

QCX
Avro
CF105
R-7-0400-64
Iss-2

FILE IN VAULT

Arrow 1 Report: 7-0400-64
A/C 25202 & 25203 Issue : 2

SECRET

WEIGHT & C.G. SUMMARY

1 June/58



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DATE

JAN 07 1993

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

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AVRO AIRCRAFT LIMITED
INTER-DEPARTMENTAL MEMORANDUM

Ref: 9600/11/J
Date: 1 June, 1958
To: See Distribution
From: E.F. Burnett
Subject: ARROW 1 A/Cs 25202 and 25203 - Weight and Balance

Attached is a copy of Weight and C.G. Summary, Report 7-0400-64
Issue 2, dated June 1, 1958, for your retention.

This report supercedes Report 7-0400-44 Weight and C.G. Summary
ARROW 1 "25201 which is now covered by Weight Statements for
Flight Test".

Classification cancelled / changed to: UNCLASSIFIED

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

Date: 5 Nov 1992

Signature: B Aubrey

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

E.F. Burnett
E.F. Burnett
Weight Supervisor

EFB/ag

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



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A/C 25202 & 25203
Date: 1 June, 1958

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3	Horizontal C.G. Envelopes for Flight conditions with fuel proportioners used.
4-1 to 4-15	I.B.M. Detail sheets of Weight and C.G.s

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 J75P5 Engines, based on the latest information available. All weight and C.G. changes are quoted relative to 7-0400-64 Issue 1 of May 1st, 1956.

NOTE:

- 1) This summary will not apply for A/C 25204 and 25205 which are to be used for full Astra I Trial installations.
- 2) After Phase I of the flight test programme A/C 25203 will be fitted with a weapons pack trial installation, in lieu of the instrument package installed here.
- 3) In this summary the Aircraft is 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 and 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.

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 Emergency Fire Protection, landing gear lowering etc. 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.

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GENERAL: Cont'd

- e) The Mk 1A Tailcones and Stinger are fitted. Actually it is doubtful if these will be available for the initial 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 +12 1/2 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
	<u>= 31.53 lb</u>

When the split control surfaces are introduced this will entail a further weight increase, however, details of these amendments to the design are not yet available.

- 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 schemes e.g. cracked outer skin on Air Intakes have been assessed and recorded.
- h) Several weighings of A/C 25201 have been made and the results obtained show good agreement with the estimated weights for the aircraft. However, at no time has it yet been possible to obtain a dry weight of the complete aircraft.

A considerable number of actual weights of parts and components have been obtained. Structural weights have checked within 0.5% of estimates of sub-assemblies etc. Equipment (most of which is now actual weight) has shown a constant increase averaging about 11% over manufacturer's quotations or initial specification weights (excluding Engines and Gear Boxes). Proceeding 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.

A summary of actual weights obtained so far is as follows:-

Structure	72.32 %	Power Plant	5.06 %	Equipment	26.89 %
Landing Gear	99.00 %	Flying Controls	53.85 %		

i.e. 44.01 % of the Basic Weight of A/C 25202.

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GENERAL: Cont'd

- 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 I Aircraft. The fuel proportioners are functioning satisfactorily and it is not considered necessary to fit the fuel sequencing system.

1. STRUCTURE

WEIGHT lb

a) Wings

No weight changes

b) Fin & Rudder

No weight changes

c) Fuselage Fwd Sta 255 ins

Air Intakes - outer side skin was in .04 Mg, subsequent to supersonic flight this was found to be cracked. Repair scheme instituted, skin now .04Al, stringer sections changed, backing angles added etc

+ 6.42

Crew's Bulkheads - jack retraction bracket now steel was aluminium self aligning bearing

+ 1.98

Front Fuselage Increase

+ 8.40

d) Centre Fuselage Sta 255 - 485 ins

No weight changes.

e) Duct Bay Sta 485 - 591.65 ins

No weight change.

f) Engine Bay Sta 591.65 - 742.5 ins

No weight change.

g) Rear Fuselage Sta 742.5 ins aft

No weight change.

h) Fuselage Joints

No weight change.

TOTAL STRUCTURAL INCREASE + 8.40

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2. LANDING GEAR

WEIGHT lb

Main Landing Gear - it has become necessary to fit modified
brakes with 1" thick discs.

+ 52.16

TOTAL LANDING GEAR INCREASE

+ 52.16

3. POWER PLANT & SERVICES

No weight change.

4. FLYING CONTROLS GROUP

No weight change.

5. EQUIPMENT GROUP

Interim Radio & Radar - Incorporation of actual weights of
approx. 30% of complete system

+ 1.34

TOTAL EQUIPMENT GROUP INCREASE

+ 1.34

SUMMARY

Weight Change - Aircraft Basic Weight

Structure	+ 8.40
Landing Gear	+ 52.16
Equipment	+ 1.34
	+ <u>61.90</u>

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

UNBALLASTED CONDITION

Issue 1

Issue 2

47,529.78

47,591.68

+ 61.90

Aircraft: ARROW 1
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DESCRIPTION	WEIGHT lb	H. ARM ins	V. ARM ins
STRUCTURE	18,972.71	563.30	137.46
Wings	10,003.01	643.11	142.25
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 aft	912.38	807.53	128.96
Fuselage Joints	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	13,770.66	652.46	120.35
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 Engine	286.80	589.18	105.54
Engine Controls	33.35	375.79	118.49
Engine Nose Bullets	75.61	562.69	115.11
Fire Extinguishing System	65.53	700.45	134.21
Engine Mountings	206.21	635.04	127.71
Fuel System	912.65	537.27	135.48
FLYING CONTROLS GROUP	2,007.17	652.13	137.12
Mechanical Flying Controls	952.63	675.92	147.59
Hydraulic Flying Controls	1,054.54	630.64	127.67
EQUIPMENT FIXED & REMOVABLE	2,438.73	402.97	113.54
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
Drag Chute	90.99	786.18	143.17
Low Pressure Pneumatics	54.65	433.30	129.37
Electrical System	1,126.18	415.86	112.91
Intake Deicing Boots	88.00	195.82	118.00
Canopy Actuation	65.86	222.01	154.36
Console Panels	17.45	174.76	124.34
MH 64 Damping	99.08	450.83	140.34
Interim Radio & Radar	648.68	342.30	124.04
Hydraulics Utility System	654.93	503.19	117.65
Nose U/C Door Actuation (wheel extended)	33.59	202.56	97.89
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.
U/C Up Aircraft Basic Weight	46,670.66	556.76	127.42	
U/C Down		558.93	123.83	
USEFUL LOAD (less fuel)	921.02	366.58	132.34	
Crew	390.00	194.00	136.00	
Eng. Fire Extinguisher Fluid	25.00	730.00	129.00	
Residual Fuel	218.40	553.98	134.04	
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	
BALLAST	792.00	84.84	116.50	
U/C Up Operational Wt. Empty	48,383.68	545.41	127.33	30.22
U/C Down		547.51	123.87	30.80
Max. Inter al Fuel (2508 gals at 7.8 lb/gal)	19,562.00	540.99	144.09	
U/C Up Gross Weight (Max. Int. Fuel)	67,945.68	544.14	132.16	29.87
U/C Down		545.63	129.69	30.28

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

- 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. i.e. 303 lb on Former Sta. 68.5 and 489 lb on the Shear Panel.

These figures are theoretical requirements only and are not to be confused with full nose ballast normally installed (1,397 lb total).

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BY: Kathleen Lyffler

HORIZONTAL C.G. ENVELOPE

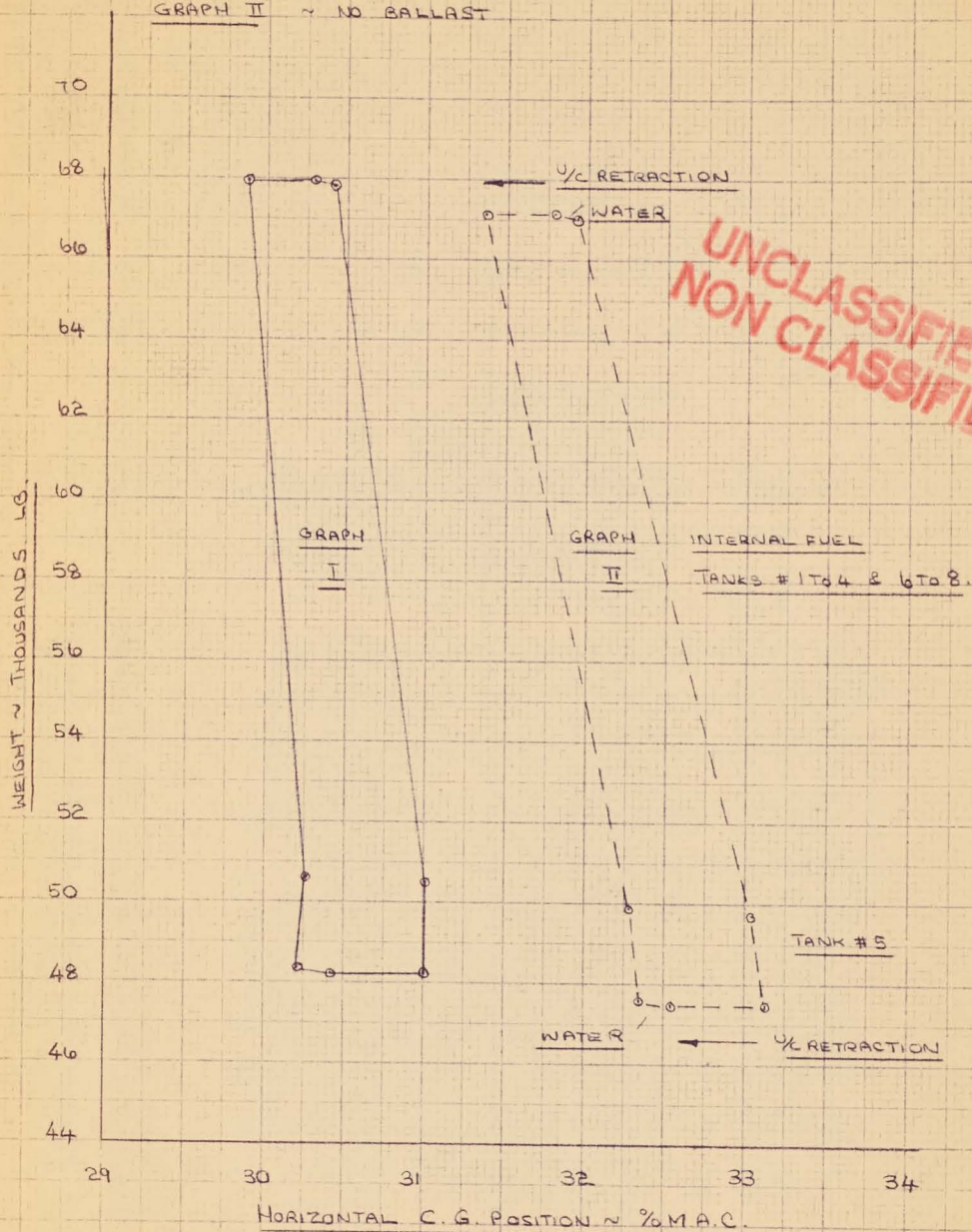
ARROW I ~ $\frac{1}{2}$ 25202 & 25203

NORMAL FLIGHT CONDITIONS

FUEL PROPORTIONERS USED

GRAPH I ~ $\frac{1}{2}$ BALLASTED SUCH THAT AFT C.G. DOES NOT EXCEED $31\frac{1}{2}$ M.A.C.

GRAPH II ~ NO BALLAST



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MALTON, ONT.

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

PROJECT _____

DESCRIPTION		REFERENCE NO.			COMP. NO.	WEIGHT		H.
TOTAL WING GROUP		1	0	0	0	0	0	
OUTER WING		1	0	1	0	0	0	
100	OUTER WING SKINS	1	0	1	0	0	1	64
100	POSTS AND INTERCOSTALS	1	0	1	0	0	2	64
100	OUTER WING SPARS	1	0	1	0	0	3	64
100	OUTER WING RIBS	1	0	1	0	0	4	64
98	AILERON CONTROL BOX	1	0	1	0	0	6	64
100	RIB 12	1	0	1	0	0	7	64
100	O W AILERON JACK FITTING	1	0	1	0	0	9	64
AILERON JOINTS AND FAIRING		1	0	1	0	0	10	
BUZZ DAMP STRUC PROV O W		1	0	1	0	0	11	64
							1	98355
96 AILERON		1	0	2	0	0	0	74
								35380
95 ELEVATOR		1	0	3	0	0	0	82
95	ELEVATOR MARRY UP	1	0	3	0	0	0	1
								47604
INNER WING		1	0	4	0	0	0	0
96	MAIN U C STRUCTURE	1	0	4	0	0	0	1
100	FRONT SPAR I W	1	0	4	0	0	0	2
100	MAIN SPAR I W	1	0	4	0	0	0	3
100	FWD CENTRE SPAR I W	1	0	4	0	0	0	4
100	AFT CENTRE SPAR I W	1	0	4	0	0	0	5
100	REAR SPAR I W	1	0	4	0	0	0	6
100	I W STRUCTURE F S TO M S	1	0	4	0	0	0	7
100	STRUCTURE MS TO R S	1	0	4	0	0	0	8
100	STRUCTURE AFT OF REAR SPAR	1	0	4	0	0	0	9
40	ELEVATOR CONTROL BOX	1	0	4	0	0	1	0
25	TRANSP JOINT MARRY UP	1	0	4	0	0	1	1
100	INNER WING JOINTS	1	0	4	0	0	1	2
100	SKINS M S TO R S	1	0	4	0	0	1	3
100	STRUT PICK UP FITTINGS	1	0	4	0	0	1	4
100	RIBS 1 TO 9 INNER WING	1	0	4	0	0	1	6
74	DORSAL FAIRING I W	1	0	4	0	0	1	7
100	RIB 10	1	0	4	0	0	1	8
77	WING TO FUS JOINT I W	1	0	4	0	0	1	9
65	TRANSPORT JOINT O W TO I W	1	0	4	0	0	2	0
77	WING TO FUS JOINT C A	1	0	4	0	0	2	1
BUZZ DAMP STRUC PROV I W		1	0	4	0	0	2	2
74	DORSAL FAIRING C A	1	0	4	0	0	2	3
								665954

EIGHT 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
	1000000						
	1010000						
	1010001	64	92910	70646	13597	65637199	12632973
S	1010002	64	2436	73207	13410	1783323	326668
	1010003	64	39258	70118	13636	27526924	5353221
	1010004	64	13456	69506	13650	9352727	1836744
	1010006	64	37530	77409	13508	29051598	5069552
	1010007	64	7626	64873	13832	4947215	1054828
ING	1010009	64	1046	72791	13670	761394	142988
IRING	1010010		3293	78726	13224	2592447	435466
O W	1010011	64	800	75828	13680	606624	109440
			198355			142259451	26961880
	1020000	74	35380	79190	13561	28017422	4797882
			35380			28017422	4797882
	1030000	82	46007	75511	14256	34740346	6558758
	1030001		1597	73810	14260	1178746	227732
			47604			35919092	6786490
	1040000						
	1040001	62	33071	57757	13983	19100817	4624318
	1040002	62	11110	48428	14260	5380351	1584286
	1040003	62	15106	56570	14280	8545464	2157137
	1040004	62	5364	60098	14415	3223657	773221
	1040005	62	3666	65492	14450	2400937	529737
	1040006	62	7667	70374	14420	5395575	1105581
M S	1040007	62	10690	49973	14403	53423136	15397383
	1040008	62	14979	60964	14572	9131798	2182740
SPAR	1040009	62	32212	71829	15020	23137557	4838242
	1040010	62	42838	72470	14328	31044699	6137829
	1040011		7065	63621	13876	4494824	980339
	1040012	62	63471	66222	15046	42031766	9549847
	1040013	62	21903	62446	14464	136780469	31681656
S	1040014	62	5391	56766	14330	3060255	772530
G	1040016	62	5120	46128	714499	31381395	7424068
	1040017	62	9548	28280	16150	45866	15343
	1040018	62	10800	63683	13835	6877764	1494180
	1040019	62	12628	61681	13811	7789077	1744053
O I W	1040020	62	12942	63071	13710	8162649	1774348
	1040021		3818	52984	14301	2022929	546012
I W	1040022	62	552	74150	14200	409308	78384
	1040023		6033	57025	16034	3440318	967331
			665954			407280611	96358565

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WEIGHT AND C. OF G BY FUNCTIONAL COMPON

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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
2000000									
201000083					85170	74957	21170	63840877	18030489
201000183					18580300	22342		148555	41333
2010002					483068538	15355		3310385	741647
					90185			67299817	18813469
202000084					1327881325	21440		10798334	2846803
					13278			10798334	2846803

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								
	3	0	0	0	0															
	3	0	1	0	0															
	3	0	1	0	0															
	3	0	1	0	0															
TURE	3	0	1	0	0															
	3	0	1	0	0	0	1	5	1	181	00	379	6	110	37	687	076	199	769	97
ORS	3	0	1	0	0	0	2	5	1	800	08	950	9	114	50	761	481	916	916	16
TA 120	3	0	1	0	0	0	3	5	1	122	07	947	7	114	40	115	685	139	172	0
	3	0	1	0	0	0	4	5	2	110	54	190	58	120	24	210	667	132	913	3
	3	0	1	0	0	0	5	5	4	212	63	376	70	143	00	800	977	304	060	9
	3	0	1	0	0	0	6	5	6	59	37	534	13	111	57	317	113	662	391	
	3	0	1	0	0	0	7	5	8	177	25	669	45	109	96	118	660	194	904	1
	3	0	1	0	0	1	1	5	2	107	17	182	94	120	36	196	056	128	989	8
	3	0	1	0	0	1	2	5	4	278	24	374	82	133	06	104	289	370	226	1
	3	0	1	0	0	1	3	5	6	74	91	537	10	113	16	402	341	847	682	
	3	0	1	0	0	1	4	5	8	135	01	668	27	111	19	902	231	150	117	6
	3	0	1	0	0	1	5	5	8	218	90	662	17	109	84	144	949	240	439	8
	3	0	1	0	0	1	6	5	2	69	69	184	83	90	44	128	808	630	276	
E B	3	0	1	0	0	1	7	5	8	110	67	708	53	96	11	783	634	106	298	
	3	0	1	0	0	1	8	5	8	68	42	658	10	97	81	450	272	669	216	
	3	0	1	0	0	1	9	5	8	63	86	666	05	139	11	424	940	887	52	
	3	0	1	0	0	2	0	5	2	295	22	341	4	89	00	691	181	262	728	
B	3	0	1	0	0	2	1	5	6	49	85	389	9	135	50	268	417	674	79	
	3	0	1	0	0	2	3	5	4	144	53	410	38	121	44	593	122	175	517	2
	3	0	1	0	0	2	4	5	4	125	58	487	17	107	00	612	860	134	606	
	3	0	1	0	0	2	5	5	6	86	55	529	31	97	59	458	117	844	641	
TURE	3	0	1	0	0	2	6	5	4	35	70	273	59	91	97	976	716	328	333	
B	3	0	1	0	0	2	7	5	6	65	70	520	07	91	25	341	686	599	513	
	3	0	1	0	0	2	8	5	4	21	60	274	00	89	76	591	840	193	882	
B 77	3	0	1	0	0	2	9	5	6	59	80	538	77	103	83	322	184	620	903	
TIONS	3	0	1	0	0	3	0	5	6	36	20	503	28	93	39	182	187	338	072	
	3	0	1	0	0	3	1	5	2	192	53	193	08	147	63	371	736	284	232	0
	3	0	1	0	0	3	2	5	4	334	75	372	49	129	17	124	691	432	396	6
	3	0	1	0	0	3	3	5	6	316	63	544	71	118	12	172	471	374	003	4
	3	0	1	0	0	3	4	5	2	86	59	228	04	160	53	197	459	139	002	9
	3	0	1	0	0	3	6	5	6	39	64	540	13	103	40	214	107	409	878	
UCTURE	3	0	1	0	0	3	7	5	2	33	43	210	49	91	86	703	668	307	088	
	3	0	1	0	0	3	8	5	2	131	01	206	19	122	91	270	129	161	024	4
URE	3	0	1	0	0	3	9	5	4	62	11	283	62	137	36	176	156	853	143	
	3	0	1	0	0	4	1	5	2	130	57	138	14	150	06	180	369	195	933	3
	3	0	1	0	0	4	2	5	8	67	04	663	97	91	89	445	125	616	031	
	3	0	1	0	0	4	3	5	8	60	46	619	26	90	58	374	404	547	647	
UTLET	3	0	1	0	0	4	4	5	4	21	43	292	45	164	00	626	720	351	452	
	3	0	1	0	0	4	5	5	8	51	54	692	89	102	57	357	115	528	646	
	3	0	1	0	0	4	6	5	8	147	39	628	67	88	74	926	596	130	793	9
	3	0	1	0	0	4	7	5	4	7	43	319	91	109	64	237	693	814	663	
F	3	0	1	0	0	4	8	5	4	39	23	370	00	125	00	145	040	490	000	
	3	0	1	0	0	4	9	5	4	133	26	384	60	114	27	512	518	152	276	2
	3	0	1	0	0	5	0	5	2	31	44	120	00	122	80	377	280	386	083	
	3	0	1	0	0	5	1	5	2	104	73	255	00	120	33	267	061	126	021	6
	3	0	1	0	0	5	2	5	4	112	54	485	00	105	30	545	819	118	504	6
	3	0	1	0	0	5	4	5	8	479	26	665	24	115	74	318	822	554	695	5
NK CF	3	0	1	0	0	5	5	5	4	211	68	397	22	145	53	840	835	308	057	9

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WEIGHT AND C. OF G BY FUNCTIONAL COMPONENTS

PROJECT _____

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H.
COCKPIT FLOOR	301005652		61.60	17
CENTRE BEAM 697 28 717 36	301005958		5577	
DORSAL OVER FUEL TANK	301006154		5007	41
SHIELD EXHAUST DEFLECTOR	301006254		1981	33
SHEAR PANEL BELOW NAV ARCH	301006352		2115	25
33 PACK MOUNTING STRUCTURE	301006454		2119	29
88 ENG ACCESS DOORS R F	301006559		8457	77
99 TUNNEL FIXED R F	301006659		1040	377
100 SKIN AND STIFFENERS R F	301006759		5143	77
100 FAIRING UNDER RUDDER R F	301006859		2616	78
100 FORMERS FIXED R F	301006959		9001	77
100 LONGERONS C BEAM FIXED R F	301007059		2799	77
TAILCONES	301007159		4398	483
CNTR STRUCT STING REM R F	301007259		8835	83
MISCELLANEOUS ITEMS E B	301007358		9196	
MTG BRKTS SIDE PANEL D B	301007556		2435	52
FORMERS LOWER PANEL D B	301007656		7640	54
LOWER PANEL D B	301007756		5348	55
JOINT F F TO C F	3010078		8552	5
JOINT AIR INTAKES TO F F	3010079		1092	22
JOINT C F TO D B	3010080		5204	8
JOINT D B TO E B	3010081		2521	58
FUS JOINT AT STA 742 50	3010082		4437	4
6 MISCELLANEOUS ITEMS F F	301008652		8501	9
			6465	34
DIVE BRAKES	302000072		11790	50
DIVE BRAKES C A	3020001		4064	8
			1219	6
AIR INTAKES	3030000			
7 AIR INTAKES	303010055		77248	21
			77248	
PILOTS AND NAVIG CANOPIES	3040000			
76 PILOTS CANOPY	304010053		24208	17
			24208	
100 NAVIGATORS CANOPY	304020053		15321	23
			15321	

WEIGHT AND C. OF G BY FUNCTIONAL COMPONE

PROJECT_____

[illegible]

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
POSITION	4	0	0	0	0					
GROUP	4	0	1	0	0					
	4	0	1	0	1	201857	53899	14100	108798904	28461837
						201857			108798904	28461837
INGS	4	0	1	0	2	28234	53760	13837	15178598	3906739
						28234			15178598	3906739
GROUP	4	0	2	0	0					
	4	0	2	0	1	33381	17080	9970	5701475	3328086
						33381			5701475	3328086
IRING	4	0	2	0	2	2667	16177	8825	431441	235363
						2667			431441	235363

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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
	5000000						
	5010000		1187578	66543	11983	790250029	142307472
			1187578			790250029	142307472
SS	5010100		3803	62941	10354	2393646	393763
			3803			2393646	393763
D B	5020001	56	4445	57866	9765	2572144	434054
E B	5020002	58	23225	60850	10431	14132413	2422600
			27670			16704557	2856654
	5030000						
	5030001	52	1558	16668	12431	259687	193675
	5030002	54	1172	6800	11800	31356	13806
	5030004	58	9466	3787	10081	603425	95366
	5030005	62	6894	9745	13137	342743	90514
	5030006		2564	137	10000	16034	2500
			3335			1253245	395861
N ENG	5040000		28680	58918	10554	16897682	3026887
			28680			16897682	3026887
	5050000		7561	56269	11511	4254499	870347
			7561			4254499	870347
	5060000						
B	5060002	56	14655	318	13749	80764	20074
B	5060003	58	6407	7038	113414	4509311	859435
			6553			4590075	879509
ETS	5070000						
S	5070001		14653	62504	12935	9158711	1895366
ES	5070002		5202	66213	12248	3444400	637141
ES CA	5070003		766	64236	13192	492048	101051
			20621			13095159	2633558

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WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

DESCRIPTION		REFERENCE NO.	COMP. NO.	WEIGHT	H.
FLYING CONTROLS GROUP		6000000			
MECHANICAL CONTROLS		6010000			
50	MECHANICAL CONTROLS F F	6010001	52	10996	16
	MECHANICAL CONTROLS C F	6010002	54	12134	0
70	MECHANICAL CONTROLS F IN	6010005	83	12423	78
72	MECHANICAL CONTROLS I W	6010006	62	39748	71
45	MECHANICAL CONTROLS O W	6010007	64	30237	77
	MECHANICAL CONTROLS C A	6010008		6467	0
				95263	
FLYING CONTROLS HYDRAULICS		6020000			
32	FLYING CONT HYDRAULICS D B	6020001	56	3243	56
32	FLYING CONT HYDRAULICS E B	6020002	58	45023	65
32	FLYING CONT HYDRAULICS R F	6020003	59	4875	
77	FLYING CONT HYDRAULICS I W	6020004	62	27475	70
66	FLYING CONT HYDRAULICS O W	6020005	64	13086	74
63	FLYING CONT HYDRAULICS F IN	6020006	83	5564	76
32	FLYING CONT HYDRAULICS R N	6020008	51	3500	11
32	FLYING CONT HYDRAULICS F F	6020009	52	5595	16
32	FLYING CONT HYDRAULICS C F	6020010	54	1920	37
				105454	

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**WEIGHT AND C. OF G BY FUNCTIONAL
COMPON**

PROJECT _____

DESCRIPTION		REFERENCE NO.	COMP. NO.	WEIGHT	
FIXED EQUIPMENT GROUP		7000000			
INSTRUMENTS		7010000			
INSTRUMENTS F F		7010001	52	4407	1
NAVIG TABLE AND STOWAGE		7010004	52	200	2
				4607	
COCKPIT PRESSURE SEALING		7020000	52	500	1
				500	
OXYGEN SYSTEM		7030000			
58	OXYGEN SYSTEM	7030001	52	2240	2
				2240	
AIR CONDITIONING SYSTEM		7040000			
54	AIRCONDITIONING F F	7040001	52	3549	
54	AIRCONDITIONING C F	7040002	54	4721	22
54	AIRCONDITIONING D B	7040003	56	1148	5
54	AIRCONDITIONING C A	7040005		2736	33
54	AIRCONDITIONING ENG	7040006		2855	6
54	AIRCONDITIONING I W	7040007	62	805	
				82207	
HYDRAULICS MAIN SYSTEM		7050000			
32	UTILITY HYDRAULICS F F	7050001	52	8981	2
29	UTILITY HYDRAULICS C F	7050002	54	4578	4
20	UTILITY HYDRAULICS D B	7050003	56	2733	85
74	UTILITY HYDRAULICS E B	7050004	58	7892	8
24	UTILITY HYDRAULICS I W	7050005	62	1351	15
32	UTILITY HYDR NOSE U C	7050006	91	2131	
24	UTILITY HYDR MAIN U C	7050007	92	2980	5
15	N W DOOR ACTUATING MECH	7050010		3359	2
				68852	
CABIN INSULATION		7070000	52	1431	1
				1431	
BRAKE PARACHUTE		7080000			
BRAKE PARACHUTE F F		7080001	52	4621	

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**WEIGHT AND C. OF G BY FUNCTIONAL
COMPONE**

PROJECT _____

DESCRIPTION		REFERENCE NO.			COMP. NO.	WEIGHT	H.
	BRAKE PARACHUTE R F	70800005	59			85.1382	
	BRAKE PARACHUTE I W	70800006	62			124.62	
						9099	
	ELECTRICAL SYSTEM	70900000					
33	ELECTRICAL WIRING R N	70900001	51			129.9	
33	ELECTRICAL WIRING F F	70900002	52			29.6619	
33	ELECTRICAL WIRING C F	70900003	54			130.441	
33	ELECTRICAL WIRING A I	70900004	55			127.421	
33	ELECTRICAL WIRING D B	70900005	56			65.1553	
33	ELECTRICAL WIRING E B	70900006	58			64.59	
33	ELECTRICAL WIRING I W	70900008	62			89.0954	
33	ELECTRICAL WIRING FIN	70900009	83			352.79	
33	ELECTRICAL WIRING NUC	70900010	91			330.18	
33	ELECTRICAL WIRING ENG	70900011				200.258	
33	ELECTRICAL WIRING C A	70900012				137.4633	
65	ELECTRICS F F	70900013	52			162.7115	
26	ELECTRICS C F	70900014	54			75.9644	
85	ELECTRICS E B	70900015	58			670.67	
85	ELECTRICS ENG	70900016				116.3256	
85	ELECTRICS C A	70900017				71.861	
	ELECTRICS FIN	70900018	83			83.89	
	ELECTRICS I W	70900019	62			23.3662	
	ELECTRICS CAW	70900020				112.62	
	ELECTRICS MUC	70900021	92			74.51	
19	ELECTRICS A I	70900022	55			530.322	
93	ELECTRICS D B	70900023	56			271.3251	
	ELECTRICS R F	70900024	59			136.80	
62	WINDSCREEN DEMISTING	70900025	52			29.6419	
						1126.18	
	L P PNEUMATICS	71000000					
26	L P PNEUMATICS F F	71000001	52			20.6019	
18	L P PNEUMATICS C F	71000002	54			671.33	
	L P PNEUMATICS D B	71000003	56			444.55	
	L P PNEUMATICS E B	71000004	58			152.665	
	L P PNEUMATICS FIN	71000005	83			640.75	
	L P PNEUMATICS R N	71000006	51			124.7	
						54.65	
	INTAKE DE ICING	71200000	55			88.0019	
						88.00	
29	RADIO RADAR INT SYST R N	71500001	51			18.72.9	
29	RADIO RADAR INT SYST F F	71500002	52			89.9619	
29	RADIO RADAR INT SYST C F	71500003	54			234.3827	

WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

PROJECT_____

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WEIGHT AND C. OF G BY FUNCTIONAL COMPONENT

PROJECT_____

[illegible]

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REPORT NO. _____

SHEET _____

GROUP	REFERENCE NO.	COMP. NO.	WEIGHT	H. ARM	V. ARM	H. MOMENT	V. MOMENT
	8000000						
	8010100	52	34294	20450	13411	7013123	4599168
			34294			7013123	4599168
	9020000						
	8030000						
	8030101	52	784	17201	12047	134856	944488
	9030102	54	2303	32213	10949	741865	252155
	8030103	58	369	63242	13432	233363	49564
	8030104	62	6070	52781	15720	3203807	954204
	8030105	64	957	4855	14000	71112	13300
	9030106	51	287	7350	9340	21095	26806
			9908			4406098	1390477
	8050800	54	68680	38581	9468	26497431	6502622
			68680			26497431	6502622
	8050900	54	304800	39400	9500	120091200	28956000
			304800			120091200	28956000

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WEIGHT AND C. OF G BY FUNCTIONAL COMPONE

PROJECT

DESCRIPTION	REFERENCE NO.	COMP. NO.	WEIGHT	H.
OPERATIONAL LOAD	9000000			
CREW MEMBERS	9010000	52	39000	19
			39000	
ENGINE OIL	9020000			
ENGINE OIL USABLE	9020001		88166	1
ENGINE OIL TRAPPED ENG	9020002		17736	2
ENGINE OIL TRAPPED D B	9020003	56	19255	8
ENGINE OIL TRAPPED E B	9020004	58	90959	
			13423	
OXYGEN CHARGE	9040000			
OXYGEN CHARGE F F	9040001	52	7220	
OXYGEN CHARGE C F	9040002	54	12672	6
			1339	
100 ENGINE FIRE EXT FLUID	9060000		25007	3
			2500	
RESIDUAL FUEL	9070000			
RESIDUAL FUEL C F	9070001	54	46803	9
RESIDUAL FUEL I W	9070002	62	17160	59
			21840	
WATER FOR AIR CONDITIONING	9100000	54	12500	26
UNUSABLE WATER FOR AIRCOND	9100001	54	15002	6
			14000	

