	77270	1370
	FORMERS FIXED R F	3060002	59	10509	77990	1373
	LONGERONS FIXED R F	3060003	59	2519	77159	1281
	TUNNEL FIXED R F	3060004	59	10994	77552	1321
	ENGINE ACCESS DOORS R F	3060005	59	9023	77505	985
	FAIRING UNDER RUDDER FIXED	3060006	59	2839	78214	1559
	REMOV TAILCONES	3060007	59	51650	82605	1278
	CENTRE STRUC AND STING REM	3060008	59	10935	83325	1391
				104127		
	DIVE BRAKES	3070001	72	11790	50884	904
	D B JOINT TO FUSELAGE	3070002		406	48794	937
				12196		

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

REPORT NO. _____

UNCLASSIFIED
SHEET
NON CLASSIFIED

	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
	3040000156		622753483	112227		3330386	699105
	3040000256		733553530	11438		3926426	838977
	3040000356		49853899	13550		268417	67479
	3040000456		19051866	13066		98545	24825
	3040000556		1030152236	9914		5380830	1021241
	3040000656		598053877	10383		3221845	620903
	3040000756		387452818	9976		2046169	386470
	3040000856		21754557	8901		118389	19315
URE	3040000956		84158554	8847		492439	74403
D	304001056		1075650854	9269		5469856	996974
WD	304001156		268651389	8892		1380309	238839
T	304001256		669856934	8863		3813439	593644
FT	304001356		260956600	8794		1476694	229435
	304001456		4555555363	11713		25220615	5335857
			103767			56244359	11147467
	30500000						
	3050000158		67466778	13921		450084	93828
	3050000258		843265911	9971		5557616	840755
	3050000358		1360464040	9057		8712002	1232114
	3050000458		6132465622	12110		40242035	7426336
FORM	3050000558		290668763	11364		1998253	330238
DOORS	3050000658		1111765021	9254		7228385	1028767
	3050000758		461061780	8915		2848058	410982
TRE	3050000858		412067078	9239		2763614	380647
	3050000958		766672063	9554		5524350	732410
	305001058		860561609	11693		5301454	1006183
	305001158		747467063	11922		5012289	891050
	305001258		745372146	12188		5377041	908372
	305001358		1963566058	10967		12970488	2153370
			157620			103985669	17435052
	30600000						
	3060000159		565877270	13708		4371937	775599
	3060000259		1050977990	13734		8195969	1443306
	3060000359		251977159	12810		1943635	322684
	3060000459		1099477552	13214		8526067	1452747
R F	3060000559		902377505	9859		6993276	889578
FIXED	3060000659		283978214	15590		2220495	442600
	3060000759		5165082605	12785		42665483	6603453
NG REM	3060000859		1093583325	13910		9111569	1521059
			104127			84028451	13451026
	3070000172		1179050884	9049		5999224	1066877
E	30700002		40648794	9374		198104	38058
			12196			6197328	1104935

FUNCTIONAL GROUP COMPONENT

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

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WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT _____

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AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL GROUP
COMPONENT

PROJECT _____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM
ENGINE GROUP	5000000				
PS 13 ENGINES	5010000		1005500	69023	121
ENGINE INSTRUMENTATION	5010001		100000	69000	121
PS 13 ENGINES C A	5010002		305	65853	103
			1015805		
ACC GEAR BOX ON FUS D B	5020001	56	3676	57768	94
ACC GEAR BOX ON FUS E B	5020002	58	23533	61295	103
ACC GEAR BOX ON FUS C A	5020003		800	61550	97
ACC GEAR BOX ON FUS I W	5020004	62	1178	61270	139
			29187		
ENGINE CONTROLS	5030000				
ENGINE CONTROLS F F	5030001	52	1576	16723	123
ENGINE CONTROLS C F	5030002	54	109	26444	118
ENGINE CONTROLS E R	5030004	58	889	66633	99
ENGINE CONTROLS I W	5030005	62	658	52142	127
			3232		
STARTER AND GEARBOX	5040000				
STARTER AND GEARBOX ENG	5040001		14645	60197	113
			14645		
FIRE EXT SYSTEM	5060000				
ENG FIRE EXT SYSTEM E B	5060001	58	5985	71074	135
ENG FIRE EXT SYSTEM D B	5060002	56	1231	56856	112
ENG FIRE EXT SYSTEM ENG	5060003		142	67960	99
			7358		
ENGINE MTGS AND BRACKETS	5070000				
ENGINE MOUNTS	5070001		7539	67191	141
			7539		
FUEL SYSTEM	5080000				
17 FUEL SYSTEM C F	5080001	54	11280	39995	140
18 FUEL SYSTEM D B	5080002	56	15735	53738	109
4 FUEL SYSTEM E B	5080003	58	1836	61392	110
39 FUEL SYSTEM I W	5080004	62	47280	55432	143

WEIGHT AND C. OF G BY

FUNCTIONAL GROUP COMPONENT

REPORT NO.

SHEET.

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WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT _____

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT _____

DESCRIPTION				REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. A
FLYING CONTROLS GROUP				6000000				
MECHANICAL CONTROLS				6010000				
60	MECHANICAL	CONTROLS	F F	60100001	52	10694	16454	114
	MECHANICAL	CONTROLS	C F	60100002	54	1290	39654	117
70	MECHANICAL	CONTROLS	FIN	60100003	83	12443	78819	221
71	MECHANICAL	CONTROLS	I W	60100006	62	40234	71800	143
80	MECHANICAL	CONTROLS	O W	60100007	64	30520	77053	135
	MECHANICAL	CONTROLS	C A	60100008		663	70984	143
						958.44		
FLYING CONTROLS HYDRAULICS				6020000				
	FLYING CONT	HYDRAULICS	D B	60200001	56	3184	56630	101
	FLYING CONT	HYDRAULICS	E B	60200002	58	39853	64788	111
	FLYING CONT	HYDRAULICS	R F	60200003	59	48	75875	108
73	FLYING CONT	HYDRAULICS	I W	60200004	62	27988	70369	147
66	FLYING CONT	HYDRAULICS	O W	60200005	64	13170	74034	135
63	FLYING CONT	HYDRAULICS	FIN	60200006	83	5581	76008	207
	FLYING CONT	HYDRAULICS	R N	60200007	51	3500	11309	105
	FLYING CONT	HYDRAULICS	F F	60200008	52	5506	16928	110
	FLYING CONT	HYDRAULICS	C F	60200009	54	1920	37329	110
						100750		

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL GROUP
COMPONENT

PROJECT _____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM
FIXED EQUIPMENT GROUP	7000000			
INSTRUMENTS	7010000			
INSTRUMENTS	7010001	52	3261	164301
NAVIG TABLE AND STOWAGE	7010004	52	200	220001
			3461	
COCKPIT SEALING	7020000	52	500	186001
			500	
OXYGEN SYSTEM	7030000			
OXYGEN SYSTEM	7030001	52	2116	259401
			2116	
AIR CONDITIONING SYSTEM	7040000			
AIRCONDITIONING F F	7040001	52	4106	177981
AIRCONDITIONING C F	7040002	54	52410	288381
AIRCONDITIONING D B	7040003	56	10345	17621
AIRCONDITIONING C A	7040005		28326	434471
AIRCONDITIONING ENG	7040006		1453	671001
AIRCONDITIONING I W	7040007	62	7152	22471
			87400	
HYDRAULICS MAIN SYSTEM	7050000			
28 UTILITY HYDRAULICS F F	7050001	52	9602	202411
4 UTILITY HYDRAULICS C F	7050002	54	4362	430031
19 UTIL&TY HYDRAULICS D B	7050003	56	21795	549201
68 UTILITY HYDRAULICS E B	7050004	58	10839	607541
30 UTILITY HYDRAULICS I W	7050005	62	14441	552401
28 UTILITY HYDR NOSE U C	7050006	91	114	18860
30 UTILITY HYDR MAIN U C	7050007	92	2980	543251
ANTI SKID SYSTEM C F	7050008	54	3134	472001
ANTI SKID SYSTEM MUC	7050009	92	634	515001
			67901	
MUC DOOR STOPS	7060000	56	302	516001
			302	
CABIN INSULATION	7070000	52	1431	187481
			1431	

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL GROUP
COMPONENT

PROJECT _____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. AR
BRAKE PARACHUTE	70800000				
BRAKE PARACHUTE F F	70800001	52	455	16913	128
BRAKE PARACHUTE R F	70800005	59	8528	82205	145
BRAKE PARACHUTE I W	70800006	62	1246	2022	145
			9107		
ELECTRICAL SYSTEM	70900000				
ELECTRICAL WIRING R N	70900001	51	129	9285	120
ELECTRICAL WIRING F F	70900002	52	2966	19977	112
ELECTRICAL WIRING C F	70900003	54	2354	39703	110
ELECTRICAL WIRING A I	70900004	55	1274	21984	120
ELECTRICAL WIRING D B	70900005	56	9015	52769	99
ELECTRICAL WIRING E B	70900006	58	6459	5500	92
ELECTRICAL WIRING I W	70900008	62	9236	53995	139
ELECTRICAL WIRING FIN	70900009	83	3527	9754	300
ELECTRICAL WIRING NUC	70900010	91	330	18600	98
ELECTRICAL WIRING ENG	70900011		2002	60683	100
ELECTRICAL WIRING C A	70900012		13746	33473	112
ELECTRICS F F	70900013	52	15240	15765	113
ELECTRICS C F	70900014	54	7877	45178	101
ELECTRICS E H	70900015	58	1020	64774	114
ELECTRICS ENG	70900016		18772	58913	115
ELECTRICS C A	70900017		7186	1350	120
ELECTRICS FIN	70900018	83	4489	9050	288
ELECTRICS I W	70900019	62	2275	62053	145
ELECTRICS CAW	70900020		1206	7488	136
ELECTRICS MUC	70900021	92	7451	1600	137
20 ELECTRICS A I	70900022	55	4900	22079	139
ELECTRICS D R	70900023	56	2671	10517	34
ELECTRICS R F	70900024	59	1768	0759	116
55 WINDSCREEN DEMISTING	70900025	52	3326	19965	106
ELECTRICS TAILC PLUG JETT	70900026		8095	55200	110
			123529		
L P PNEUMATICS	71000000				
L P PNEUMATICS F F	71000001	52	1993	19586	122
L P PNEUMATICS C F	71000002	54	7963	2397	116
L P PNEUMATICS FIN	71000005	83	4147	4966	252
L P PNEUMATICS R N	71000006	51	199	7067	92
L P PNEUMATICS ENG	71000008		1403	63897	99
L P PNEUMATICS I W	71000009	62	2035	52880	159
			5008		
INTAKE DE ICING	71200000	55	8800	19582	118
			8800		
29 CANOPY ACTUATION	71600000	52	6492	22199	154
			6492		

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT _____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM
CABIN CONSOLES	7170000	52	1728	17466	124
			1728		
SURFACE FINISH F F	7190001	52	363	18744	1220
SURFACE FINISH CANOPY	7190002	53	64	20218	1590
SURFACE FINISH C F	7190003	54	1400	37197	1240
SURFACE FINISH 2NTAKES	7190004	55	408	22798	1200
SURFACE FINISH D B	7190005	56	377	53828	1120
SURFACE FINISH E B	7190006	58	443	66701	1120
SURFACE FINISH P F	7190007	59	648	80362	1310
SURFACE FINISH I W	7190008	62	315	160144	1440
SURFACE FINISH O W	7190009	64	1067	70650	1350
SURFACE FINISH O W L EDGE	7190010	65	319	63948	1350
SURFACE FINISH AILERON	7190011	74	353	79190	1350
SURFACE FINISH ELEVATOR	7190012	82	566	75523	1420
SURFACE FINISH FIN	7190013	83	639	74663	2080
SURFACE FINISH RUDDER	7190014	84	202	81279	2140
			10000		
FLIGHT TEST INSTALLATION	7200000		51700	49927	1300
			51700		

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
	717000052		1728	17466	12433	301812	214842
			1728			301812	214842
	719000152		363	18744	12200	68044	44286
RY	719000253		64	20218	15900	12940	10176
	719000354		1400	37197	12455	520758	174370
KES	719000455		408	22798	12020	93016	49042
	719000556		377	53828	11200	202932	42224
	719000658		443	66701	11200	295485	49616
	719000759		648	80362	13175	520746	85374
	719000862		315	160144	14400	1895137	453744
	719000964		1067	70650	13590	753836	145005
L EDGE	719001065		319	63948	13526	203994	43148
RON	719001174		353	79190	13556	279541	47853
ATOR	719001282		566	75523	14260	427460	80712
	719001383		639	74663	20837	477097	133148
ER	719001484		202	81279	21431	164184	43291
			10000			5915167	1401989
ATION	7200000		51700	49927	13044	25812259	6743748
			51700			25812259	6743748

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AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT _____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. A
REMOVABLE EQUIPMENT GROUP	8000000				
94 EJECTOR SEATS	801010052		34294	20450	13
			34294		
RADIO RADAR PART ASTRA R N	802010151		168	10687	9
RADIO RADAR PART ASTRA F F	802010252		13986	18004	11
RADIO RADAR PART ASTRA C F	802010354		27244	27238	9
RADIO RADAR PART ASTRA D B	802010456		49045	1662	11
RADIO RADAR PART ASTRA F IN	802010583		32497	6179	25
RADIO RADAR PART ASTRA C A	8020106		15505	40534	12
RADIO RADAR PART ASTRA I W	802010862		27955	58836	15
RADIO RADAR PART ASTRA O W	802010964		10497	4642	13
			68900		
DAMPING SYSTEM F F	803010152		784	17201	120
DAMPING SYSTEM C F	803010254		23033	2213	109
DAMPING SYSTEM E B	803010358		36963	242	134
DAMPING SYSTEM I W	803010462		60705	3781	157
DAMPING SYSTEM O W	803010564		9574	855	140
DAMPING SYSTEM R N	803010651		287	7350	93
			9908		
INSTRUMENTATION	805090094		172600	39340	95
			172600		
INSTRUMENT PACK STRUCTURE	805100054		69200	38486	93
			69200		
ADDITIONAL FIRE PROTECTION	8090000		18061	39887	108
			18061		

WEIGHT AND C. OF G BY

PROJECT

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM
OPERATIONAL LOAD	9000000				
CREW MEMBERS	9010000	52	39000	19400	1365
			39000		
ENGINE OIL	9020000				
ENGINE OIL DRAINABLE F NG	9020001		9290	64000	1194
ENGINE OIL DRAINABLE F B	9020002	58	4110	65640	976
ENGINE OIL TRAPPED D B	9020003	56	753	58176	967
ENGINE OIL TRAPPED E B	9020004	58	2047	61512	1039
			16200		
OXYGEN CHARGE	9050000				
OXYGEN CHARGE F F	9050001	52	72	20493	1320
OXYGEN CHARGE C F	9050002	54	1267	26280	1615
			1339		
ENGINE FIRE EXT FLUID	9060000		2500	73000	1290
			2500		
TRAPPED FUEL	9080000				
TRAPPED FUEL C F	9080001	54	2430	41426	1310
TRAPPED FUEL D B	9080002	56	690	49400	1335
TRAPPED FUEL I W	9080003	62	18260	56814	1435
			21380		
WATER FOR AIR CONDITIONING	9100000	54	26000	26800	1320
UNUSABLE WATER FOR AIRCOND	9100001	54	2500	26700	1270
			28500		

