QC
Avro
R-7-0400-64
Iss. 4

FILE IN VAULT

Arrow 1
A/C 25202 & 25203

Report: 7-0400-64
Issue : 4

Weight & C.G. Summary

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1 Aug/58

C. 1

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TO

DATE

JAN 07 1993

Report no.: QCX-AVRO-CF105-R-7-0400-64-Iss. 4

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: 2632/11/J
Date: 1 August, 1958
To: See Distribution
From: E.F. Burnett - Weight Supervisor
Subject: Arrow 1 - A/C 25202 & 25203 - Weight and C.G. Summary Report 7-0400-64 Issue 4.

Attached is a copy of Weight and C.G. Summary Report 7-0400-64 Issue 4 dated 1 August, 1958, for your retention.

It was intended to conclude the Monthly Weight Reports for these Aircraft with Report 7-0400-64 Issue 3 dated July 1st, 1958. However, the experimentally obtained figures for Trapped and Residual Fuel were unacceptable due to the possibility of inaccuracies in the procedure and subsequent detailed investigation has resulted in new estimates for these items which are now incorporated in this issue of the subject report.

All future weight reporting will be done on the standard "Weight Statement for Flight Testing" form, as established for Arrow 25201.

Classification cancelled / changed to: UNCLASSSIFIED
By authority of: DRDA 7/DARFT 5-8/DAS Eng 6-4-5
Date: 5 Nov 1992
Signature: B Aubrey
Unit / Rank / Appointment: DSIS 3, Secretary CRAD HQ DRP

E.F. Burnett

E.F. Burnett

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

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Date : 1 August, 1958

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N.B.

Work has been cancelled on the fuel C.G. management system for Arrow 1 aircraft due to the satisfactory functioning of the proportioners.

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Introduction & Weight Changes

The following is a weight & C.G. summary for the second and third Arrow 1 Aircraft Nos. 25202 & 25203, with J75 P5 Engines, based on the latestinformation available. All weight & C.G. changes are quoted relative to 7-0400-64 Issue 3 of July 1st, 1958.

Note:

1) Issue 3 of July 1st, 1958, was intended to close the monthly weight statements for A/C 25202 & 25203, however, due to the fact that the experimentally determined trapped and residual fuel figures were not accepted, the report is being issued again, this issue being final. In future A/C 25202 & 25203 will be covered by Weight Statements for Flight Test.

2) Neither a dry nor a drained weighing has yet been obtained for Aircraft No. 25202. However, based on the good agreement shown between estimated and actual weights of A/C 25201 it is felt that this summary is completely representative of the subject Aircraft within ± 0.30%.

   It should be remembered that the figures shown here for Nose Ballast are theoretical requirements and NOT the ballast as installed on A/C 25202, see General note b) on the Instrument Package.

3) This summary will not apply for A/C 25204 and 25205 which are to be used for full Astra I Trial Installations. Reference Weights Report #7-0400-64 Issue 3.

4) After Phase I of the flight test programme A/C 25203 will be fitted with a weapons pack trial installation, in lieu of the instrumentation package recorded here.

5) In this summary the Aircraft is shown ballasted such that the aft C.G. shall not exceed 31% M.A.C. - which is the theoretical aft limit.

General:

a) Pratt and Whitney J75 P5 Engines comprise the Power Plant for A/C's 25202 & 25203. (5850 lb each, Pratt and Whitneys latest brochure weight with their installation kit, confirmed by P & W actual weight recorded in engine inspection records).

b) The Instrument Package containing Flight Instrumentation is installed. The Packages for A/C's 25201 to 25203 differ from those for A/C's 25204 and 25205.

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General:-

b) Cont'd

The weight recorded here is Flight Test Department's estimate of cable and instruments. An actual weight will be obtained as soon as a complete pack is available.

For early flights the package will not have complete instrumentation, but ballast will be installed to exactly simulate the completed weight and C.G.

A relatively detailed estimate of other proposed Flight Test Installations throughout the Aircraft has been made. These installations amount to 1457 lb (figure partially confirmed by actual weights of some cable assys).

c) In A/C 25201 for early flights additional emergency fire protection and additional emergency provisions for landing gear lowering were installed. These are no longer necessary in A/C's 25202 and 25203 and have been deleted from the weight records.

d) An Interim Radio & Radar System with Minneapolis-Honeywell MH64 Damping System is installed. Currently there is no Doppler or Tacan installation, though space provision for future installation of Doppler, which is not yet available, is made.

e) The Mk 1A Tailcones and Stinger are fitted. Possibly these may not be available for first flights of A/C 25202, however, they will be retrofit as soon as available.

f) On A/C 25202, the set of control surfaces modified structurally for "buzz damper" installation are fitted. The control boxes are already modified for all Mk 1 A/C. If it is decided to fit a trial installation of the "buzz damper" system there will be the following additional wt. to A/C 25202.....

Buzz Damping Equipment + 124 lb.

This weight report incorporates the modified surfaces as on A/C 25202, however, if A/C 25203 does not have a "buzz damper" installation then the following changes ensue:-

Elevators	- 11.07 lb/A/C
Ailerons	- 11.68 lb/A/C
Rudder	- 8.78 lb
	- 31.53 lb

When the split control surfaces are introduced a further weight increase will result:-

Elevators	+ 4.36 lb/A/C
Rudder	+ 2.34 lb
	+ 6.70 lb

General: (Cont'd)

g) Due to material substitutions and concessions introduced by Planning and Production Departments, there is a structural weight penalty of 72 lb approx. This is all recorded in the structural weight breakdown. No account has been taken of variations on machinings etc. nor of shop repair schemes, since it is impossible to assess these, except where actual weights have been obtained. Major repair shcemes e.g. cracked outer skin on Air Intakes have been assessed and recorded.

h) Preceeding the report titles on the I.B.M. tabulation sheets, will be found a number varying from 0 to 100, this is the percentage of actual weight recorded within the report. (see also note 2) on sheet 1-1).

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

k) No further work is being proceeded with in the fuel management system for Arrow 1 Aircraft. The fuel proportioners are functioning satisfactorily and it is not considered necessary to fit the fuel sequencing system.

	Weight lb
1. Structure	
No weight change	
2. Landing Gear	
No weight change	
3. Power Plant Group	
Fuel System - actual weight of pressure regulator valves 5.13 lb each, Spec. wt. 3.25 lb each	+ 3.76
Total Power Plant Increase	+ 3.76
4. Flying Controls Group	
No weight change	
5. Equipment Group	
No weight change	

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6. Trapped Fuel — Weight lb

The figures established last month were deemed unacceptable due to possible inaccuracies in the method of obtaining them. Now detailed estimates, partially supported by test rig results reveal that the trapped fuel in the system is probably 238.2 lb. Hence a decrease in wt is shown here (372 lb July 1st, 1958) — - 133.80
(See also Operational Load for note pertaining to residual fuel)

*

Total Trapped Fuel Decrease — - 133.80

7. Operational Load

Residual Fuel - On July 1st the weight of this item was quoted from an experimental determination. However, since the method had some possible inaccuraces the figures have been checked by detailed calculations. Similar weights are applicable to the Mk 2 A/C, but in these A/C it is proposed to modify the fuel no-air valves, and to introduce a sump in tank #5 such that the fuel is recoverable. Thus if the Mk 1 A/C fuel system were similarly modified it would be possible to regain 287 lb of currently unusable fuel. Wt Change + 2.00

*

Total Operational Load Increase + 2.00

N.B.

* Thes figures have not influenced the Gross Weight of the Aircraft, see also note following WT. and C.G. Summary Sheet 2-2.

Summary

Weight Change - Aircraft Basic Weight

Power Plant	+ 3.76
Trapped Fuel	- 133.80
	- 130.04

Weight Change - Operational Load

Residual Fuel	+ 2.00

Weight Change - Operational Weight Empty (A/C less usable fuel)
UNBALLASTED CONDITION

Issue 3	Issue 4	
48,069.15	47,941.11	- 128.04 lb

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Description	Weight lb	H. Arm ins	V. Arm ins
Structure	18,797.46	563.30	137.45
Wings	10,007.76	643.06	142.24
Fin & Rudder	1,034.63	754.84	209.36
Fuselage Fwd Sta 255 ins	2,669.92	181.78	128.17
Sta 255 - 485 ins	1,670.36	380.23	130.70
Sta 485 - 591.65 ins	1,010.63	533.81	104.49
Sta 591.65 - 742.5 ins	1,437.47	660.98	107.30
Sta 742.5 ins aft	912.38	807.53	128.96
"Marry-Up"	54.31	462.81	104.25
Landing Gear - Retracted	2,661.39	488.88	135.01
Main Landing Gear	2,018.57	538.99	141.00
Main Gear Doors & Fairings	282.34	537.60	138.37
Nose Landing Gear	333.81	170.81	99.70
Nose Gear Door & Fairing	26.67	161.77	88.25
Power Plant & Services	13,774.42	652.51	120.36
Engines & Accessories J75 P5	11,913.81	665.32	119.78
Gear Box & Drives on Fuselage	276.70	603.71	103.24
Gear Box & Starters on Engines	286.80	589.18	105.54
Engine Controls	33.35	375.79	118.49
Engine Nose Bullets	75.61	526.69	115.11
Fire Extinguishing System	65.53	700.45	134.21
Engine Mountings	206.21	635.04	127.71
Fuel System	916.41	538.53	135.54
Flying Controls Group	2,007.99	652.17	137.19
Mechanical Flying Controls	953.45	675.98	147.72
Hydraulic Flying Controls	1,054.54	630.64	127.67
Equipment -Fixed & Removable	9,472.03	403.28	113.61
Instruments	46.07	163.68	138.70
Probe	15.00	-38.14	108.00
Cockpit Pressure Sealing	5.00	186.00	130.00
Ejector Seats	342.94	204.50	134.11
Oxygen System	22.40	252.82	156.03
Air Conditioning System	822.07	339.45	134.46
Surface Finish	100.00	591.52	140.20
Cockpit Insulation	14.31	187.48	132.00
Brake Chute	90.99	786.18	143.17
Low Pressure Pneumatics	54.65	433.33	129.37
Electrical System	1,126.18	415.86	112.91
Intake De-icing Boots	88.00	195.82	118.00
Canopy Actuation	65.86	222.01	154.36
Console Panels	17.45	174.76	124.34
MH64 Damping	99.08	450.83	140.34
Interim Radio & Radar	648.68	342.30	124.04
Hydraulics Utilities System	654.93	503.19	117.65
U/C Doors - Sequencing	66.89	345.66	116.36
Instrument Pack Structure	686.80	385.81	94.68
Pack Instrumentation	3,048.00	394.00	95.00
Flight Test Installations	1,456.73	488.48	128.90

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Description	Weight lb	H. Arm ins	V. Arm ins	M.A.C. %
Trapped Fuel	238.20	553.66	141.42	
U/C Up		556.72	127.50	
Aircraft Basic Weight	46,951.49			
U/C Down		558.88	123.94	
Useful Load	989.62	366.28	132.83	
Crew	390.00	194.00	136.50	
Oxygen Charge	13.39	259.69	159.91	
Water for Air Conditioning	140.00	268.00	132.00	
Oil	134.23	608.92	115.68	
Fire Extinguisher Fluid	25.00	730.00	129.00	
Residual Fuel	287.00	508.14	135.33	
Ballast	765.00	84.48	116.50	
U/C Up		545.43	127.44	30.23
Operational Wt. Empty	48,706.11			
U/C Down		547.52	124.00	30.80
Max. Int. Fuel (2468 * at 7.8 lb/gal)	19,253.00	540.80	144.09	
U/C Up		544.12	132.16	29.87
Gross Weight (Max. Int. Fuel)	67,959.11			
U/C Down		545.62	129.69	30.28

N.B. 1) A/C Datum = 120 ins above an arbitrarily chosen ground line

2) The above figures are for the Aircraft in the BALLASTED condition such that the aft C.G. on the horizontal C.G. envelope, using fuel proportioners, does not exceed 31% M.A.C. ie 303 lb on Former Sta. 68.5 ins and 462 lb on the Shear Panel.

These figures are theoretical requirements only and are not to be confused with full nose ballast as normally installed (1397 lb total + possible additional 500 lb).

* 3) The trapped and residual fuel figures have now been calculated in detail (the experimentally determined figures of July 1st, 1958, being deemed unacceptable - see notes in text of report).

Figure obtained by actual weighing	657	lb
Revised calculated figure	525.2	lb
Decrease in trapped + residual fuel	-131.8	lb

Hence since the trapped + residual fuel have decreased by approx. 132 lb the usable fuel has increased by a similar amount, it not being considered desirable to alter the total estimated fuel within the Aircraft at this time.

It is hoped, in the near future, to make an accurate check on the total volumes contained in each tank, since currently only calculated figures are available.

REPORT NO: 7-0400-64 ISSUE 4

DATE: Aug 1st 1958

SHEET: 3

BY: Kathleen Griffin

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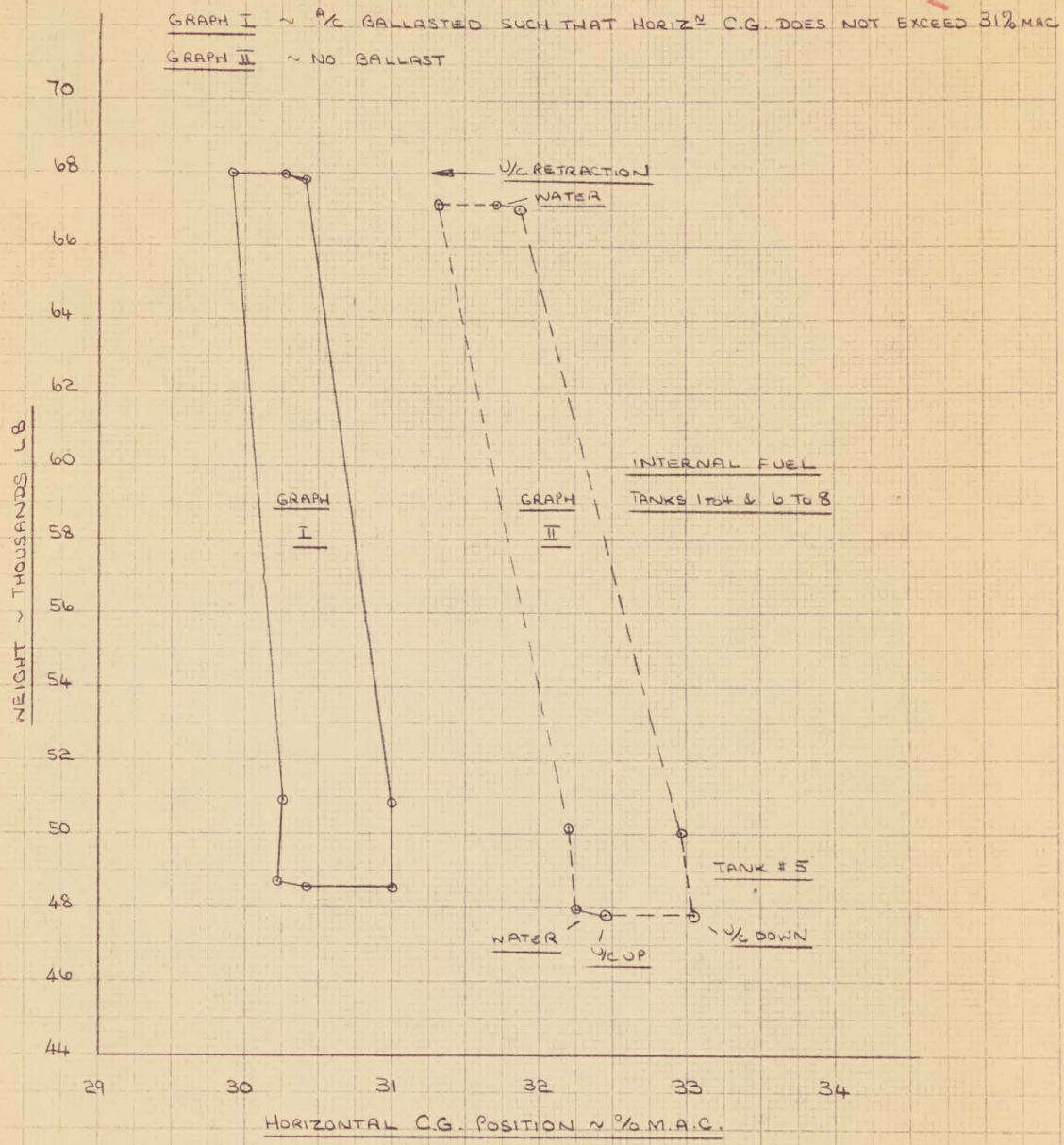
HORIZONTAL C.G. ENVELOPE

ARROW I ~ A/C 25202 & 25203

NORMAL FLIGHT CONDITIONS

FUEL PROPORTIONERS USED



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WEIGHT AND C. OF G BY FUNCTIONAL GRO COMPONENT

PROJECT

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM
100 LEADING EDGE I W	105000062		22138	4684
			22138	
LEADING EDGE O W	106000065		30870	6301
			30870	

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WEIGHT AND C. OF G BY FUNCTIONAL GR
COMPONENT

PROJECT_____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. AR
FIN AND RUDDER GROUP	2000000			
100 FIN	2010000	83	85170	749
BUZZ DAMP STRUC PROV FIN	2010001	83	185	803
12 FIN TO WING MARRY UP	2010002		4830	685
			90185	
93 RUDDER	2020000	84	13278	813
			13278	

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

REPORT NO.

SHEET

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	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
P	2000000						
	201000083		851707495721170			63840877	18030489
V FIN	201000183		185803002 2342			148555	41333
P	2010002		4830	68538	15355	3310385	741847
			90185			67299817	18813469
	202000084		13278	81325	21440	10798334	2846803
			13278			10798334	2846803

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WEIGHT AND C. OF G BY FUNCTIONAL GR COMPONENT

PROJECT

	DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. AR
	TOTAL FUSELAGE GROUP	300000			
	FUSELAGE BASIC STRUCTURE	301000			
100	RADOME	301000	151	18100	37
100	RADAR NOSE ACCESS DOORS	301000	251	8008	95
	NOSE STRUCTURE FWD STA 120	301000	351	12207	94
	SKIN F F	301000	452	11054	190
88	SKIN C F	301000	554	21263	376
	SKIN D B	301000	656	5937	534
3	SKIN E B	301000	758	17725	669
	FORMERS F F	301001	152	10717	182
100	FORMERS C F	301001	254	27824	374
	FORMERS D B	301001	356	7491	537
	LIGHT FORMERS E B	301001	458	13501	668
72	HEAVY FORMERS E B	301001	558	21890	662
	LOWER LONGERONS F F	301001	652	6969	184
	LONGITUDINAL MEMBERS E B	301001	758	11067	708
75	LOWER LONGERON E B	301001	858	6842	658
	TOP LONGERONS E B	301001	958	638	666
	LOWER SHEAR PANEL F F	301002	052	2952	234
	TOP WING LONGERONS D B	301002	156	498	538
66	LONGERONS C F	301002	354	14453	410
43	LONGERONS F D B	301002	454	1258	487
43	LONGERONS A D B	301002	556	8655	529
	ELECTRONICS BAY STRUCTURE	301002	654	3570	273
59	LONGITUDINAL BEAMS D B	301002	756	6570	520
	RADAR ACCESS DOOR C F	301002	854	2160	274
72	MAIN FRAME AT STN 538 77	301002	956	5980	538
	DIVE BRAKE ACCOMMODATIONS	301003	056	3620	503
48	TOP LONGERONS F F	301003	152	19253	193
100	DUCT C F	301003	254	33475	372
97	DUCT D B	301003	356	31663	544
22	CANOPY ARCH	301003	452	8659	228
4	ACCESS PANELS D B	301003	656	3964	540
66	NOSE U C SUPPORT STRUCTURE	301003	752	3343	210
3	CREWS BULKHEADS	301003	852	13101	206
51	EQUIPMENT BAY STRUCTURE	301003	954	6211	283
86	WINDSCREEN	301004	152	13057	138
33	SERVICE ACCESS DOORS	301004	258	6704	663
	TORSION BOX F B	301004	358	6046	619
	DORSAL FAIRING AIR OUTLET	301004	454	2143	292
66	INTERMEDIATE FORMERS	301004	558	5154	692
3	ENGINE ACCESS DOORS	301004	658	14739	628
	SEALING MISSILE BAY	301004	754	743	319
100	MISCELLANEOUS ITEM C F	301004	854	392	370
98	ARMAMENT BAY ROOF	301004	954	13326	384
	BULKHEAD AT STA 120	301005	052	3144	120
	BULKHEAD STA 255	301005	152	10473	255
100	BULKHEAD STA 485	301005	254	11254	485
	ENGINE TUNNEL	301005	458	47926	665
100	INTEGRAL FUS FUEL TANK CF	301005	554	21168	397

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	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
IP	3000000						
ICTURE	3010000						
	3010001	51	18100	3796	11037	687076	1997697
OORS	3010002	51	8008	9509	11450	761481	916916
STA 120	3010003	51	12207	9477	11401	1156857	1391720
	3010004	52	11054	19058	12024	2106671	1329133
	3010005	54	21263	37670	14300	8009772	3040609
	3010006	56	5937	53413	11157	3171130	662391
	3010007	58	17725	66945	10996	11866001	1949041
	3010011	52	10717	18294	12036	1960568	1289898
	3010012	54	27824	37482	13306	10428992	3702261
	3010013	56	7491	53710	11316	4023416	847682
	3010014	58	13501	66827	11119	9022313	1501176
	3010015	58	21890	66217	10984	14494901	2404398
F	3010016	52	6969	18483	9044	1288080	630276
RS E B	3010017	58	1106	70853	9611	783634	106298
	3010018	58	684	26581	0 9781	4502720	669216
	3010019	58	63	86660	5 13911	424940	88752
F	3010020	52	2952	23414	8900	691181	262728
D B	3010021	56	498	53899	13550	268417	67479
	3010023	54	14453	41038	12144	5931222	1755172
	3010024	54	1258	48717	10700	612860	134606
	3010025	56	8655	52931	9759	4581178	844641
RUCTURE	3010026	54	3570	27359	9197	976716	328333
D B	3010027	56	6570	52007	9125	3416860	599513
C F	3010028	54	2160	27400	8976	591840	193882
538 77	3010029	56	5980	53877	10383	3221845	620903
DATIONS	3010030	56	3620	50328	9339	1821874	338072
	3010031	52	19253	19308	14763	3717369	2842320
	3010032	54	33475	37249	12917	12469103	4323966
	3010033	56	31663	54471	11812	17247153	3740034
	3010034	52	8659	22804	16053	1974598	1390029
	3010036	56	3964	54013	10340	2141075	409878
TRUCTURE	3010037	52	3343	21049	9186	703668	307088
	3010038	52	13101	20619	12291	2701295	1610244
CTURE	3010039	54	6211	28362	13736	1761564	853143
	3010041	52	13057	13814	15006	1803694	1959333
RS	3010042	58	6704	66397	9189	4451255	616031
	3010043	58	6046	61926	9058	3744046	547647
OUTLET	3010044	54	2143	29245	16400	626720	351452
RS	3010045	58	5154	69289	10257	3571155	528646
S	3010046	58	1473	96286	7 8874	9265967	1307939
	3010047	54	743	31991	10964	237693	81463
C F	3010048	54	392	37000	12500	145040	49000
	3010049	54	1332	6 38460	11427	5125180	1522762
	3010050	52	3144	12000	12280	377280	386083
	3010051	52	1047	3 25500	12033	2670615	1260216
	3010052	54	1125	4 48500	10530	5458190	1185046
	3010054	58	4792	6 66524	11574	31882292	5546955
ANK CF	3010055	54	2116	8 39722	14553	8408353	3080579

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WEIGHT AND C. OF G BY FUNCTIONAL COMPONE

PROJECT_____

	DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H
	COCKPIT FLOOR	30100056	52	6160	1
	CENTRE BEAM 697 28 717 36	30100059	58	557	7
	DORSAL OVER FUEL TANK	30100061	54	5007	4
	SHIELD EXHAUST DEFLECTOR	30100062	54	1981	3
	SHEAR PANEL BELOW NAV ARCH	30100063	52	2115	2
33	PACK MOUNTING STRUCTURE	30100064	54	2119	2
88	ENG ACCESS DOORS R F	30100065	59	8457	7
99	TUNNEL FIXED R F	30100066	59	10403	7
100	SKIN AND STIFFENERS R F	30100067	59	5143	7
100	FAIRING UNDER RUDDER R F	30100068	59	2616	7
100	FORMERS FIXED R F	30100069	59	9001	7
100	LONGERONS C BEAM FIXED R F	30100070	59	2799	7
	TAILCONES	30100071	59	43984	8
	CNTR STRUCT STING REM R F	30100072	59	8835	8
	MISCELLANEOUS ITEMS E B	30100073	58	919	6
	MTG BRKTS SIDE PANEL D B	30100075	56	243	5
	FORMERS LOWER PANEL D B	30100076	56	7640	5
	LOWER PANEL D B	30100077	56	5348	5
	JOINT F F TO C F	30100078		855	2
	JOINT AIR INTAKES TO F F	30100079		1092	2
	JOINT C F TO D B	30100080		520	4
	JOINT D B TO E B	30100081		2521	5
	FUS JOINT AT STA 742 50	30100082		443	7
6	MISCELLANEOUS ITEMS F F	30100086	52	850	1
				646534	
	DIVE BRAKES	30200000	72	11790	5
	DIVE BRAKES C A	30200001		406	4
				12196	
	AIR INTAKES	30300000			
7	AIR INTAKES	30301000	55	77248	2
				77248	
	PILOTS AND NAVIG CANOPIES	30400000			
76	PILOTS CANOPY	30401000	53	24208	
				24208	
100	NAVIGATORS CANOPY	30402000	53	15321	
				15321	

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WEIGHT AND C. OF G BY FUNCTIONAL GRO COMPONENT

PROJECT

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM
UNDERCARRIAGE UP POSITION	4000000			
MAIN UNDERCARRIAGE GROUP	4010000			
100 MAIN UNDERCARRIAGE	401010092		201857	5389
			201857	
89 MAIN U C DOORS FAIRINGS	401020062		28234	5376
			28234	
NOSE UNDERCARRIAGE GROUP	4020000			
100 NOSE UNDERCARRIAGE	402010091		33381	1708
			33381	
95 NOSE U C DOOR AND FAIRING	402020052		2667	1617
			2667	

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WEIGHT AND C. OF G BY FUNCTIONAL G COMPONEN

PROJECT_____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. A
ENGINE GROUP	5000000			
ENGINE J 75	5010000		1187578	665
			1187578	
J 75 ENGINE SERV ACCESS	5010100		38036	29
			3803	
ACC GEAR BOXES ON FUS D B	502000156		44455	78
ACC GEAR BOXES ON FUS E B	502000258		23225	608
			27670	
ENGINE CONTROLS	5030000			
35 ENGINE CONTROLS F F	503000152		15581	66
35 ENGINE CONTROLS C F	503000254		1172	68
35 ENGINE CONTROLS E B	503000458		9466	37
35 ENGINE CONTROLS I W	503000562		6894	97
35 ENGINE CONTROLS ENG	5030006		256	41
			3335	
83 GEARBOX AND STARTER ON ENG	5040000		28680	589
			28680	
91 ENGINE ANTI ICING	5050000		7561	562
			7561	
FIRE EXT SYSTEM	5060000			
FIRE EXTING SYSTEM D B	506000256		14655	
FIRE EXTING SYSTEM E B	506000358		64077	0
			6553	
ENGINE MTGS AND BRACKETS	5070000			
64 ENG MOUNTING AND BRKTS	5070001		14653	62
ENGINE MTGS ACCESSORIES	5070002		5202	66
ENGINE MTGS ACCESSORIES CA	5070003		766	64
			20621	

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

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	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
	5000000						
	5010000		1187578	66543	11983	790250029	142307472
			1187578			790250029	142307472
CESS	5010100		3803	62941	10354	2393646	393763
			3803			2393646	393763
US D B	502000156		44457	866	9765	2572144	434054
US E B	502000258		23225	60850	10431	14132413	2422600
			27670			16704557	2856654
	5030000						
	503000152		1558	16668	12431	259687	193675
	503000254		117	26800	11800	31356	13806
	503000458		946	37871	10081	603425	95366
	503000562		68	94974	5131 37	342743	90514
	5030006		25	64137	10000	16034	2500
			3335			1253245	395861
ON ENG	5040000		2868	58918	10554	16897682	3026887
			2868			16897682	3026887
	5050000		756	1562	69 11511	4254499	870347
			756			4254499	870347
	5060000						
D B	506000256		146	5531	8 13749	80764	20074
E B	506000358		640	7038	1 13414	4509311	859435
			655			4590075	879509
CKETS	5070000						
KTS	5070001		146	5362	5 04 12935	9158711	1895366
RIES	5070002		52	02662	13 12248	3444400	637141
RIES CA	5070003		76	6423	6 13192	492048	101051
			20621			13095159	2633558

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WEIGHT AND C. OF G BY FUNCTIONAL COMPONE

PROJECT

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H.
FUEL SYSTEM	508000 0			
23 FUEL SYSTEM C F	508000 1	54	13483	40
29 FUEL SYSTEM D B	508000 2	56	17382	53
40 FUEL SYSTEM E B	508000 3	58	4025	66
49 FUEL SYSTEM I W	508000 4	62	54349	55
FUEL SYSTEM ENG	508000 5		1648	68
FUEL SYSTEM C A	508000 6		754	61
			91641	

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

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REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
5080000						
5080001	54	13483	407.81	140.85	5498502	1899081
5080002	56	17382	534.18	113.11	9285117	1966078
5080003	58	4025	669.18	125.00	2693450	503125
5080004	62	54349	557.15	144.13	30280545	7833321
5080005		1648	685.63	89.16	1129918	146936
5080006		754	615.25	96.58	463899	72821
		91641			49351431	12421362

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WEIGHT AND C. OF G BY FUNCTIONAL GI COMPONENT

PROJECT_____

	DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. AR
	FLYING CONTROLS GROUP	6000000			
59	MECHANICAL CONTROLS F F	601000152		10992162	
	MECHANICAL CONTROLS C F	601000254		1213400	
70	MECHANICAL CONTROLS FIN	601000583		12528787	
74	MECHANICAL CONTROLS I W	601000662		39689718	
85	MECHANICAL CONTROLS O W	601000764		30260770	
	MECHANICAL CONTROLS C A	6010008		663709	
				95345	
	FLYING CONTROLS HYDRAULICS	6020000			
32	FLYING CONT HYDRAULICS D B	602000156		32435 66	
32	FLYING CONT HYDRAULICS E B	602000258		45023651	
32	FLYING CONT HYDRAULICS R F	602000359		48758	
77	FLYING CONT HYDRAULICS I W	602000462		27475703	
66	FLYING CONT HYDRAULICS O W	602000564		13086740	
63	FLYING CONT HYDRAULICS FIN	602000683		5564760	
32	FLYING CONT HYDRAULICS R N	602000851		3500113	
32	FLYING CONT HYDRAULICS F F	602000952		5595169	
32	FLYING CONT HYDRAULICS C F	602001054		1920373	
				105454	

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WEIGHT AND C. OF G BY FUNCTIONAL GR
COMPONENT

PROJECT

	DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. AR
	FIXED EQUIPMENT GROUP	7000000			
	INSTRUMENTS	7010000			
	INSTRUMENTS F F	701000152		4407	161
	NAVIG TABLE AND STOWAGE	701000452		200	220
				4607	
	COCKPIT PRESSURE SEALING	702000052		500	186
				500	
	OXYGEN SYSTEM	7030000			
58	OXYGEN SYSTEM	703000152		2240	252
				2240	
	AIR CONDITIONING SYSTEM	7040000			
54	AIRCONDITIONING F F	704000152		3549	178
54	AIRCONDITIONING C F	704000254		47212	294
54	AIRCONDITIONING D R	704000356		1148	516
54	AIRCONDITIONING C A	7040005		27363	397
54	AIRCONDITIONING ENG	7040006		2855	640
54	AIRCONDITIONING I W	704000762		80	515
				82207	
	HYDRAULICS MAIN SYSTEM	7050000			
32	UTILITY HYDRAULICS F F	705000152		8981	200
29	UTILITY HYDRAULICS C F	705000254		4578	440
20	UTILITY HYDRAULICS D B	705000356		27338	556
74	UTILITY HYDRAULICS E B	705000458		7892	605
24	1TILITY HYDRAULICS I W	705000562		13511	553
32	UTILITY HYDR NOSE U C	705000691		213	188
24	UTILITY HYDR MAIN U C	705000792		2980	543
	NUC AND MUC DOOR SEQ MECH	7050010		6689	345
				72182	
	CABIN INSULATION	707000052		1431	187
				1431	
	BRAKE PARACHUTE	7080000			
	BRAKE PARACHUTE F F	708000152		462	168

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	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
JP	7000000						
	7010000						
	70100001	52	4407	16112	13909	710056	612970
WAGE	70100004	52	200	22000	13000	44000	26000
			4607			754056	638970
ALING	70200000	52	500	18600	13000	93000	65000
			500			93000	65000
	7030000						
	70300001	52	2240	25282	15603	566317	349507
			2240			566317	349507
STEM	7040000						
	70400001	52	3549	17813	11118	632183	394578
	70400002	54	47212	29489	13515	13922347	6380702
	70400003	56	1148	51640	12503	592827	143534
	7040005		27363	39792	13613	10888285	3724925
	7040006		2855	64017	13900	1827685	396845
	70400007	62	80	51500	15950	41200	12760
			82207			27904527	11053344
TEM	7050000						
F	70500001	52	8981	20071	10926	1802577	981264
F	70500002	54	4578	44016	10399	2015052	476066
B	70500003	56	27338	55692	11077	15225079	3028230
B	70500004	58	7892	60587	10861	4781526	857150
W	70500005	62	13511	55304	14234	7472123	1923156
C	70500006	91	2131	8863	9318	40178	19847
C	70500007	92	2980	54325	14100	1618885	420180
MECH	7050010		6689	34566	11636	2312120	778332
			72182			35267540	8484225
	70700000	52	1431	18748	13200	268284	188892
			1431			268284	188892
	7080000						
	70800001	52	462	16895	12875	78055	59483

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WEIGHT AND C. OF G BY FUNCTIONAL G COMPONEN

PROJECT_____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. A
29 RADIO RADAR INT SYST I W	715000562		482757	
29 RADIO RADAR INT SYST O W	715000664		104974	
29 RADIO RADAR INT SYST FIN	715000783		338076	
29 RADIO RADAR INT SYST C A	7150008		212933	36
29 RADIO RADAR INT SYST D B	715000959		1374	
			64868	
37 CANOPY ACTUATION	716000052		658622	
			6586	
CABIN CONSOLES	717000052		174517	
			1745	
SURFACE FINISH F F	719000152		36318	
SURFACE FINISH CANOPY	719000253		6420	
SURFACE FINISH C F	719000354		140037	
SURFACE FINISH INTAKES	719000455		40822	
SURFACE FINISH D B	719000556		37753	
SURFACE FINISH E B	719000658		44366	
SURFACE FINISH R F	719000759		64880	
SURFACE FINISH I W	719000862		315160	
SURFACE FINISH O W	719000964		106770	
SURFACE FINISH O W L EDGE	719001065		31963	
SURFACE FINISH AILERON	719001174		35379	
SURFACE FINISH ELEVATOR	719001282		56675	
SURFACE FINISH FIN	719001383		63974	
SURFACE FINISH RUDDER	719001484		20281	
			10000	
FLIGHT TEST INSTALLATION	7200000		14567348	
			145673	

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WEIGHT AND C. OF G BY FUNCTIONAL GR COMPONENT

PROJECT_____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM
REMOVABLE EQUIPMENT GROUP	8000000			
94 EJECTOR SEATS	801010052		34294	2045
			34294	
RADAR REMOV GROUP	8020000			
DAMPING SYSTEM	8030000			
DAMPING SYSTEM F F	803010152		784	172
DAMPING SYSTEM C F	803010254		2303	3223
DAMPING SYSTEM E 8	803010358		369	632
DAMPING SYSTEM I W	803010462		6070	527
DAMPING SYSTEM O W	803010564		95	748
DAMPING SYSTEM R N	803010651		287	73
			9908	
98 INSTRUMENT PACK	805080054		68680	385
			68680	
INSTRUMENTATION	805090054		304800	394
			304800	

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WEIGHT AND C. OF G BY FUNCTIONAL GRO COMPONENT

PROJECT_____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM
OPERATIONAL LOAD	9000000			
CREW MEMBERS	901000052		39000	1940
			39000	
ENGINE OIL	9020000			
ENGINE OIL USABLE	9020001		8816	6124
ENGINE OIL TRAPPED ENG	9020002		1773	6267
ENGINE OIL TRAPPED D B	902000356		1925	5808
ENGINE OIL TRAPPED E B	902000458		909	5992
			13423	
OXYGEN CHARGE	9040000			
OXYGEN CHARGE F F	904000152		722	2049
OXYGEN CHARGE C F	904000254		1267	2628
			1339	
100 ENGINE FIRE EXT FLUID	9060000		2500	7300
			2500	
RESIDUAL FUEL	9070000			
RESIDUAL FUEL C F	907000154		5700	3926
RESIDUAL FUEL D B	907000262		2300	5367
			28700	
TRAPPED FUEL	9080000			
TRAPPED FUEL C F	908000154		2430	4142
TRAPPED FUEL D B	908000256		690	4940
TRAPPED FUEL I W	908000362		2070	5720
			23820	
WATER FOR AIR CONDITIONING	910000054		1250	2680
UNUSABLE WATER FOR AIRCOND	910000154		150	2670
			14000	

WEIGHT AND C. OF G BY FUNCTIONAL GROUP COMPONENT

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	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
	90000000						
	901000005	2	39000	19400	13650	7566000	5323500
			39000			7566000	5323500
	90200000						
	90200001		88166	12461	12186	5399447	1074318
ENG	90200002		17736	26761	11640	1111245	206377
D B	902000035	6	19255	8084	9555	1118117	183934
E B	902000045	8	9095	9928	9704	544746	88209
			13423			8173555	1552838
	90400000						
	904000015	2	7	2049	3132	00	14755	9504
	904000025	4	12672	6280	16150	332968	204621
			1339			347723	214125
D	90600000		25	00730	00129	00	1825000	322500
			2500			1825000	322500
	90700000						
	907000015	4	57	00392	63123	60	2237991	704520
	907000026	2	230	00536	76603	44	12345480	13879120
			28700			14583471	14583640
	90800000						
	908000015	4	24	30414	26131	06	1006652	318476
	908000025	6	69	0494	00133	50	340860	92115
	908000036	2	207	00572	01142	90	11840607	2958030
			23820			13188119	3368621
IONING	910000005	4	125	00268	00132	00	3350000	1650000
IRCOND	910000015	4	15	00267	00127	00	400500	190500
			14000			3750500	1840500