Arrow 2
A/C 25206

Report: 7-0400-82
Issue : 1

CONFIDENTIAL

UNCLASSIFIED

WEIGHT & C.G. SUMMARY

56

Mr. A.J. Crust

1 Sept/58

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Report no.: QCX - AVRO - CF105 - R-7-0400-82 - Iss-1

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by (Name): Michel W. Drapeau

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

Date: Dec. 7, 1992

R. Drapeau
Signature

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AVRO AIRCRAFT LIMITED
INTER-DEPARTMENTAL MEMORANDUM

Ref: 3221/11/J
Date: 1 September, 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 1

Attached is the initial copy of Weight & C.G. Summary Report: 7-0400-82 Issue 1 for A/C 25206 dated September 1st, 1958, for your retention.

In this summary Weight comparisions are made to 7-0400-34 Issue 23, the similar type summary for Mk 2 Prodn. Aircraft. Subsequent issues of this report, however, will be compared to the preceeding issue, in the usual manner.

The report will be revised on a monthly basis and is issued complete on the 1st of each month.

E.F. Burnett ppkg
E.F. Burnett

EFB/ag
cc: Messrs. J.C. Floyd, R.N. Lindley, R. Marshall, C.V. Lindow, J.W. Ames, B.C. Alford, D. Wade, D.N. Scard, A.R. Buley, F. Brame, W. Czerwinski, J. Lucas, S. Kwiatkowski, A. Cornish, T. Roberts, C. Marshall, J. Zurakowski, A. Crust (6 copies for R.C.A.F.), D. Inglis, D. Moore, R. Cairns, D. Brownridge

57219

CONFIDENTIAL

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

Report: 7-0400-82
Issue : 1

INDEX

Introduction & Weight Changes

The following is the initial issue of a Weight & C.G. Summary for the first Mk 2 Aircraft, serial No. 25206, with PS13 Engines (preproduction versions), based on the latest information available.

All weight & C.G. changes for the subject aircraft are quoted herein, relative to 7-0400-34 Issue 23, which is the current similar type statement for a production version of the Mk 2 Aircraft.

In future issues of this report all weight & C.G. changes will be quoted relative to the previous issue, and the above paragraph applies ONLY to this issue of the Weight report.

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. To the extent of currently available information this statement could also be applicable to A/C 25208. Aircraft 25207, however, is entirely different and is the Orenda PS13 Flight Test Vehicle. Weight & C.G. summaries will be issued for this Aircraft at a later date.

General:

a) Orenda PS13 Engines comprise the Power Plant. These will be an early preproduction version but a specific weight for them is not yet available. (Weight recorded is 4,800 lb each, Orenda's latest available weight for preproduction engines, excluding Nose Bullet, Input Frame and AVRO installed accessories).

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 seperately 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 517lb.

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

Minneaplis Honeywell MH64 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.

General: Cont'd

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.

1. Structure

	Weight lb
a) Wings No Weight Change	
b) Fin & Rudder	
I.R. Seeker Head Mtg. Structure - deleted, no provisions for the IR system will be made on A/C 25206, 25207 or 25208	- 10.75
c) Fuselage Complete No weight change.	
Total Structural Decrease	- 10.75

2. Landing Gear

Main Landing Gear - for the initial Mk 2 Main Gear existing forgings are to be utilized and it is estimated by Dowty that there will be an increase of approx. 55 lb/leg over the wt. of the unmodified Mk 1 leg assy. This will NOT apply to the ultimate Mk 2 design, which it is hoped will be lighter than existing Mk 1 Main Gears	+ 110.00
Total Landing Gear Increase	+ 110.00

3. Power Plant & Services

Engine Instrumentation - this seems to be rather a nebulous item. A weight for the specific engines to be installed on A/C 25206 is not yet available. Orenda quote the weight of their pre-production series of PS13 Engines at 4,800 lb each, this is recorded; but they also state that the early engines will have about 50 lb of instrumentation. Until more specific details can be obtained this allowance will be recorded.	+ 100.00
Power Plant Group Increase	+ 100.00

4. Flying Controls Group

No weight change.

5. Equipment Group

	Weight lb
Missile Pack & All services in pack - deleted, this is replaced by an Instrument Pack	-2,238.52
Instrument Pack Structure - new item	+ 692.00
Pack Instrumentation - initial Flight Test Dept estimate of full pack requirements	+1,726.00
Flight Test Installations - other installations throughout the A/C	+ 517.00
Radio & Radar Remov - full Astra I deleted	-2,110.48
Radio & Radar Fixed - full Astra I deleted	- 880.04
Radar Door Actuation - included with 'Astra Minus' system below	- 10.00
MH64 Damping System - cable allowance deleted, est. in full with Astra Minus system, see below	- 87.34
"Astra Minus" - Navigational & Communication equipment only	+ 689.00
Additional Fire Protection - this is an emergency system applicable to A/C 25206 only	+ 180.61
Air Conditioning System - there is no cooling ducting in the fin for the IR seeker head, since I.R system not applicable to this A/C	- 12.22
Cockpit Equipment - deleted, applicable to A/C 25209 & subsequent, map case, board etc	- 6.00
Total Equipment Group Decrease	-1,539.99

6. Trapped Fuel No weight change.

7. Operational Load

Missiles - not applicable	-1,728.00
Missile Cocoons - not applicable	- 84.00
Total Operational Load Decrease	-1,812.00

Summary

Weight Change - Aircraft Basic Weight

Structure	- 10.75
Landing Gear	+ 110.00
Power Plant	+ 100.00
Equipment	-1,539.99
	-1,340.74

Weight Change - Operational Load

Missiles	- 1,728.00
Cocoons	- 84.00
	- 1,812.00
Ballast	+ 1,476.00

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

Mk 2 Prodn. A/C ref 7-0400-34 Issue 23	A/C 25206	
47,261.94	45,585.20	-1,676.74 lb

Aircraft: Arrow 1
A/C 25206
Date : 1 Sept/58

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

Weight & C.G. Summary

Description	Wt. lb	H. Arm	V. Arm
Structure	19,201.34	566.51	137.23
Wings	10,041.11	642.92	142.18
Fin & Rudder	1,030.60	753.90	208.30
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	2,791.98	491.52	135.28
Main Landing Gear	2,142.67	539.39	141.00
Main Gear Doors & Fairing	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	11,546.72	671.99	121.41
Engines Bare PS13	9,600.00	689.94	121.25
Engine Accessories (Inlet frame etc)	303.04	607.92	119.29
Engine Instrumentation (Orenda supplied)	100.00	690.00	121.25
Engine Controls	32.32	379.90	117.49
Gear Box & Drives on Fuselage	293.93	602.27	102.24
Gear Box & Starter on Engine	305.20	614.82	105.66
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	1,932.26	651.64	138.17
Mechanical Flying Controls	958.44	677.70	147.63
Hydraulic Flying Controls	973.82	626.00	128.86
Equipment Fixed & Removable	7,570.74	398.56	114.51
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	26.07	240.54	156.70
Ejector Seats	342.94	204.50	134.11
Air Conditioning System	864.09	341.68	135.33
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
Mechanical 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
Cabin Consoles	17.28	174.66	124.33
MH64 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 (25206 only)	180.61	398.87	108.63

Aircraft: Arrow 2
A/C 25206
Date : 1 Sept/58

Description	Wt. lb	H. Arm	V. Arm	%M.A.C.
Trapped Fuel	213.80	548.26	141.79	
U/C Up		564.14	128.97	
Aircraft Basic Weight	43,256.84			
U/C Down		566.58	124.94	
Useful Load (less usable fuel)	852.36	307.68	130.77	
Crew	390.00	194.00	136.50	
Engine Fire Extinguisher Fluid	25.00	730.00	129.00	
Oil	138.97	636.92	110.57	
Oxygen	13.39	259.68	159.91	
Water for Air Conditioning	285.00	267.91	131.56	
Ballast	1,476.00	100.00	114.00	
U/C Up		544.32	128.52	29.92
Operational Weight Empty	45,585.20			
U/C Down		546.64	124.70	30.56
Max. Internal Fuel (2491 gals at 7.8 lb/gal)	19,433.00	541.85	144.16	
U/C Up		543.58	133.19	29.72
Gross Weight (Max. Int. Fuel)	65,018.20			
U/C Down		545.20	130.51	30.16
Max External Fuel (500 gal at 7.8 lb/gal + drop tank)	4,242.36	520.32	60.79	
Tailcone Plugs	252.00	857.07	128.60	
U/C Up		543.30	128.75	29.64
Max. Gross Weight (Int + Ext fuel)	69,512.56			
U/C Down		544.82	126.24	30.06

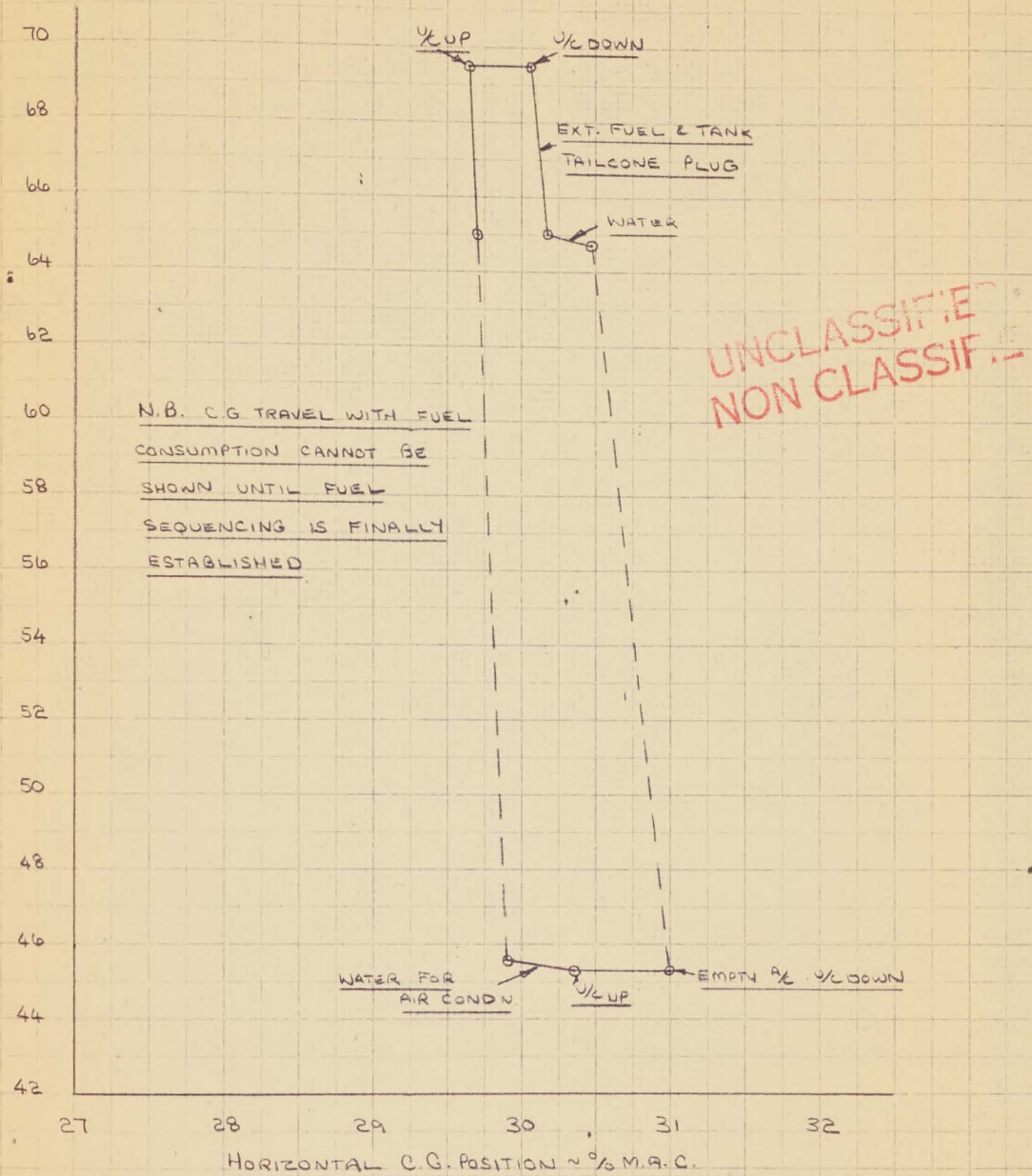
N.B. 1) Aircraft datum = 120 ins above an arbitrarily chosen ground line

2) Aircraft is ballasted such that the aft. C.G. on atypical flight envelope, excluding any effects of fuel sequencing (see note on sheet 3), does not exceed 31% M.A.C. Mk 2 A/C Radar Noses have provisions for 900 lb ballast, current theoretical requirements are 1,476 lb; however, this summary is only of a preliminary nature and this ballast figure is subject to change.

REPORT NO: T-0400-82-1
DATE : Sept 1st 1958
SHEET : 3
BY: Kathleen Griffin

HORIZONTAL C.G. PLOT OF FIXED POINTS ON ARROW 2 A/C 25206 FLIGHT ENVELOPE

A/C WITH 1476 LB BALLAST AT STA 100 INS



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WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT_____

	DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM
	TOTAL WING GROUP	1000000				
	OUTER WING	1010000				
100	OUTER WING SKINS	10100016	4	92910	70646	1359
100	POSTS AND INTERCOSTALS	10100026	4	24367	32071	1341
100	OUTER WING SPARS	10100036	4	39258	70608	1357
100	OUTER WING RIBS	10100046	4	13456	69506	1365
18	AILERON CONTROL BOX	10100066	4	37920	77409	1350
100	RIB 12	10100076	4	7626	64873	1383
100	O W AILERON JACK FITTING	10100096	4	1046	72791	1367
	AILERON JOINTS AND FAIRING	101010		3293	78726	1322
				197945		
100	AILERON	10200007	4	33600	79213	1355
				33600		
20	ELEVATOR	10300008	2	44638	75618	1426
20	ELEVATOR MARRY UP	103001		1597	73810	1426
				46235		
	INNER WING	1040000				
70	MAIN UC STRUCTURE	10400016	2	33315	57743	1398
16	INNER WING SPARS	10400026	2	41112	58060	1431
5	I W STRUCTURE F S TO M S	10400076	2	109730	49924	1439
	I W STRUCTURE M S TO R S	10400086	2	15130	60868	1456
	STRUCT AFT OF REAR SPAR	10400096	2	31639	72041	1488
40	ELEVATOR CONTROL BOX I W	10400106	2	42838	72470	1432
25	TRANSP JOINT MARRY UP	104001	1	7065	63621	1387
38	CENTRE LINE JOINTS	10400126	2	59083	66241	1503
	INNER WING SKINS	10400136	2	225107	62727	1446
17	STRUT PICK UP FITTINGS	10400146	2	12740	61711	1458
8	RIBS 1 TO 9 INNER WING	10400166	2	48618	61173	1451
74	DORSAL FAIRINGS I W	10400176	2	9548	28016	1615
	RIB 10	10400186	2	10800	63683	1383
49	FUSELAGE HINGE JOINT I W	10400196	2	12628	61688	1379
25	TRANSP JOINT	10400206	2	12942	63071	1371
49	FUSELAGE HINGE JOINT	104002	1	3935	53234	1436
74	DORSAL FAIRINGS C A	104002	3	6033	57025	1603
	SHUT OFF VALVE OPERAT MECH	10400246	2	513	54965	1418
	LEADING EDGE I W	10400256	2	22138	46841	1442
				695461		
	LEADING EDGE O W	10500006	5	30870	63013	1356
				30870		

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
	1000000						
	1010000						
	101000164		92910	70646	13597	65637199	12632973
ALS	101000264		2436	73207	13410	1783323	326668
	101000364		39258	70608	13579	27719289	5330844
	101000464		13456	69506	13650	9352727	1836744
	101000664		37920	77409	13508	29353493	5122234
	101000764		7626	64873	13832	4947215	1054828
TTING	101000964		1046	72791	13670	761394	142988
FAIRING	101001 0		329	37872	61322	4	2592447 435466
			197945			142147087	26882745
	102000074		33600	79213	13556	26615568	4554816
			33600			26615568	4554816
	103000082		44638	75618	14260	33754363	6365379
	1030001		1597	73810	14260	1178746	227732
			46235			34933109	6593111
	1040000						
	104000162		33315	57743	13983	19237080	4658436
	104000262		41112	58060	14318	2386962	588641 6
O M S	104000762		109730	49924	14391	54781605	15791244
O R S	104000862		15130	60868	14563	9209328	2203382
SPAR	104000962		31639	72041	14887	2279305 2	4710098
X I W	104001062		42838	72470	14328	31044699	6137829
UP	1040011		706	56362	13876	4494824	980339
	104001262		5908	36624	15030	39137170	8880175
	104001362		225107	62727	14469	14120286 8	32570732
NGS	104001462		12740	61711	14584	7861981	1858002
ING	104001662		48618	61173	14513	29741089	7055930
	104001762		95	48280	16150	45866	15343
	104001862		10800	63683	13835	68777764	14941 80
T I W	104001962		12628	61688	13790	7789961	1741401
	104002062		12942	63071	13710	8162649	1774348
T	1040021		3935	53234	14364	2094758	565223
	1040023		6033	57025	16034	3440318	967331
AT MECH	104002462		513	54965	14180	281970	72743
	104002562		22138	46841	14423	10369661	3192964
			695461			422436270	100556116
	105000065		30870	63013	13561	19452113	4186281
			30870			19452113	4186281

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WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM
FIN AND RUDDER GROUP	2000000				
13 FIN	20100008	3	85596	749022	1060
FIN TO WING MARRY UP	2010001		4830	685381	5355
			90426		
94 RUDDER	20200008	4	12634	813162	1374
			12634		

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
P	2000000						
						UNCLASSIFIED	
						NON CLASSIFIE	
	201000083		85596	74902	21060	64113116	18026518
P	2010001		4830	68538	15355	3310385	741647
			90426			67423501	18768165
	202000084		12634	81316	21374	10273463	2700391
			12634			10273463	2700391

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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	301000151		15958	3992	110
	RADAR NOSE STRUCTURE C A	3010002		270	12000	112
	RADAR NOSE STRUCTURE R N	301000351		17032	9583	113
				33260		
	FRONT FUSELAGE STRUCTURE	3020000				
	SKIN F F	302000152		8264	19296	123
	COCKPIT FORMERS	302000252		10426	18298	120
	LOWER LONGERONS F F	302000352		6837	18460	90
38	TOP LONGERONS F F	302000452		18746	19435	147
66	NOSE U C SUPPORT STRUCT	302000552		3343	21049	91
	CREW BULKHEADS	302000652		13063	20558	123
	BULKHEAD STA 120	302000752		3110	12000	114
	BULKHEAD STA 255	302000852		10921	25500	119
	COCKPIT FLOOR	302000952		5881	17695	115
	SHEAR PANEL BELOW NAV ARCH	302001052		2026	25697	153
5	MISC STRUCTURE F F	302001152		1066	18455	124
	LOWER SHEAR PANEL	302001252		3141	23423	89
22	CANOPY ARCHES	302001352		8553	22594	160
58	WINDSCREEN	302001452		13139	13817	149
				108516		
	CENTRE FUSELAGE STRUCTURE	3030000				
	SKIN C F	303000154		22112	36736	144
	FORMERS C F	303000254		28749	37520	133
5	BULKHEAD STA 485	303000354		12815	48500	103
66	LONGERONS C F	303000454		14453	41038	121
	STR BELOW LOWER LONGERONS	303000554		4836	27455	92
	RADAR ACCESS DOOR	303000654		2418	27908	90
	FWD DORSAL FAIRING	303000854		2969	28927	164
	DEFLECTOR SHIELD	303000954		2045	33739	164
	DORSAL OVER FUEL TANK	303001054		4138	41310	142
	PACK MTG STRUCTURE	303001154		2280	29289	102
	SEALING MISSILE BAY	303001254		559	29616	110
	MISC ITEMS C F	303001354		1216	37000	125
	ARAMENT BAY ROOF	303001454		12432	38370	114
	FUSELAGE FUEL TANK	303001554		22665	39429	145
	DUCT C F	303001654		31867	35898	129
	EQUIPMENT BAY STRUCTURE	303001754		5959	28506	135
				171513		
	DUCT BAY STRUCTURE	3040000				

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
P	3000000						
E	3010000						
	30100015	1	15958	3992	11070	637043	1766551
E C A	3010002		270	12000	11200	32400	30240
E R N	30100035	1	17032	9583	11325	1632177	1928874
			33260			2301620	3725665
CTURE	3020000						
	30200015	2	8264	19296	12301	1594621	1016555
	30200025	2	10426	18298	12064	1907749	1257793
	30200035	2	6837	18460	9045	1262110	618407
	30200045	2	18746	19435	14763	3643285	2767472
RUCT	30200055	2	3343	21049	9186	703668	307088
	30200065	2	13063	20558	12385	2685492	1617853
	30200075	2	3110	12000	11477	373200	356935
	30200085	2	10921	25500	11927	2784855	1302548
	30200095	2	5881	17695	11569	1040643	680373
AV ARCH	30200105	2	2026	25697	15352	520621	311032
	30200115	2	1066	18455	12434	196730	132546
	30200125	2	3141	23423	8900	735716	279549
	30200135	2	8553	22594	16023	1932465	1370447
	30200145	2	13139	13817	14999	1815416	1970719
			108516			21196571	13989317
UCTURE	3030000						
	30300015	4	22112	36736	14420	8123064	3188550
	30300025	4	28749	37520	13317	10786625	3828504
	30300035	4	12815	48500	10337	6215275	1324687
	30300045	4	14453	41038	12144	5931222	1755172
GERONS	30300055	4	4836	27455	9298	1327724	449651
	30300065	4	2418	27908	9016	674815	218007
	30300085	4	2969	28927	16400	858843	486916
	30300095	4	2045	33739	16400	689963	335380
NK	30300105	4	4138	41310	14206	1709408	587844
	30300115	4	2280	29289	10280	667789	234384
	30300125	4	559	29616	11074	165553	61904
	30300135	4	1216	37000	12500	449920	152000
	30300145	4	12432	38370	11428	4770158	1420729
	30300155	4	22665	39429	14539	8936583	3295264
	30300165	4	31867	35898	12969	11439616	4132831
TURE	30300175	4	5959	28506	13549	1698673	807385
			171513			64445231	22279208
	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	30400015	6	6227	53483	11227
5	FORMERS D B	30400025	6	7335	53530	11438
	TOP LONGERONS	30400035	6	498	53899	13550
	MTG BRKTS SIDE PANEL	30400045	6	190	51866	13066
	LOWER LONGERONS	30400055	6	10301	52236	9914
72	MAIN FRAME STA 538 77	30400065	6	5980	53877	10383
	ACCESS PANELS	30400075	6	3874	52818	9976
	LOWER PANEL ASSY	30400085	6	217	54557	8901
	DROP TANK MTG STRUCTURE	30400095	6	841	58554	8847
20	LOWER SIDE PANELS FWD	30400105	6	10712	50859	9269
	LOWER CENTRE PANEL FWD	30400115	6	2791	51322	8886
	LOWER SIDE PANELS AFT	30400125	6	6698	56934	8863
	LOWER CENTRE PANEL AFT	30400135	6	2609	56600	8794
	FLOATING DUCT D B	30400145	6	45555	55363	11713
				103828		
	ENGINE BAY	30500000				
100	TOP LONGERONS	30500015	8	674	66778	13921
84	BOTTOM LONGERONS	30500025	8	8432	65911	9971
	ENGINE ACCESS DOORS	30500035	8	13604	64040	9057
	ENGINE TUNNEL	30500045	8	61324	65622	12110
71	ENG RAILS ATTACH TO FORM	30500055	8	2906	68763	11364
	PANELS AT ENG ACCESS DOORS	30500065	8	11117	65021	9254
	BOTTOM CTR PANEL FWD	30500075	8	4610	61780	8915
	BOTTOM CTR PANEL CENTRE	30500085	8	4120	67078	9239
	BOTTOM CTR PANEL AFT	30500095	8	7666	72063	9554
5	SIDE PANEL FRONT	30500105	8	8605	61609	11693
5	SIDE PANEL CENTRE	30500115	8	7474	67063	11922
32	SIDE PANEL AFT	30500125	8	7453	72146	12188
41	HEAVY FORMERS	30500135	8	19635	66058	10967
				157620		
	REAR FUSELAGE	30600000				
	SKIN OUTER FIXED R F	30600015	9	5579	77281	13693
	FORMERS FIXED R F	30600025	9	10509	77990	13734
	LONGERONS FIXED R F	30600035	9	2519	77159	12810
	TUNNEL FIXED R F	30600045	9	10994	77552	13214
	ENGINE ACCESS DOORS R F	30600055	9	9023	77505	9859
	FAIRING UNDER RUDDER FIXED	30600065	9	2839	78214	15590
	REMOV TAILCONES	30600075	9	5130	82595	12786
	CENTRE STRUC STING REM R F	30600085	9	10909	83328	13908
				103681		
	DIVE BRAKES	30700015	2	11790	50884	9049
	D B JOINT TO FUSELAGE	30700025		406	48794	9374
				12196		

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
AIR INTAKES	3080001	55	77039	21132	11827
			77039		
FUSELAGE JOINTS	3090000				
JOINT AIR INTAKES TO F F	3090001		663	22000	12000
JOINT F F TO C F	3090002		1028	25711	12250
JOINT D B TO C F	3090003		428	47940	11590
JOINT D B TO E B	3090004		1421	58950	9150
JOINT AT STA 742 50	3090005		724	74250	11500
			4264		
CANOPIES	3100000				
PILOTS CANOPIE	3100001	53	24431	17689	15916
NAVIGATORS CANOPY	3100002	53	16616	23249	16257
			41047		

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
	3080001	55	77039	21132	11827	16279881	9111403
			77039			16279881	9111403
	3090000						
O F F	3090001		663	22000	12000	145860	79560
	3090002		1028	25711	12250	264309	125930
	3090003		428	47940	11590	205183	49605
	3090004		1421	58950	9150	837680	130022
	3090005		724	74250	11500	537570	83260
			4264			1990602	468377
	3100000						
	310000153		24431	17689	15916	4321600	3888438
	310000253		16616	23249	16257	3863054	2701263
			41047			8184654	6589701

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
UNDERCARRIAGE UP POSITION	4000000				
MAIN UNDERCARRIAGE GROUP	4010000				
MAIN UNDERCARRIAGE	4010100	92	214267	53939	141
			214267		
80 MAIN U C DOORS FAIRINGS	4010200	62	28798	53852	138
			28798		
NOSE UNDERCARRIAGE GROUP	4020000				
100 NOSE UNDERCARRIAGE	4020100	91	33361	17080	99
			33361		
NOSE U C DOOR AND FAIRING	4020200	52	2752	16222	88
			2752		

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
	ENGINE GROUP	5000000				
	PS 13 ENGINES	5010000		9903046	8743	121
	ENGINE INSTRUMENTATION	5010001		100006	9000	121
				1000304		
	ACC GEAR BOX ON FUS D B	5020001	56	52335	7865	95
	ACC GEAR BOX ON FUS E B	5020002	58	233606	0764	103
	ACC GEAR BOX ON FUS C A	5020003		80061	480	95
				29393		
	ENGINE CONTROLS	5030000				
	ENGINE CONTROLS F F	5030001	52	15761	6723	123
	ENGINE CONTROLS C F	5030002	54	1092	6444	118
	ENGINE CONTROLS E B	5030004	58	8896	6633	99
	ENGINE CONTROLS I W	5030005	62	6585	2142	127
				3232		
	STARTER AND GEARBOX	5040000				
	STARTER AND GEARBOX ENG	5040001		302156	1438	105
	STARTER AND GEARBOX C A	5040002		30565	853	92
				30520		
	FIRE EXT SYSTEM	5060000				
	ENG FIRE EXT SYSTEM E B	5060001	58	59857	1074	135
	ENG FIRE EXT SYSTEM D B	5060002	56	12315	6856	112
	ENG FIRE EXT SYSTEM ENG	5060003		1426	7960	99
				7358		
	ENGINE MTGS AND BRACKETS	5070000				
	ENGINE MOUNTS	5070001		75396	7191	141
				7539		
	FUEL SYSTEM	5080000				
17	FUEL SYSTEM C F	5080001	54	11280	3999	5140
18	FUEL SYSTEM D B	5080002	56	15735	5373	8109
4	FUEL SYSTEM E B	5080003	58	1836	6139	2110
39	FUEL SYSTEM I W	5080004	62	47280	5543	2143
	FUEL SYSTEM C A	5080005		19568	630	99
				76326		

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
	5000000						
						UNCLASSIFIED	
						NON CLASSIFIE	
	5010000		9903046	8743	12119	6807646	79 1200149
ION	5010001		1000069	000	12125	6900000	12125
			1000304			6876646	79 1212744
D B	5020001	56	5233578	65	9548	3028075	499647
E B	5020002	58	2336060	764	10399	1419447	0 2429206
C A	5020003		800614	80	9530	491840	76240
			29393			1771438	5 3005093
	5030000						
	5030001	52	1576167	23	12368	263554	194920
	5030002	54	109264	44	11800	28824	12862
	5030004	58	8896663	3	9904	592367	88047
	5030005	62	6585214	2	12751	343094	83902
			3232			1227839	379731
	5040000						
ENG	5040001		3021561	438	10579	1856349	2 3196445
C A	5040002		305658	53	9270	200852	28274
			30520			1876434	4 3224719
	5060000						
E B	5060001	58	5985710	74	13583	4253779	812943
D B	5060002	56	1231568	56	11237	699897	138327
ENG	5060003		1426796	0	9970	96503	14157
			7358			5050179	965427
CKETS	5070000						
	5070001		7539671	91	14152	5065529	1066919
			7539			5065529	1066919
	5080000						
	5080001	54	1128039	995	14090	4511436	1589352
	5080002	56	1573553	738	10957	8455674	17240 84
	5080003	58	1836613	92	11024	1127157	202401
	5080004	62	4726055	432	14346	26208250	6782789
	5080005		1956863	0	9920	133829	19344
			76326			4043634	6 10317970

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
	FLYING CONTROLS GROUP	6000000				
	MECHANICAL CONTROLS	6010000				
60	MECHANICAL CONTROLS F F	6010001	52	10694	16454	114
	MECHANICAL CONTROLS C F	6010002	54	1290	39654	117
70	MECHANICAL CONTROLS FIN	6010005	83	12443	78819	221
71	MECHANICAL CONTROLS I W	6010006	62	40234	71800	143
80	MECHANICAL CONTROLS O W	6010007	64	30520	77053	135
	MECHANICAL CONTROLS C A	6010008		6637	09841	143
				95844		
	FLYING CONTROLS HYDRAULICS	6020000				
	FLYING CONT HYDRAULICS D B	6020001	56	3184	56630	101
	FLYING CONT HYDRAULICS E B	6020002	58	39853	64788	111
	FLYING CONT HYDRAULICS R F	6020003	59	4875	87510	108
80	FLYING CONT HYDRAULICS I W	6020004	62	26264	70328	147
74	FLYING CONT HYDRAULICS O W	6020005	64	11701	74076	135
60	FLYING CONT HYDRAULICS FIN	6020006	83	5406	76183	208
	FLYING CONT HYDRAULICS R N	6020007	51	3500	11309	105
	FLYING CONT HYDRAULICS F F	6020008	52	5506	16928	110
	FLYING CONT HYDRAULICS C F	6020009	54	1920	37329	110
				97382		

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
	FIXED EQUIPMENT GROUP	7000000				
	INSTRUMENTS	7010000				
	INSTRUMENTS	7010001	52	326	11643	0139
	NAVIG TABLE AND STOWAGE	7010004	52	200	22000	1300
				3461		
	COCKPIT SEALING	7020000	52	500	18600	1300
				500		
	OXYGEN SYSTEM	7030000				
	OXYGEN SYSTEM	7030001	52	2607	24054	1567
				2607		
	AIR CONDITIONING SYSTEM	7040000				
	AIRCONDITIONING SYSTEM F F	7040001	52	3115	17867	1062
	AIRCONDITIONING SYSTEM C F	7040002	54	5241	02883	1356
	AIRCONDITIONING SYSTEM D B	7040003	56	1034	51762	1245
	AIRCONDITIONING SYSTEM C A	7040005		2832	64344	7137
	AIRCONDITIONING SYSTEM ENG	7040006		1453	67100	1400
	AIRCONDITIONING SYSTEM I W	7040007	62	71	52247	1572
				86409		
	HYDRAULICS MAIN SYSTEM	7050000				
14	UTILITY HYDRAULICS F F	7050001	52	8415	20016	1085
4	UTILITY HYDRAULICS C F	7050002	54	4362	43003	1039
19	UTIL&TY HYDRAULICS D B	7050003	56	21795	54920	1095
68	UTILITY HYDRAULICS E B	7050004	58	10839	60754	1115
30	UTILITY HYDRAULICS I W	7050005	62	14441	55240	1425
14	UTILITY HYDR NOSE U C	7050006	91	325	19033	952
30	UTILITY HYDR MAIN U C	7050007	92	2980	54325	1410
	ANTI SKID SYSTEM C F	7050008	54	3134	47200	1080
	ANTI SKID SYSTEM MUC	7050009	92	634	51500	1400
	NUC AND MUC DOOR SEQ MECH	7050010		2700	20000	1150
				69625		
	MUC DOOR STOPS	7060000	56	302	51600	1200
				302		
	CABIN INSULATION	7070000	52	1431	18748	1320
				1431		

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
P	7000000						
	7010000						
	7010001	52	326	116430	13947	535782	454812
AGE	7010004	52	200	22000	13000	44000	26000
			3461			579782	480812
	7020000	52	500	18600	13000	93000	65000
			500			93000	65000
	7030000						
	7030001	52	2607	24054	15670	627088	408517
			2607			627088	408517
TEM	7040000						
EM F F	7040001	52	311	51786	10626	556557	331000
EM C F	7040002	54	5241	02883	13567	15113996	7110465
EM D B	7040003	56	1034	51762	12492	535219	129167
EM C A	7040005		2832	64344	13798	12306797	3908421
EM ENG	7040006		145	36710	14000	974963	203420
EM I W	7040007	62	7	15224	15728	37095	11167
			8640	9		29524627	11693640
EM	7050000						
F	7050001	52	841	52001	610853	1684346	913280
F	7050002	54	436	24300	310395	18757791	4534330
B	7050003	56	2179	55492	010950	11969814	2386553
B	7050004	58	1083	96075	411157	6585126	1209307
W	7050005	62	1444	15524	014254	7977208	2058420
C	7050006	91	32	51903	3 9521	61857	30943
C	7050007	92	298	05432	514100	16188885	4201800
	7050008	54	313	44720	010800	14792480	3384720
	7050009	92	63	45150	014000	3265100	887600
MECH	7050010		2700	20000	11500	5400000	3105000
			6962	5		34118785	82098450
	7060000	56	302	51600	12000	155832	36240
			302			155832	36240
	7070000	52	1431	18748	13200	2682840	1888920
			1431			2682840	1888920

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT_____

NON CI

	DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. AR
	BRAKE PARACHUTE	7080000				
	BRAKE PARACHUTE F F	708000152		455	16913	128
	BRAKE PARACHUTE R F	708000559		8528	82205	143
	BRAKE PARACHUTE I W	708000662		124	62022	145
				9107		
	ELECTRICAL SYSTEM	7090000				
	ELECTRICAL WIRING R N	709000151		129	9285	120
	ELECTRICAL WIRING F F	709000252		2966	19977	112
	ELECTRICAL WIRING C F	709000354		2354	39703	110
	ELECTRICAL WIRING A I	709000455		1274	21984	120
	ELECTRICAL WIRING D B	709000556		9015	52769	99
	ELECTRICAL WIRING F B	709000658		64	59500	92
	ELECTRICAL WIRING I W	709000862		9236	53995	139
	ELECTRICAL WIRING FIN	709000983		352	79754	300
	ELECTRICAL WIRING NUC	709001091		330	18600	98
	ELECTRICAL WIRING ENG	70900011		2002	60683	100
	ELECTRICAL WIRING C A	70900012		13746	33473	112
	ELECTRICS F F	709001352		15240	15765	113
	ELECTRICS C F	709001454		7331	45196	101
	ELECTRICS E B	709001558		670	67944	115
	ELECTRICS ENG	70900016		18772	58913	115
	ELECTRICS C A	70900017		718	61350	120
	ELECTRICS FIN	709001883		44	89050	288
	ELECTRICS I W	709001962		2336	62053	145
	ELECTRICS CAW	70900020		112	62946	135
	ELECTRICS MUC	709002192		74	51600	137
20	ELECTRICS A I	709002255		4900	22079	139
	ELECTRICS D B	709002356		30051	51859	102
	ELECTRICS R F	709002459		136	80200	113
	WINDSCREEN DEMISTING	709002552		3564	19898	99
				125416		
	L P PNEUMATICS	7100000				
	L P PNEUMATICS F F	710000152		1993	19586	122
	L P PNEUMATICS C F	710000254		796	32397	116
	L P PNEUMATICS FIN	710000583		414	74966	252
	L P PNEUMATICS R N	710000651		199	7067	92
	L P PNEUMATICS ENG	71000008		1403	63897	99
	L P PNEUMATICS I W	710000962		203	52880	159
				5008		
	INTAKE DE ICING	712000055		8800	19582	118
				8800		
29	CANOPY ACTUATION	716000052		6492	22199	154
				6492		

AVRO AIRCRAFT LTD.
MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

PROJECT_____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V.
CABIN CONSOLES	7170000	52	1728	17466	12
			1728		
SURFACE FINISH F F	7190001	52	363	18744	12
SURFACE FINISH CANOPY	7190002	53	64	20218	15
SURFACE FINISH C F	7190003	54	1400	37197	12
SURFACE FINISH 2NTAKES	7190004	55	408	22798	12
SURFACE FINISH D B	7190005	56	377	53828	11
SURFACE FINISH E B	7190006	58	443	66701	11
SURFACE FINISH R F	7190007	59	648	80362	13
SURFACE FINISH I W	7190008	62	3151	60144	14
SURFACE FINISH O W	7190009	64	1067	70650	13
SURFACE FINISH O W L EDGE	7190010	65	319	63948	13
SURFACE FINISH AILERON	7190011	74	353	79190	13
SURFACE FINISH ELEVATOR	7190012	82	566	75523	14
SURFACE FINISH FIN	7190013	83	639	74663	20
SURFACE FINISH RUDDER	7190014	84	202	81279	21
			10000		
FLIGHT TEST INSTALLATION	7200000		51700	49927	13
			51700		

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
REMOVABLE EQUIPMENT GROUP	8000000				
94 EJECTOR SEATS	8010100	52	34294	20450	1341
			34294		
RADIO RADAR PART ASTRA R N	8020101	51	168	10687	919
RADIO RADAR PART ASTRA F F	8020102	52	13986	18004	1167
RADIO RADAR PART ASTRA C F	8020103	54	27244	27238	964
RADIO RADAR PART ASTRA D B	8020104	56	4904	51662	1145
RADIO RADAR PART ASTRA F I N	8020105	83	3249	76179	2519
RADIO RADAR PART ASTRA C A	8020106		15505	40534	1237
RADIO RADAR PART ASTRA I W	8020108	62	2795	58836	1544
RADIO RADAR PART ASTRA O W	8020109	64	1049	74642	1372
			69900		
DAMPING SYSTEM F F	8030101	52	784	17201	1204
DAMPING SYSTEM C F	8030102	54	23033	32213	1094
DAMPING SYSTEM E B	8030103	58	369	63242	1343
DAMPING SYSTEM I W	8030104	62	6070	53781	1572
DAMPING SYSTEM O W	8030105	64	95	74855	1400
DAMPING SYSTEM R N	8030106	51	287	7350	934
			9908		
INSTRUMENTATION	8050900	94	172600	39340	950
			172600		
INSTRUMENT PACK STRUCTURE	8051000	54	69200	38486	935
			69200		
ADDITIONAL FIRE PROTECTION	8090000		18061	39887	1086
			18061		

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
OPERATIONAL LOAD	9000000				
CREW MEMBERS	901000052		39000	19400	136
			39000		
ENGINE OIL	9020000				
ENGINE OIL DRAINABLE	9020001		9290	65225	113
ENGINE OIL TRAPPED ENG	9020002		1773	63676	116
ENGINE OIL TRAPPED D B	902000356		1925	58084	95
ENGINE OIL TRAPPED E B	902000458		909	59928	97
			13897		
OXYGEN CHARGE	9050000				
OXYGEN CHARGE F F	905000152		72	20493	1320
OXYGEN CHARGE C F	905000254		1267	26280	1615
			1339		
ENGINE FIRE EXT FLUID	9060000		2500	73000	1290
			2500		
TRAPPED FUEL	9080000				
TRAPPED FUEL C F	908000154		2430	41426	1310
TRAPPED FUEL D B	908000256		690	49400	1335
TRAPPED FUEL I W	908000362		18260	56814	1435
			21380		
WATER FOR AIR CONDITIONING	910000054		26000	26800	1320
UNUSABLE WATER FOR AIRCOND	91000154		2500	26700	1270
			28500		

EIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

REPORT NO. _____

SHEET _____

	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
	9000000						
	90100005	2	39000	19400	13650	7566000	5323500
			39000			7566000	5323500
	9020000						
	9020001		9290	65225	11390	6059403	1058131
NG	9020002		1773	63676	11640	1128975	206377
B	90200035	6	1925	58084	9555	1118117	183934
B	90200045	8	909	59928	9704	544746	88209
			13897			8851241	1536651
	9050000						
	90500015	2	72	20493	13200	14755	9504
	90500025	4	1267	26280	16150	332968	204621
			1339			347723	214125
)	9060000		2500	73000	12900	1825000	322500
			2500			1825000	322500
	9080000						
	90800015	4	2430	41426	13106	1006652	318476
	90800025	6	690	49400	13350	340860	92115
	90800036	2	18260	56814	14353	10374236	2620858
			21360			11721748	3031449
ONING	9100000	54	26000	26800	13200	6968000	3432000
IRCOND	9100001	54	2500	26700	12700	667500	317500
			28500			7635500	3749500