

QC
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7-0400-44
Iss-12

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CF105
R-7-0400-44
Iss-12

FILE IN VAULT

ARROW 1 Report # 7-0400-44
A/C 25201 Issue 12
UNCLASSIFIED
NON CLASSIFIE
WEIGHT & C.G. SUMMARY
NEA N.A.E. Dec. 1/57

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~~SECRET~~
UNCLASSIFIE



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JAN 07 1992 1993

Report no.: QCX - AVRO - CF105 - R-7-400-44-155-12

has been downgraded to : _____

de-classified

by (Name): Michel W. Drapeau

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

Date: Dec. 7, 1992

R. Anon
Signature

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AVRO AIRCRAFT LIMITED
INTER-DEPARTMENTAL MEMORANDUM

Ref. 4450/11/J
Date December 1st, 1957
To See Distribution
From Mr. E.F. Burnett
Subject ARROW 1 A/C 25201 WEIGHT & C.G. SUMMARY - Report # 7-0400-44 Iss. 12

Attached is a copy of Weight and C.G. Summary, Report # 7-0400-44 Issue 12, dated December 1st, 1957 for your retention.

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



amc.

E. F. Burnett
Weights Supervisor

cc: Messrs. J.C. Floyd N. Ring
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E. Kosko R. Cairns
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Classification cancelled / changed to: UNCLASSIFIED

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

Date: 5 Nov 1992

Signature: B. Aubrey

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



50963

Date: December 1st, 1957
ARROW 1 A/C 25201 with
J75 P3 Engines.

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I N D E X

<u>Sheet #</u>	<u>Content</u>
1-1 to 1-5	Introductory notes and explanations of Weight Changes.
2-1 to 2-2	Weight & C.G. Summaries.
3	Horizontal C.G. Envelopes for Flight conditions with fuel proportioners used.
4-1 to 4-15	I.B.M. Detail Sheets of Weights & C.G.'s.
<u>N. B.</u>	The C.G. Envelopes for A/C 25201 with fuel sequencing has been omitted until a fully approved sequencing is established.

Date: December 1st, 1957
ARROW 1 A/C 25201 With
J75 P3 Engines

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Sheet # 1-1
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INTRODUCTION & WEIGHT CHANGES

The following is a Weight and C.G. Summary for the first Arrow 1 Aircraft # 25201, with J75 P3 Engines, based on the latest information currently available. All Weight and C.G. changes are relative to Issue 11 of November 1st, 1957.

- Note: 1) This Summary does not apply for Aircraft 25202 & 25203 which will have J75 P5 Engines, nor for Aircraft 25204 & 25205 which are for full Astra I trial installations etc.
- 2) The statement herein is for the Aircraft complete to drawings and not necessarily in the condition encountered for first flight.

For early flights there may be some shortages in non-essential equipment, some flight test installations will probably be incomplete etc. A Statement for first flight will be issued later.

GENERAL:

- a) Pratt & Whitney J75 P3 Engines comprise the Power Plant for the first Aircraft. J75 P5 Engines, which are partially redesigned versions of the P3 Engines, are to be installed on Aircraft 25202 and subsequent MK 1 Aircraft.
(J75 P3 Engines = 6,175 lb each; J75 P5 Engines = 5,950 lb each).
- b) An Instrument Package containing Flight Instructions is installed, this also varies, the package for Aircraft 25201 to Aircraft 25203 differing from those for Aircraft 25204 and Aircraft 25205 (Astra I Trial Installations.)
- A relatively detailed estimate of other proposed Flight Test Installations throughout the Aircraft has been made. These installation amount to 1,398 lb. (figure partially confirmed by actual weights of cable assys.).
- c) Emergency lowering for the Undercarriages and additional fire protection, to be installed in the first Aircraft, are allowed for in the summary. There is no provision to jettison any or all of the Instrument Package in an emergency.
- d) An Interim Radio & Radar System, with Minneapolis-Honeywell M.H.64 Damping is installed. Currently there is no Doppler or Tacan installation, although provisions for future installation of Doppler, which is not yet available will be made.
- e) The original design of tailcones and stinger are recorded, the redesigned versions will be recorded at a later date, when they are available for retrofit. The ensuing weight changes will be:-
- | | |
|------------|----------------|
| Tailcones | + 127.3 lb/A/C |
| Stinger | = 29.7 lb |
| Net Change | + 97.6 lb/A/C. |

Date: December 1st, 1957
ARROW 1 A/C 25201 with
J75 P3 Engines.

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INTRODUCTION & WEIGHT CHANGES

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GENERAL:

- f) Pending Flight Test requirements a "Buzz Damping" System may be installed on the first Aircraft. Provisions for this installation are already included in the structural group as modifications to the Control Boxes. For the first flight the control surfaces will be unmodified, however, if the need for Dampers is proven, a modified set of Control Surfaces will be made available.

The following weight penalties ensue:

Ailerons	+	11.68 lb/A/C
Elevators	+	11.07 lb A/C
Rudder	+	8.78 lb A/C
Equipment	+	123.97 lb
		<hr/>
		+ 155.50 lb

- g) It should be noted that due to material substitutions and concessions introduced by Planning & Production Departments there is a structural weight penalty of 203 lb to-date. 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.
- h) A considerable number of Actual Weights have now been obtained. Structural weights are checking within 0.5% of estimates on sub-assemblies etc. However, equipment (excluding Engines and Gear Boxes) shows a consistent increase averaging about 11% over manufacturer's quotations or initial specification weights. Preceding 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	-	74.81%
Landing Gear	-	97.86%
Power Plant	-	92.97%
Flying Controls	-	59.13%
Equipment	-	23.22%

i.e. 70.51% of the Basic Weight of the first Aircraft.

- 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.

For first flight the Aft restriction is 30% M.A.C., this may be achieved by installing maximum ballast.

C.G. Envelopes showing fuel sequencing have currently been omitted until a fully approved sequencing is established.

Date: December 1st, 1957
ARROW 1 A/C 25201 with
J75 P3 Engines

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Sheet # 1-3

INTRODUCTION & WEIGHT CHANGES

<u>1. STRUCTURE</u>	<u>WEIGHT (lb)</u>
a) <u>Wings:</u>	
No Weight Change.	
b) <u>Fin & Rudder</u>	
No Weight Change.	
c) <u>Fuselage Fwd. Sta. 255"</u>	
Radome - actual weight of complete assy.	+ 3.72
Crews ^l Bulkheads- addition of miscellaneous equip- ment.	+ 0.78
Additional Stiffeners	+ 2.01
Upper Shear Panel - miscellaneous minor changes	+ 0.02
<u>Weight Increase Front Fuselage</u>	+ 6.53
d) <u>Centre Fuselage Sta. 255"-485"</u>	
No Weight Change.	
e) <u>Duct Bay Sta. 485"-591.65"</u>	
No Weight Change.	
f) <u>Engine Bay Sta. 591.65" - 742.5"</u>	
No Weight Change.	
g) <u>Rear Fuselage Sta. 742.5" Aft.</u>	
Skin fixed R.F. - Cover plate added to upper skin for M.H.64 Damping Cables	+ 0.21
<u>Weight Increase Rear Fuselage</u>	+ 0.21
h) <u>Fuselage^l Marry-Up^l</u>	
No Weight Change.	
<u>TOTAL STRUCTURAL INCREASE</u>	+ 6.74
2. <u>LANDING GEAR</u>	
No Weight Change	
3. <u>POWER PLANT & SERVICES</u>	
Engine Nose Bullet - actual weight obtained	- 0.43

continued.

Date: December 1st, 1957
ARROW 1, A/C 25201 with
J75 P3 Engines

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INTRODUCTION & WEIGHT CHANGES

3. <u>POWER PLANT & SERVICES (Continued)</u>	<u>WEIGHT (lb)</u>
Gear Boxes and Starter on Engine - addition of reinforcing can to constant speed drive unit on A/C 25201 only	+ 26.65
<u>TOTAL POWER PLANT GROUP INCREASE</u>	<u>+ 26.22</u>
4. <u>FLYING CONTROLS GROUP</u>	
Mechanical Controls - extensive actual weighing of components carried out	- 7.92
<u>TOTAL FLYING CONTROLS DECREASE</u>	<u>- 7.92</u>
5. <u>EQUIPMENT GROUP</u>	
Oxygen System - new type converter installed	- 2.00
Alterations to piping, addition of flexible hose etc.	+ 4.48
Low Pressure Pneumatics - addition of small flexible hoses	+ 0.26
De-icing Boots - first quotation of weights received from Messrs. Goodyear manufacturers of same	+ 36.16
Ram Air Turbine - Dowty supplied actual Weight of swivel assembly	+ 0.94
Interim Radio & Radar - deletion of Ice Detector and noise filter, since radome de-icing is no longer a requirement	- 3.72
Flight Test Installations - addition of piping for Bristol "Sniffers"	+ 16.43
Emergency Fire Protection - redesign of bottle mountings, whereas previously the pack members were utilized now a complete frame is mounted from fuselage	+ 23.50
<u>TOTAL EQUIPMENT INCREASE</u>	<u>+ 76.05</u>

SUMMARY:

Weight Change - Aircraft Basic Weight

Structure	+ 6.74 lb
Power Plant	+ 26.22 lb
Flying Controls	- 7.92 lb
Equipment	+ 76.05 lb
	<u>+ 101.09 lb</u>

continued.

Date: December 1st, 1957
ARROW 1, A/C 25201 with
J75 P3 Engines.

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INTRODUCTION & WEIGHT CHANGES

SUMMARY (Continued)

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

Issue 11

Issue 12

47,837.01 lb

47,938.10 lb

+ 101.09 lb

N.B. If Aircraft Ballasted such that the C.G. in the flight envelope, using fuel system proportioners, does not exceed 31% M.A.C., a further 929 lb of ballast are necessary.

Date: December 1st, 1957
ARROW 1, A/C 25201 with
J75 P3 Engines.

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INTRODUCTION & WEIGHT CHANGES

SUMMARY (Continued)

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

Issue 11

Issue 12

47,837.01 lb

47,938.10 lb

+ 101.09 lb

N.B. If Aircraft Ballasted such that the C.G. in the flight envelope, using fuel system proportioners, does not exceed 31% M.A.C., a further 929 lb of ballast are necessary.

Date: December 1st, 1957
 Aircraft: ARROW 1
 A/C 25201

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WEIGHT & C.G. SUMMARY

<u>DESCRIPTION</u>	<u>WEIGHT</u> <u>lb</u>	<u>H. ARM</u> <u>ins.</u>	<u>H. ARM</u> <u>ins.</u>
STRUCTURE	18,592.53	561.52	137.47
Wings	9,963.50	642.82	142.26
Fin & Rudder	1,025.85	754.34	209.31
Fuselage: Fwd. Sta. 255"	2,634.95	181.57	128.15
Sta. 255"-485"	1,682.14	377.80	130.20
Sta. 485"-591.65"	998.59	534.01	104.59
Sta. 591.65"-742.5"	1,433.13	661.00	107.31
Sta. 742.5" Aft.	801.79	801.03	129.06
'Marry-Up'	52.58	468.91	103.89
LANDING GEAR - RETRACTED	2,600.31	488.39	134.91
Main Landing Gear	1,959.62	539.48	141.00
Main Gear Doors & Fairings	282.34	537.60	138.37
Nose Landing Gear	333.81	170.81	99.70
Nose Gear Door & Fairings	24.54	162.24	88.23
POWER PLANT & SERVICES	14,391.81	652.82	120.34
Engines & Accessories J75 P3	12,562.29	664.92	119.78
Gear Box & Drives on Fuselage	275.54	601.39	102.98
Gear Box & Starters on Engines	286.30	589.08	105.59
Engine Controls	32.43	375.76	118.62
Engine Nose Bullets	70.58	562.75	115.07
Fire Extinguishing System	65.46	700.45	134.21
Engine Mountings	206.21	635.04	127.71
Fuel System	893.00	536.67	136.12
FLYING CONTROLS GROUP	1,849.26	685.38	139.56
Mechanical Flying Controls	941.12	686.14	148.31
Hydraulic Flying Controls	908.14	684.60	130.50
EQUIPMENT FIXED AND REMOVABLE	9,583.23	403.51	113.49
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	339.06	204.43	134.10
Oxygen System	26.07	240.54	156.70
Air Conditioning System	812.41	335.87	134.32
Surface Finish	100.00	591.52	140.20
Hydraulics Main System	639.97	504.37	117.71
Cockpit Insulation	14.31	187.48	132.00
Drag Parachute	90.78	786.65	143.16
Electrical System	1,118.98	417.54	112.96
Low Pressure Pneumatics	54.65	433.30	129.37
Intake De-icing Boots	88.00	195.82	118.00
Canopy Actuation	64.92	221.99	154.35
Console Panels	17.45	174.76	124.34
M.H.64 Damping System	99.08	450.83	140.34
Interim Radio & Radar	631.89	340.18	124.23
Instrument Pack Structure	686.80	385.81	94.68
Pack Instrumentation (A/C 25201)	3,036.00	395.45	95.00
Flight Test Installations	1,414.86	491.73	129.66
Additional Fire Protection	177.67	402.00	109.57
Emergency Landing Gear Lowering	12.91	458.83	128.60
Ram Air Turbine Equipment	91.35	336.08	104.74

Date: December 1st, 1957
 Aircraft: ARROW 1
 A/C 25201

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 Sheet # 2-2
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WEIGHT & C.G. SUMMARY

<u>DESCRIPTION</u>	<u>WEIGHT</u> <u>lb</u>	<u>H.ARM</u> <u>ins.</u>	<u>V. ARM</u> <u>ins.</u>	<u>M.A.C.</u> <u>%</u>
AIRCRAFT BASIC WEIGHT	47,017.14	558.09	127.28	
	U/C Up			
	U/C Down	560.17	123.83	
USEFUL LOAD (less fuel)	921.02	366.58	132.34	
Crew	390.00	194.00	136.50	
Engine 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	929.00	86.33	116.50	
Operational Weight Empty	48,867.16	545.51	127.17	30.25
	U/C Up			
	U/C Down	547.51	123.85	30.80
Maximum Internal Fuel (2,544 gals. @ 7.8 lb/gal.)	19,843.00	538.88	144.32	
A.U.W. Maximum Internal Fuel	68,710.16	543.60	132.12	29.72
	U/C Up			
	U/C Down	545.02	129.76	30.11

N.B. 1) Aircraft Datum is considered to be 120" 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 does not exceed 31% M.A.C. i.e. 303 lb on Former Sta. 68.5" and 626 lb on the Shear Panel.

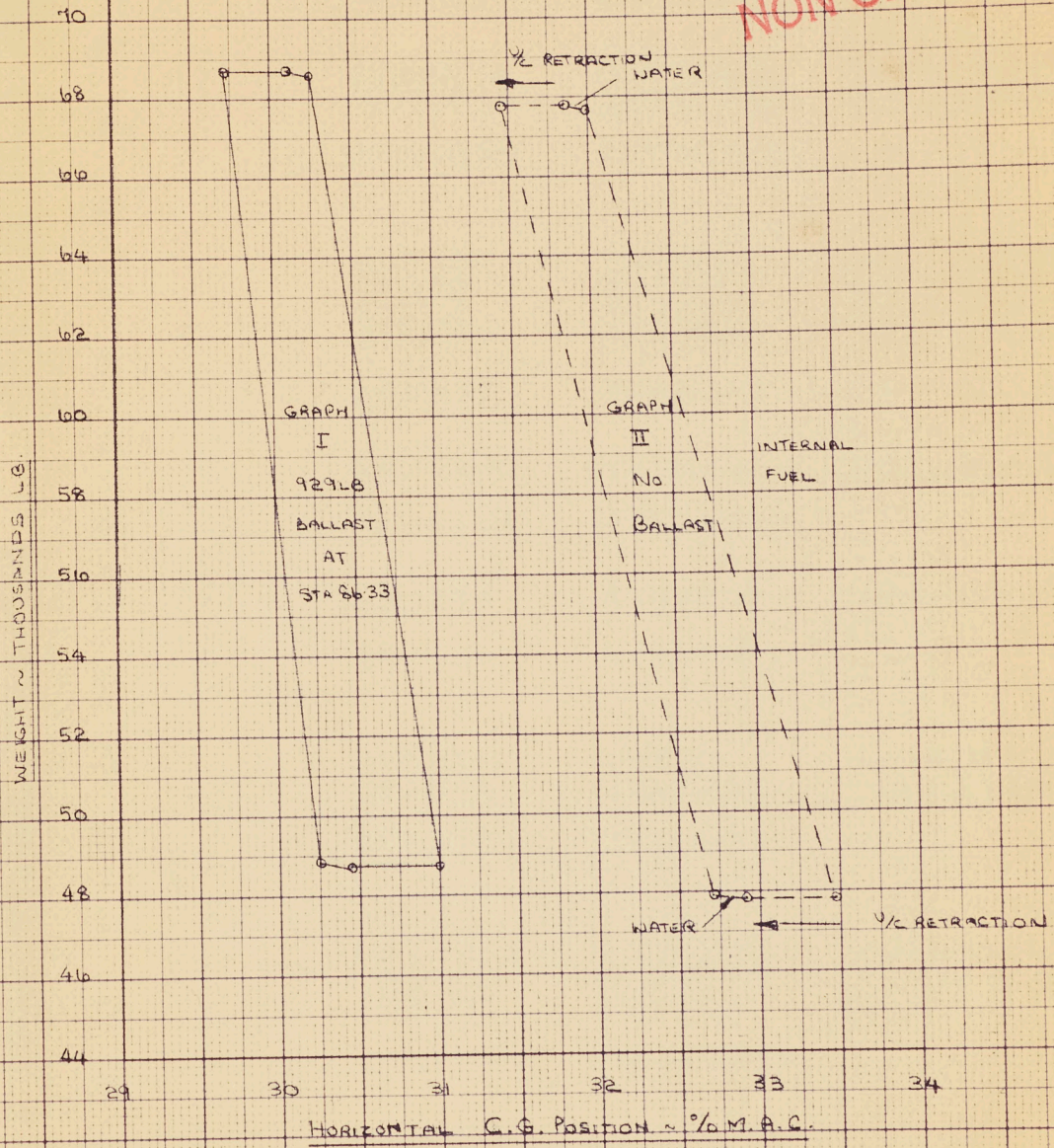
DATE: Dec 15 1957

BY: Kathleen J. Goff

SHEET: 3

HORIZONTAL C.G. ENVELOPE
ARROW I A/C NO 25201
NORMAL FLIGHT CONDITIONS
FUEL SYSTEM PROPORTIONERS USED

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G9-12
10 X 10 TO THE 15 INCH
MADE IN CANADA

ARROW 1 A/C 25201

	TOTAL WING GROUP	1000000	
	OUTER WING	1010000	
100	OUTER WING SKINS	101000164	9291070
100	POSTS AND INTERCOSTALS	101000264	243673
100	OUTER WING SPARS	101000364	3925870
100	OUTER WING RIBS	101000464	1345669
98	AILERON CONTROL BOX	101000664	3753077
100	RIB 12	101000764	762664
100	O W AILERON JACK FITTING	101000964	104672
	AILERON JOINTS AND FAIRING	1010010	329378
	BUZZ DAMP STRUC PROV O W	101001164	80075

198355

	AILERON	1020000	
100	AILERON STRUCTURE	102000174	3360079

33600

97	ELEVATOR	103000082	4490075
97	ELEVATOR MARRY UP	1030000	1597738

46497

	INNER WING	1040000	
96	MAIN U C STRUCTURE	104000162	3307157
100	FRONT SPAR I W	104000262	1111048
100	MAIN SPAR I W	104000362	1510656
100	FWD CENTRE SPAR I W	104000462	536460
100	AFT CENTRE SPAR I W	104000562	366665
100	REAR SPAR I W	104000662	766770
94	I W STRUCTURE F S TO M S	104000762	10591849
100	STRUCTURE MS TO R S	104000862	1497960
100	STRUCTURE AFT OF REAR SPAR	104000962	3221271
40	ELEVATOR CONTROL BOX	104001062	4283872
25	TRANSP JOINT MARRY UP	1040011	706563
100	INNER WING JOINTS	104001262	6347166
100	SKINS M S TO R S	104001362	2190386
100	STRUT PICK UP FITTINGS	104001462	539156
100	RIBS 1 TO 9 INNER WING	104001662	5120461
74	DORSAL FAIRING I W	104001762	95482
100	RIB 10	104001862	1080063
77	FUSELAGE HINGE JOINT	104001962	1262861
65	TRANSPORT JOINT O W TO I W	104002062	1294263
49	FUSELAGE HINGE JOINT	1040021	374052
	BUZZ DAMP STRUC PROV I W	104002262	55274
74	DORSAL FAIRING C A	1040023	603357

664890

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1000000

10100000			
1010000164	929107064613597	65637199	12632973
1010000264	24367320713410	1783323	326668
1010000364	392587011813636	27526924	5353221
1010000464	134566950613650	9352727	1836744
1010000664	375307740913508	29051598	5069552
1010000764	76266487313832	4947215	1054828
1010000964	10467279113670	761394	142988
10100010	32937872613224	2592447	435466
1010001164	8007582813680	606624	109440
	198355	142259451	26961880

1020000			
1020000174	336007921313556	26615568	4554816
	33600	26615568	4554816

103000082	449007552314260	33909827	6402740
1030000	15977381014260	1178746	227732
	46497	35088573	6630472

1040000			
1040000162	330715775713983	19100817	4624318
1040000262	111104842814260	5380351	1584286
1040000362	151065657014280	8545464	2157137
1040000462	53646009814415	3223657	773221
1040000562	36666549214450	2400937	529737
1040000662	76677037414420	5395575	1105581
1040000762	1059184992914405	52883798	15257488
1040000862	149796096414572	9131798	2182740
1040000962	322127182915020	23137557	4838242
1040001062	428387247014328	31044699	6137829
10400011	70656362113876	4494824	980339
1040001262	634716622215046	42031766	9549847
1040001362	2190386244614464	136780469	31681656
1040001462	53915676614330	3060255	772530
1040001662	512046128714499	31381395	7424068
1040001762	954828016150	45866	15343
1040001862	108006368313835	6877764	1494180
1040001962	126286168113811	7789077	1744053
1040002062	129426307113710	8162649	1774348
10400021	37405279614309	1974570	535157
1040002262	5527415014200	409308	78384
10400023	60335702516034	3440318	967331
	664890	406692914	96207815

100 LEADING EDGE I W

105000062

22138468

22138

22138

LEADING EDGE 0 W

106000065

30870630

30870

30870

30870

MOORE BUSINESS FORMS LTD.

12
11
10
9
8
7
6
5
4
3

105000062 221384684114423 10369661 3192964

22138 10369661 3192964

106000065 308706301313561 19452113 4186281

30870 19452113 4186281

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100 FIN
BUZZ DAMP STRUC PROV FIN
12 FIN TO WING MARRY UP

201000083
201000183
2010002

85170749
185803
4830685

90185

95 RUDDER

202000084

12400813

12400

201000083	851707495721170	63840877	18030489
201000183	1858030022342	148555	41333
2010002	48306853815355	3310385	741647

90185	67299817	18813469
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202000084	124008132521438	10084300	2658312
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12400	10084300	2658312
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TOTAL FUSELAGE GROUP

3000000

	FUSELAGE BASIC STRUCTURE	3010000		
100	RADOME	301000151	18100	37
100	RADAR NOSE ACCESS DOORS	301000251	8008	95
	NOSE STRUCTURE FWD STA 120	301000351	12188	94
	SKIN F F	301000452	11054	190
88	SKIN C F	301000554	21182	376
	SKIN D B	301000656	5880	534
3	SKIN E B	301000758	1772	5669
4	FORMERS F F	301001152	1053	1183
100	FORMERS C F	301001254	2782	4374
	FORMER D B	301001356	745	7537
	LIGHT FORMERS E B	301001458	1350	1668
72	HEAVY FORMERS E B	301001558	2189	0662
	LOWER LONGERONS F F	301001652	684	6184
	LONGITUDINAL MEMBERS E B	301001758	110	6708
75	LOWER LONGERON E B	301001858	684	2658
	TOP LONGERONS E B	301001958	638	666
	LOWER SHEAR PANEL	301002052	298	8234
	TOP WING LONGERONS D B	301002156	49	8538
	LONGERONS C F	301002252	53	252
	LONGERONS C F	301002354	138	13411
43	LONGERONS F D B	301002454	125	8487
43	LONGERONS A D B	301002556	86	5529
	ELECTRONICS BAY STRUCTURE	301002654	259	6272
59	LONGITUDINAL BEAMS D B	301002756	657	0520
	RADAR ACCESS DOORS C F	301002854	213	8274
72	MAIN FRAME AT STN 538 77	301002956	598	0538
	DIVE BRAKE ACCOM STRUCTURE	301003056	36	34503
30	TOP LONGERONS F F	301003152	186	49193
100	DUCT C F	301003254	33	286372
97	DUCT D B	301003356	31	633544
22	CANOPY ARCHES	301003452	84	61228
4	ACCESS PANEL STIFFNERS	301003656	38	65539
66	NOSE U C SUPPORT STRUCTURE	301003752	33	43210
3	CREW BULKHEADS	301003852	12	551205
51	EQUIPMENT BAY STRUCTURE	301003954	61	50283
86	WINDSCREEN	301004152	130	03138
33	SERVICE ACCESS DOORS	301004258	67	04663
	TORSION BOX E B	301004358	60	42619
	DORSAL FAIRING AIR OUTLET	301004454	20	61291
66	INTERMEDIATE FORMERS	301004558	51	54692
	ENGINE ACCESS DOORS	301004658	14	659628
	SEALING MISSILE BAY	301004754	69	7321
100	MISCELLANEOUS ITEM C F	301004854	39	2370
98	ARMAMENT BAY ROOF	301004954	13	216384
	BULKHEAD AT STA 120	301005052	30	60120
	BULKHEAD AT STA 255	301005152	10	429255
100	BULKHEAD AT STA 485	301005254	11	245485
13	ENGINE TUNNEL	301005458	47	572665
	INTEGRAL FUS FUEL TANK	301005554	20	359392

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3010000

3010000151	18100	379611037	687076	1997697
3010000251	8008	950911450	761481	916916
3010000351	12188	947311401	1154569	1389554
3010000452	110541	1905812024	2106671	1329133
3010000554	211823	3767314300	7979895	3029026
3010000656	58805	340711155	3140332	655914
3010000758	17725	6694510996	11866001	1949041
3010001152	10531	11833012018	1930332	1265616
3010001254	27824	3748213306	10428992	3702261
3010001356	74575	371011315	4005155	843760
3010001458	13501	6682711119	9022313	1501176
3010001558	21890	66621710984	14494901	2404398
3010001652	68461	184309044	1261718	619152
3010001758	11067	08539611	783634	106298
3010001858	68426	58109781	4502720	669216
3010001958	63866	60513911	424940	88752
3010002052	29882	34208900	699790	265932
3010002156	4985	389913550	268417	67479
3010002252	5325	29515250	13406	8083
3010002354	13813	4111212289	5678801	1697480
3010002454	12584	4871710700	612860	134606
3010002556	86555	29319759	4581178	844641
3010002654	25962	72919135	708474	237145
3010002756	65705	20079125	3416860	599513
3010002854	21382	74108974	586026	191864
3010002956	59805	387710383	3221845	620903
3010003056	36345	03999299	1831500	337926
3010003152	18649	1930614750	3600376	2750728
3010003254	33286	3725612919	12401032	4300218
3010003356	31633	5447111811	17230811	3736174
3010003452	84612	284416055	1932831	1358414
3010003656	38655	391810294	2083931	397863
3010003752	33432	10499186	703668	307088
3010003852	12551	2058412288	2583498	1542267
3010003954	61502	836013752	1744140	845748
3010004152	13003	1381415008	1796234	1951490
3010004258	67046	63979189	4451255	616031
3010004358	60426	619269058	3741569	547284
3010004454	20612	919516400	601709	338004
3010004558	51546	928910257	3571155	528646
3010004658	14659	628518873	9213328	1300693
3010004754	69732	14810900	224072	75973
3010004854	39237	00012500	145040	49000
3010004954	13216	3843811427	5079966	1510192
3010005052	30601	200012280	367200	375768
3010005152	10429	2550012027	2659395	1254296
3010005254	11245	4850010530	5453825	1184099
3010005458	47572	6652911581	31649176	5509313
3010005554	20359	3933914536	8009027	2959384

	COCKPIT FLOOR	301005652	5904176
	CENTRE BEAM 697 28 717 36	301005958	557713
	DORSAL OVER FUEL TANK	301006154	5097413
	SHIELD EXHAUST DEFLECTOR	301006254	1965334
	SHEAR PANEL BELOW NAV ARCH	301006352	2076257
33	PACK MOUNTING STRUCTURE	301006454	2119292
88	ENG ACCESS DOORS R F	301006559	8457772
99	TUNNEL FIXED R F	301006659	10403771
100	SKIN AND STIFFENERS R F	301006759	5143771
100	FAIRING UNDER RUDDER R F	301006859	2616781
100	FORMERS FIXED R F	301006959	9001779
100	LONGERONS C BEAM FIXED R F	301007059	2799771
100	TAILCONES	301007159	30000821
100	CNTR STRUC STING REMOV R F	301007259	11760835
	MISCELLANEOUS ITEMS E B	301007358	923663
	MTG BRKTS SIDE PANEL D B	301007556	213524
	FORMERS LOWER PANEL D B	301007656	7606545
	LOWER PANEL D B	301007756	5054554
	JOINT F F TO C F	3010078	855255
	JOINT AIR INTAKES TO F F	3010079	952220
	JOINT C F TO D B	3010080	500485
	JOINT D B TO E B	3010081	2508584
	FUS JOINT AT STA 742 50	3010082	443742
	MISC STRUCTURE F F	301008652	552187
	STRUCT REQUIRM FOR R A T	301009054	4074276

633063

96	DIVE BRAKES	302000072	11150508
96	DIVE BRAKES C A	3020001	406487

11556

	AIR INTAKES	3030000	
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18	AIR INTAKES	303010055	76248210
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76248

	PILOTS AND NAVIG CANOPIES	3040000	
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76	PILOTS CANOPY	304010053	24154176
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24154

100	NAVIGATORS CANOPY	304020053	15297232
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15297

UNDERCARRIAGE UP POSITION 4000000

MAIN UNDERCARRIAGE GROUP 4010000

100 MAIN UNDERCARRIAGE 401010092 195962539
195962

89 MAIN U C DOORS FAIRINGS 401020062 28234537
28234

NOSE UNDERCARRIAGE GROUP 4020000

100 NOSE UNDERCARRIAGE 402010091 33381170
33381

NOSE U C DOOR AND FAIRING 402020052 2454162
2454

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4010000

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401010092 1959625394814100 105717580 27630642

195962 105717580 27630642

401020062 282345376013837 15178598 3906739

28234 15178598 3906739

4020000

402010091 3338117080 9970 5701475 3328086

33381 5701475 3328086

402020052 245416224 8823 398137 216516

2454 398137 216516

	ENGINE GROUP	5000000	
99	ENGINE J 75	5010000	1252707665
			1252707
	J 75 ENGINE SERV ACCESS	5010100	3522630
			3522
68	ACC GEAR BOXES ON FUS D B	502000156	4524578
68	ACC GEAR BOXES ON FUS E B	502000258	23030605
			27554
	ENGINE CONTROLS	5030000	
36	ENGINE CONTROLS F F	503000152	1458161
36	ENGINE CONTROLS C F	503000254	264308
36	ENGINE CONTROLS D B	503000356	508499
36	ENGINE CONTROLS E B	503000458	1013639
			3243
83	GEARBOX AND STARTER ON ENG	5040000	28630589
			28630
91	ENGINE ANTI ICING	5050000	7058562
			7058
	FIRE EXT SYSTEM	5060000	
55	FIRE EXT SYSTEM D B	506000256	146553
55	FIRE EXT SYSTEM E B	506000358	6400703
			6546
	ENGINE MTGS AND BRACKETS	5070000	
64	ENG MOUNTING AND BRKTS	5070001	14653625
	ENGINE MTGS ACCESSORIES	5070002	5202662
	ENGINE MTGS ACCESSORIES CA	5070003	766642
			20621
	FUEL SYSTEM	5080000	

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5000000

5010000 12527076650211983 833075209 150111880

1252707 833075209 150111880

5010100 35226309710341 2222276 364210

3522 2222276 364210

502000156 452457875 9607 2618265 434621

502000258 230306058410434 13952495 2402950

27554 16570760 2837571

5030000

503000152 14581612912476 235161 181900

503000254 2643081311798 81346 31147

503000356 5084999113459 253954 68372

503000458 10136398210194 648138 103265

3243 1218599 384684

5040000 286305890810559 16865360 3023042

28630 16865360 3023042

5050000 70585627511507 3971890 812164

7058 3971890 812164

5060000

506000256 1465531813749 80764 20074

506000358 64007038113414 4504384 858496

6546 4585148 878570

5070000

5070001 146536250412935 9158711 1895366

5070002 52026621312248 3444400 637141

5070003 7666423613192 492048 101051

20621 13095159 2633558

5080000

23	FUEL	SYSTEM	C	F	508000154	13474407
27	FUEL	SYSTEM	D	B	508000256	16857535
17	FUEL	SYSTEM	E	B	508000358	3592665
49	FUEL	SYSTEM	I	W	508000462	53997558
	FUEL	SYSTEM	ENG		5080005	626659
	FUEL	SYSTEM	C	A	5080006	754615

89300

12
11
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508000154	134744078114045	5494832	1892423
508000256	168575357511233	9031138	1893547
508000358	35926653112549	2389794	450760
508000462	539975580414420	30132486	7786367
5080005	62665901 9594	412540	60058
5080006	75461525 9658	463899	72821
	89300	47924689	12155976

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FLYING CONTROLS GROUP

6000000

	MECHANICAL CONTROLS			6010000	
71	MECHANICAL CONTROLS	F	F	601000152	9257164
	MECHANICAL CONTROLS	C	F	601000254	939391
70	MECHANICAL CONTROLS	F	I	601000583	12423788
70	MECHANICAL CONTROLS	I	W	601000662	40610717
46	MECHANICAL CONTROLS	O	W	601000764	30237770
	MECHANICAL CONTROLS	C	A	6010008	646709

94112

	FLYING CONTROLS HYDRAULICS			6020000	
	FLYING CONT HYDRAULICS	D	B	602000156	2391571
43	FLYING CONT HYDRAULICS	E	B	602000258	43629651
	FLYING CONT HYDRAULICS	R	F	602000359	48758
77	HYDRAULICS FLYING CONT	I	W	602000462	27294701
73	HYDRAULICS FLYING CONT	O	W	602000564	11930740
59	RUDDER HYDRAULICS			602000683	5522759

90814

MOORE BUSINESS FORMS CO.

6000000

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6010000

6010000152	92571645411489	1523147	1063537
6010000254	9393913211765	367449	110473
6010000583	124237881722159	9791436	2752813
6010000662	406107173214375	29130365	5837688
6010000764	302377706813562	23303051	4100742
60100008	6467098214338	458544	92623
	94112	64573992	13957876

6020000

6020000156	239157395 9691	1372314	231712
6020000258	436296538711067	28527694	4828421
6020000359	487587510824	36420	5196
6020000462	272947035814721	19203513	4017950
6020000564	119307405613580	8834881	1620094
6020000683	55227599620784	4196499	1147692
	90814	62171321	11851065

FIXED EQUIPMENT GROUP 7000000

INSTRUMENTS 7010000
INSTRUMENTS F F 701000152 4407161
NAVIG TABLE AND STOWAGE 701000452 200220

4607

COCKPIT PRESSURE SEALING 702000052 500186

500

OXYGEN SYSTEM 7030000
OXYGEN SYSTEM 703000152 2607240

2607

AIR CONDITIONING SYSTEM 7040000
54 AIR CONDITIONING F F 704000152 3549178
54 AIR CONDITIONING C F 704000254 47212294
54 AIR CONDITIONING D B 704000356 1148516
54 AIR CONDITIONING C A 70400005 27363397
54 AIR CONDITIONING ENG 70400006 1889640
54 AIR CONDITIONING I W 7040000762 80515

81241

HYDRAULICS MAIN SYSTEM 7050000
32 UTILITY HYDRAULICS F F 705000152 8418200
31 UTILITY HYDRAULICS C F 705000254 4272434
20 UTILITY HYDRAULICS D B 705000356 27338556
66 UTILITY HYDRAULICS E B 705000458 7353606
23 UTILITY HYDRAULICS I W 705000562 13311553
32 UTILITY HYDR NOSE U C 705000691 325190
23 UTILITY HYDR MAIN U C 705000792 2980542
28 EMERGENCY LOWERING M U C 705000862 853584
35 EMERGENCY LOWERING N U C 705000952 438214

65288

3 RAM AIR TURB EMERG POWER 706000054 9135336

9135

CABIN INSULATION 707000052 1431187

1431

UNCLASSIFIED
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7000000

7010000

7010000152	44071611213909	710056	612970
7010000452	2002200013000	44000	26000

4607	754056	638970
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702000052

5001860013000	93000	65000
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500	93000	65000
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7030000

7030000152	26072405415670	627088	408517
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2607	627088	408517
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7040000

7040000152	35491781311118	632183	394578
7040000254	472122948913515	13922347	6380702

7040000356	11485164012503	592827	143534
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70400005	273633979213613	10888285	3724925
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70400006	18896401713525	1209281	255487
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7040000762	805150015950	41200	12760
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81241	27286123	10911986
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7050000

7050000152	84182004310871	1687220	915121
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7050000254	42724348010431	1857466	445612
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7050000356	273385569211077	15225079	3028230
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7050000458	73536063710857	4458639	798315
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7050000562	133115536014235	7368970	1894821
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7050000691	325190339521	61857	30943
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7050000792	29805432514100	1618885	420180
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7050000862	8535843614188	498459	121024
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7050000952	4382143510275	93885	45005
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65288	32870460	7699251
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706000054

91353360810474	3070091	956800
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9135	3070091	956800
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707000052

14311874813200	268284	188892
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1431	268284	188892
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	BRAKE	PARACHUTE			7080000	
	BRAKE	PARACHUTE	F	F	708000152	455169
	BRAKE	PARACHUTE	R	F	708000559	8499822
	BRAKE	PARACHUTE	I	W	708000662	124620

9078

	ELECTRICAL	SYSTEM			7090000	
33	ELECTRICAL	WIRING	R	N	709000151	129 92
33	ELECTRICAL	WIRING	F	F	709000252	2966199
33	ELECTRICAL	WIRING	C	F	709000354	1304418
33	ELECTRICAL	WIRING	A	I	709000455	1274219
33	ELECTRICAL	WIRING	D	B	709000556	6515533
33	ELECTRICAL	WIRING	E	B	709000658	64595
33	ELECTRICAL	WIRING	I	W	709000862	8909541
33	ELECTRICAL	WIRING	FIN		709000983	352797
33	ELECTRICAL	WIRING	NUC		709001091	330186
33	ELECTRICAL	WIRING	ENG		7090011	2002585
33	ELECTRICAL	WIRING	C	A	7090012	13746334
58	ELECTRICS	F	F		709001352	15586155
26	ELECTRICS	C	F		709001454	7596448
85	ELECTRICS	E	B		709001558	670679
85	ELECTRICS	ENG			7090016	11632562
85	ELECTRICS	C	A		7090017	718613
	ELECTRICS	FIN			709001883	83895
	ELECTRICS	I	W		709001962	2336620
	ELECTRICS	CAW			7090020	112629
	ELECTRICS	MUC			709002192	74516
19	ELECTRICS	A	I		709002255	5303220
93	ELECTRICS	D	B		709002356	27132518
	ELECTRICS	R	F		709002459	136802
	WINDSCREEN	DEMISTING			709002552	2929198

111898

	L P	PNEUMATICS			7100000	
26	L P	PNEUMATICS	F	F	710000152	2060194
18	L P	PNEUMATICS	C	F	710000254	671334
	L P	PNEUMATICS	D	B	710000356	444552
	L P	PNEUMATICS	E	B	710000458	1526656
	L P	PNEUMATICS	FIN		710000583	640758
	L P	PNEUMATICS	R	N	710000651	124 74

5465

	INTAKE	DE ICING			712000055	8800195
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8800

5	RADIO	RADAR	INT	SYST	R	N	715000151	1872 99
5	RADIO	RADAR	INT	SYST	F	F	715000252	9699192

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7080000			
708000152	4551691312869	76954	58554
708000559	84998221314391	6987283	1223091
708000662	1246202214500	76907	17980
	9078	7141144	1299625

7090000			
709000151	129 928512000	11978	15480
709000252	29661997711200	592518	332192
709000354	13044187811000	546089	143440
709000455	12742198412000	280076	152880
709000556	651553375 9200	3477381	599380
709000658	6459500 9200	38080	5888
709000862	89095411113900	4820749	1238351
709000983	3527975430000	280734	105600
709001091	33018600 9800	61380	32340
7090011	20025858310000	1172832	200200
7090012	137463347311234	4601199	1544226
709001352	155861558211127	2428611	1734254
709001454	75964489710870	3410376	825685
709001558	6706794411597	455225	77700
7090016	116325620711472	6537998	1334423
7090017	7186135012000	440493	86160
709001883	838955028840	74327	23937
709001962	23366205314500	1449558	338720
7090020	1126294613561	70500	15188
709002192	745160013700	38184	10138
709002255	53032207613833	1170690	733564
709002356	271325186110254	14070927	2782115
709002459	1368020011360	109072	15450
709002552	292919898 9980	582812	292314
	111898	46721789	12639625

7100000			
710000152	20601947412434	401164	256140
710000254	6713343111033	224322	74031
710000356	4445529611859	245514	52654
710000458	152665650 9737	1001819	148587
710000583	6407581825515	485235	163296
710000651	124 7431 9955	9214	12344
	5465	2367268	707052

712000055	88001958211800	1723216	1038400
	8800	1723216	1038400

715000151	1872 9909 9034	185496	169116
715000252	96991924212007	1866282	1164559

5	RADIO	RADAR	INT	SYST	C	F	715000354	22501274
5	RADIO	RADAR	INT	SYST	I	W	715000562	4927572
5	RADIO	RADAR	INT	SYST	O	W	715000664	1049746
5	RADIO	RADAR	INT	SYST	F	I	715000783	3380761
5	RADIO	RADAR	INT	SYST	C	A	7150008	19748358
5	RADIO	RADAR	INT	SYST	D	B	715000959	13745

63189

29	CANOPY	ACTUATION					716000052	6492221
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6492

	CABIN	CONSOLES					717000052	1745174
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1745

	SURFACE	FINISH	F	F			719000152	363187
	SURFACE	FINISH	CANOPY				719000253	64202
	SURFACE	FINISH	C	F			719000354	1400371
	SURFACE	FINISH	INTAKES				719000455	408227
	SURFACE	FINISH	D	B			719000556	377538
	SURFACE	FINISH	E	B			719000658	443667
	SURFACE	FINISH	R	F			719000759	648803
	SURFACE	FINISH	I	W			719000862	3151601
	SURFACE	FINISH	O	W			719000964	1067706
	SURFACE	FINISH	O	W	L	EDGE	719001065	319639
	SURFACE	FINISH	AILERON				719001174	353791
	SURFACE	FINISH	ELEVATOR				719001282	566755
	SURFACE	FINISH	FIN				719001383	639746
	SURFACE	FINISH	RUDDER				719001484	202812

10000

	FLIGHT	TEST	INSTALLATIONS				7200000	141486491
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141486

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15000354	225012749010297	6185525	2316928
15000562	49275721515695	2818983	773293
15000664	10497464213720	782995	143923
15000783	33807617925195	2574850	851591
150008	197483581215397	7072154	3040600
15000959	137455015800	9692	2054

63189	21495977	8462064
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16000052	64922219915435	1441159	1002040
6492	1441159	1002040	

17000052	17451747612434	304956	216973
1745	304956	216973	

19000152	3631874412200	68041	44286
19000253	642021815900	12940	10176
19000354	14003719712455	520758	174370
19000455	4082279812020	93016	49042
19000556	3775382811200	202932	42224
19000658	4436670111200	295485	49616
19000759	6488036213175	520746	85374
19000862	31516014414400	1895137	453744
19000964	10677065013590	753836	145005
19001065	3196394813526	203994	43148
19001174	3537919013556	279541	47853
19001282	5667552314260	427460	80712
19001383	6397466320837	477097	133148
19001484	2028127921431	164184	43291

10000	5915167	1401989
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200000	1414864917312966	69572911	18345075
141486	69572911	18345075	

REMOVABLE EQUIPMENT GROUP 8000000

77 EJECTOR SEATS 801010052 33906204
33906

RADAR REMOV GROUP 8020000

DAMPING SYSTEM 8030000

DAMPING SYSTEM F F 803010152 784172
DAMPING SYSTEM C F 803010254 2303322
DAMPING SYSTEM E B 803010358 369632
DAMPING SYSTEM I W 803010462 6070527
DAMPING SYSTEM O W 803010564 95748
DAMPING SYSTEM R N 803010651 287 73

9908

98 INSTRUMENT PACK 805080054 68680385

68680

INSTRUMENTATION 805090054 303600395

303600

FIRE PREVENT FIRST A C CF 805100054 16379386
FIRE PREVENT FIRST A C DB 805100156 806549
FIRE PREVENT FIRST A C EB 805100258 582626

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NON CLASSIFIE

8 000000

8 01010052	339062044313410	6931404	4546795
	33906	6931404	4546795

8 020000

8 030000

8 03010152	7841720112047	134856	94448
8 03010254	23033221310949	741865	252155
8 03010358	3696324213432	233363	49564
8 03010462	60705278115720	3203807	954204
8 03010564	957485514000	71112	13300
8 03010651	287 7350 9340	21095	26806
	9908	4406098	1390477

8 05080054	6868038581 9468	26497431	6502622
	68680	26497431	6502622

8 05090054	30360039545 9500	120058620	28842000
	303600	120058620	28842000

8 05100054	163793868010750	6335397	1760743
8 05100156	8065494012883	442816	103837
8 05100258	5826263414095	364530	82033
	17767	7142743	1946613

OPERATIONAL LOAD 9000000

CREW MEMBERS 901000052 39000194
39000

ENGINE OIL 9020000
ENGINE OIL USABLE 9020001 8816612
ENGINE OIL TRAPPED ENG 9020002 1773626
ENGINE OIL TRAPPED D B 902000356 1925580
ENGINE OIL TRAPPED E B 902000458 909599
13423

OXYGEN CHARGE 9040000
OXYGEN CHARGE F F 904000152 72204
OXYGEN CHARGE C F 904000254 1267262
1339

100 ENGINE FIRE EXT FLUID 9060000 2500730
2500

RESIDUAL FUEL 9070000
RESIDUAL FUEL C F 907000154 4680394
RESIDUAL FUEL I W 907000262 17160597
21840

WATER FOR AIR CONDITIONING 910000054 12500268
UNUSABLE WATER FOR AIRCOND 910000154 1500267
14000

UNCLASSIFIED
NON CLASSIFIED

9000000

901000052	390001940013650	7566000	5323500
	39000	7566000	5323500

9020000

9020001	88166124612186	5399447	1074318
9020002	17736267611640	1111245	206377
902000356	192558084 9555	1118117	183934
902000458	90959928 9704	544746	88209
	13423	8173555	1552838

9040000

904000152	722049313200	14755	9504
904000254	12672628016150	332968	204621
	1339	347723	214125

9060000

25007300012900	1825000	322500
2500	1825000	322500

9070000

907000154	46803942412300	1845043	575640
907000262	171605975513705	10253958	2351778
	21840	12099001	2927418

910000054

125002680013200	3350000	1650000	
910000154	15002670012700	400500	190500
	14000	3750500	1840500

MADE IN
USA