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Date: April 1st, 1956
Aircraft: C-105 With J75 Engines
as Interim Power Plant

Report # 7-0400-05
Sheet # 001-1 Issue 25
Prepared By: K. Griffin
Checked By: E. Burnett

INTRODUCTION

The following is a revised Weight and C. G. Summary for the C-105 Aircraft, based on the latest weight estimates available on March 30th, 1956. All Weights and C.G. change are relative to Issue 24.

GENERAL

- (a) As in Issue 24 Pratt & Whitney J75 Engines comprise the Interim Power Plant (6,175 lb each)
- (b) A package containing 4 'semi-submerged' Sparrow Missiles is currently carried. Until this date fully 'submerged' Missiles were considered, however, a substantial weight reduction is expected with the semi-submerged system.
- (c) The Hughes MX 1179 Radar System is installed, but with a Douglas Missile Control System, as in Issue 23 and 24.
- (d) As in issues subsequent to 15, the extended Outer Wing Leading Edge is recorded here.

1. STRUCTURE

WEIGHT (lb)

(a) Wing:

I/Wing Leading Edge - ribs mostly .072 were .081 Al.	-	10
I/B Skin .09 was .156 Al.	-	36
I/Wing Spars - R/Spar - redesigned - reduction in cross section area	-	18
F/Spar - redesigned some reduction in caps etc.	-	40
I/Wing Joints - Outer angles at Fin attachment now with Fin	-	21
Weight Change Decrease	-	125

Ref. 002-1

(b) Fin and Rudder:

Completely re-estimated mainly to Production Drawings.		
Addition of Outer Angles at Attach. (see above)	+	21
Addition of Marry-Up Hardware	+	29
Increases in Skins, Spars etc.	+	34
Weight Change Increase	+	84

Ref. 002-1

(c) Fuselage to Sta. 255th:

Miscellaneous production drawing changes to Formers, Cockpit Floor, Navigator's Canopy etc.	+	13
Weight Change Increase	+	13

Ref. 002-2



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INTRODUCTION

<u>1. STRUCTURE (Continued)</u>	<u>WEIGHT (lb)</u>
(d) <u>Fuselage Sta. 255^W - 485^W</u>	
Dorsal Deflector Shield - redesigned Stainless Steel replaces Fibreglass	+ 2
Weight Change Increase	+ 2
	<u>Ref. 002-2</u>
(e) <u>Fuselage Sta. 485^W Aft.</u>	
Heavy Formers E.B. - Considerable increase in cap thickness	+ 19
Engine Tunnel R.F. - Addition of Steel guides for Engine removal rails	+ 7
Nacelles, Stringer etc. R.F. - miscellaneous changes	- 1
Weight Change Increase	+ 25
	<u>Ref. 002-3</u>
<u>TOTAL STRUCTURE WEIGHT DECREASE</u>	<u>- 1</u>
<u>2. LANDING GEAR</u>	
Main Undercarriage - Wheel assys. Manufacturer's increase	+ 4
Allowance for Air in Tyres 260 p.s.i.	+ 4
Nose Undercarriage - Allowance for Air in Tyres 170 p.s.i.	+ 1
Main U/C Hydraulics - Brake controls now with mechanical Flying Controls	- 11
Nose U/C Hydraulics - Mechanical controls for steering now with Flying Controls	- 6
	<u>Ref. 002-3</u>
<u>TOTAL LANDING GEAR WEIGHT DECREASE</u>	<u>- 8</u>
<u>3. POWER PLANT & SERVICES</u>	
Engines: - C. G. moved Aft by .36 ins.	0
Fire Extinguishing - increase in weight of bottles and mountings	+ 6
Engine Anti-icing - complete redesign of nose bullet	- 1
Engine Mounts - Estimated to production drawings	- 1
	<u>Ref. 002-3</u>
<u>TOTAL POWER PLANT AND SERVICES INCREASE</u>	<u>+ 4</u>

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INTRODUCTION

4. FLYING CONTROLS GROUP WEIGHT (lb)

Mechanical Controls - these have been re-estimated almost completely to production drawings - some mechanical controls have been removed from the U/C Group and included here (+ 11 lb) but the weight increase is largely due to heavy roller bearings replacing the lighter ball bearings, it was assumed earlier would be used + 55

Ref. 002-4

TOTAL FLYING CONTROLS GROUP INCREASE + 55

5. EQUIPMENT: - FIXED AND REMOVABLE

Electrics - All circuits have been re-estimated to production schematic drawings -
Wiring now MIL-W-8777 earlier MIL-W-5086 assumed + 27
Redesign of De-icing boots + 7
Addition of Air-Conditioning Safety shut-off + 17
Miscellaneous equipment changes + 7
Windscreen De-misting - trnsformer increased from 2 to 4.5 K.V.A. + 6
Oxygen System - convertor now has transmitter, evaporator coils, relief and fill valves etc. as an integral unit also miscellaneous other changes - 3
Air Conditioning - addition of safety shut-off system + 24
Ducts .012 Stainless Steel replace Fibreglass + 15
Miscellaneous other changes + 15
Emergency Provisions - The hand fire extinguisher, fire hatchet and signal pistol are no longer R.C.A.F. requirements - 13
Radome De-icing - Fuller information available + 7
Missile Package Structure and Mechanisms - the 'semi-submerged' Missiles replace the fully submerged and the pack is expected to be considerably lighter. On the instructions of Mr. F. Mitchell approx. 600 lb will be removed - 599

Ref. 002-5

TOTAL EQUIPMENT DECREASE - 490

6. OPERATIONAL LOAD

Sparrow Missiles - C. G. changed in accordance with new geometry of 'semi-submerged' state

Ref. 002-5

OPERATIONAL LOAD WEIGHT CHANGE - NIL

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SUMMARY

Weight Change - Aircraft Weight Empty

Structure	- 1 lb.
Landing Gear	- 8 lb.
Power Plant & Services	+ 4 lb.
Flying Controls	+55 lb.
Equipment	-490 lb.
	<u>-440 lb.</u>

Weight Change - Operational Load Less Fuel

NIL

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

<u>Issue 24</u>	<u>Issue 25</u>	
<u>45,130</u>	<u>44,690</u>	<u>- 440 lb.</u>

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WEIGHT CHANGES TO 7-0400-05 ISSUE 24

WEIGHT CHANGES

Wing:

- 45.70 I/Wing Leading Edge - Ribs estimated to production drawings, mostly .072 were .081 Al. I/B Skin .09 was .156 Al. - 10.00 - 35.70 - 45.70
 - 58.00 I/Wing Spars - R/Spar - redesign reduction in cross sectional area - 18.00 F/Spar - re-estimated to production drawings, reduction in cap areas etc. - 40.00 - 58.00
 - 21.00 I/Wing Joints - Outer angle at Fin Attach. now included with Fin - see below.
-
- 124.70

Fin and Rudder:

- + 83.72 Fin - Completely re-estimated to production drawings except the Fin Tip which is still only at scheme drawing issues. Addition of outer angle at wing attachment (see I/W Joints - above) + 21.00 Addition of 'Marry-Up' hardware + 28.86 Revised estimate of hinges + 3.50 Revised estimate of Leading Edge (provisions for pitot masts now included) + 4.70 Refined estimate of skins and pivot fittings + 13.99 Misc. design changes to spars (incl. systems bracketry) + 8.08 Misc. structural ammendments etc. + 3.59 - 83.72
-
- + 83.72

Front Fuselage (Fwd. Sta. 255")

- + 3.36 Cockpit Floor - some alterations to centre stiffeners and additional details "Marry-Up" assy.
- + 0.83 Nose U/C Support Structure - Stiffeners added to cross Beam.
- + 5.62 Formers - Addition of clips, stiffeners etc. to production drawings + 2.80 Addition of former stubs .081 Al. at 237.5 and 246.25, also corner gussets .051 were .04 Al. + 2.82 - 5.62
- + 2.62 Navigator's Canopy - Glass .48" thick with vinyl laminates was .25" thick. The proposed larger window has not yet been considered. (continued)

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WEIGHT CHANGES TO 7-0400-05 Issue 24

WEIGHT CHANGES

Front Fuselage (Fwd. Sta. 255") Con't.

+ 0.29 Bulkhead Sta. 120" - addition of Miscellaneous clips etc.
to production drawings.

+ 12.72

Centre Fuselage (Sta. 255" - 485")

+ 1.81 Dorsal Deflector Shield - redesigned in .012 St. Steel
with 3 lb/cu.ft. 'Refrasil'
Insulation- previous fibreglass
shield unsatisfactory at encountered
temperatures.

+ 1.81

Aft. Fuselage (Sta. 255" Aft)

+ 0.48 Dive Brake Accommodations - gauge increases in doublers and
and angle reinforcing on Decking.

+ 18.71 Heavy Formers E.B. - Production drawing estimates of Formers
Sta. 591.65, 644.43, 697.28 - consider-
able increase in thickness of caps.

+ 1.02 Rudder Fairing R.F. - redesign fore and aft ends, skin gauges
changed, doublers removed.

- 2.91 Formers Fixed R.F. - Production drawing estimate of majority
of formers
Reduction in gauges of O/B web and
angles Sta. 753"

+ 2.79

- 5.70

- 2.91

+ 2.81 Outer Skins Fixed R.F. - Redesign fwd. stiffeners
Redesign aft. stiffeners
Fwd. of Sta. 753" .04Al. was Mg.

- 0.98

- 0.78

+ 4.57

+ 2.81

+ 7.16 Engine Tunnel Fixed R.F. - addition of St. Steel guides for
Engine removal rails.

+ 0.96 Nacelles R.F. - Gauge changes to most of formers -
Upper and Lower sections often lighter gauge
than side panels.

- 1.17

Elevator fairing channel & angle .025 was
.016 titanium

+ 0.21

- 0.96

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WEIGHT CHANGES

Aft. Fuselage (Sta. 255" Aft.) (Cont'd.)

- 1.58	Centre Structure R.F. - 'chute box longer, aft end redesigned	+	2.24
	Alteration to sealing design	-	1.64
	Slitter O/B Skin .025 was .016 titanium	+	0.84
	Latches - previous allowance too low	+	3.74
	Fwd. Skins were .032 & .04 Al. now .025 Al.	-	7.17
	Struct. aft 842.25 - skins .016 & .02 were .025 also bulkhead 848.8 added etc.	+	0.41
		-	1.58

+ 24.73

Landing Gear

+ 8.64	Main Undercarriage - Manufacturers increase in wheel-assys.	+	4.40
	Allowance for Air at 260 p.s.i. in tyres	+	4.24
		+	8.64
+ 1.00	Nose Undercarriage - Allowance for Air at 170 p.s.i. in tyres		
- 10.73	Main U/c Hydraulics - Mechanical brake controls now included with Flying Controls.		
- 5.93	Nose U/C Hydraulics - Mechanical steering controls now included with Flying Controls.		
- 7.01			

Power Plant & Services

0	Engines - C.G. moved aft by 0.36"		
- 1.01	Engine Mounts - Production Drawing estimates of most items		
- 1.25	Engine Anti-icing - Complete redesign of Nose bullet		
+ 6.25	Engine Fire Extinguishing - increase in weight of bottles	+	5.00
	increase in weight of bottle mtgs.	+	1.25
		+	6.25
+ 3.99			

Flying Controls Group

+ 54.51	Mechanical Controls - completely re-estimated mostly to Production Drawings. Addition of mechanical controls steering (see U/C Group)	+	5.00
	Addition of Mechanical controls brakes (see U/C Group)	+	5.59
	Aileron linkage - increase in bell-cranks etc., roller bearings replace lighter ball bearings	+	43.92

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WEIGHT CHANGES TO 7-0400-05 ISSUE 24

WEIGHT CHANGES

Flying Controls Group (Cont'd.)

Rudder Controls in Fin	+ 7.67
Generally refined estimate of controls in fuselage	+ 5.33
Generally refined estimate of controls in I/Wing	- 13.00
	<u>+ 54.51</u>

+ 54.51

Equipment - Fixed and Removable

All Electrical reports have been revised in accordance with the Production schematics and wiring has been removed from individual reports and incorporated into a separate wiring report - for further details see below.

- 100.00	Alternator System - deletion of wiring (see note above)	
+ 12.19	Air Conditioning Electrics - increase in Relays and circuit breakers	+ 2.20
	deletion of wiring (see note above)	- 4.21
	preliminary estimate of safety equipment	<u>+ 14.20</u>
		<u>+ 12.19</u>
- 15.87	Undercarriage Electrics - deletion of wiring (see note above)	- 14.75
	Equipment estimated to production schematic	- 1.12
		<u>- 15.87</u>
- 3.50	External Lights - deletion of wiring (see note above)	- 5.06
	Increase in weight of taxi and landing lights	+ 1.56
		<u>- 3.50</u>
- 22.43	Fuel Valve Control - deletion of wiring (see note above)	- 27.81
	Increase in Weight of 12 relays	+ 5.38
		<u>- 22.43</u>
- 24.52	Engine Services Electrics - deletion of wiring (see note above)	- 18.42
	Equipment estimated to production schematic	- 6.10
		<u>- 24.52</u>

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WEIGHT CHANGES TO 7-0400-05 ISSUE 24

WEIGHT CHANGES

Equipment - Fixed & Removable (Continued)

- 1.90	Canopy Electrics - deletion of wiring (see note above)	- 3.00
	Circuit breakers	+ 0.40
	Relays etc. to production schematic	+ 0.70
		<hr/> - 1.90
+ 2.03	Cockpit Lighting - deletion of wiring (see note above)	- 4.91
	increase in console flood lights, edge lights etc.	+ 6.94
		<hr/> + 2.03
- 11.37	Flight Services Electrics - deletion of wiring (see note above)	- 10.26
	Equipment estimated to production schematics	- 1.11
		<hr/> - 11.37
- 7.18	Fuel Capacity Electrics - deletion of wiring (see note above)	- 14.18
- 13.17	Fire Detection Electrics - deletion of wiring (see note above)	- 4.50
	Fire detection loops	+ 1.70
	Inertia crash switch	+ 2.50
	Relays - further information	+ 3.00
	Control Units	- 1.69
	Circuit breakers, limiters etc.	<hr/> - 13.17
- 10.50	Starting & Ignition - deletion of wiring (see note above)	- 11.35
	Equipment estimated to production schematic	+ 0.85
		<hr/> - 10.50
- 19.10	Intake De-icing - Redesign of Boots	+ 6.86
	Deletion of wiring (see note above)	- 25.96
		<hr/> - 19.10
+ 273.73	Electrical Wiring - Incorporation of all wiring from above reports. The weight has however, increased due to MIL-W-8777 replacing MIL-W-5086 (Weight penalty + 26.64 lb)	
+ 6.00	Windscreen De-misting - Transformer increased from 2.0 to 4.5 K.V.A.	
- 2.52	Oxygen System - revision of estimate - though drawings still not issued - the convertor now in integral with the transmitter, evaporator coil, relief and fill valves etc.	

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Date: April 1st 1956
Aircraft: C-105 G. I. J. Engines
as Interim Power Plant

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WEIGHT CHANGES TO 7-0400-05 ISSUE 24

WEIGHT CHANGES

Equipment - Fixed & Removable (Cont'd.)

- 11.45 Emergency Provisions - Hand Fire Extinguisher, Axe and Signal Pistol are no longer R.C.A.F. requirements
 - 2.00 Signal Pistol Cartridges - no longer an R.C.A.F. requirement
 - + 53.87 Air Conditioning System - Introduction of Safety Shut-Off system
 - Radar Ram Air Valve added + 24.30
 - Actuator added on flow augmentor + 3.18
 - Pneumatically operated doors between ram and ramp air intake added + 1.75
 - Control of Turbine discharge temperature + 5.00
 - Electrical press. selector replaces cockpit non-return valve. + 3.00
 - Exhaust Ducts - .012 St. Steel replaces fibreglass + 1.80
 - + 14.84
 - + 53.87
 - + 6.66 Radome De-icing - further information available - no drawings yet 4.55 lb electrics not previously allowed for.
 - 524.10 Missile Pack Structure - "semi-submerged" missiles replace "fully sub-merged" and the pack is expected to be considerably lighter (approximately 600 lb ref. F. Mitchell). The expected reduction has been divided proportionately between structure and mechanisms.
 - 74.50 Missile Pack Mechanisms - see note above.
-
- 489.63

Operational Load

- 0 Sparrow Missiles - C.G. change only in accordance with 'Semi-submerged' missile geometry.
-
- 439.86 TOTAL WEIGHT CHANGE.

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 Date: April 1st, 1956
 Aircraft: C-101 J-1 Engines
 as Interim Power Plant

Report # 7-0400-05
 Sheet # 003-1
 Prepared By: J. Murphy
 Checked By: E. Burnett

WEIGHT AND C.G. SUMMARY

REF. No.	DESCRIPTION	WEIGHT lb.	H. ARM ins.	V. ARM ins.
	STRUCTURE	16,951.65	565.75	141.21
1000000	Wing	9,455.83	642.68	146.94
2000000	Fin & Rudder	995.74	754.13	209.06
3000000	Fuselage Structure Fwd. 255"	2,168.19	185.89	129.99
	255" to 485"	1,545.47	369.67	131.49
	Aft. 485"	2,786.42	641.72	111.63
4000000	UNDERCARRIAGE - Up Position	2,861.34	484.83	133.81
4010100	Main Undercarriage	1,848.24	539.88	141.00
4010200	Main U/C Doors and Fairings	287.32	539.21	136.40
4010300	Main U/C Hydraulics	284.84	548.06	135.75
4020100	Nose Wheel Undercarriage	315.47	168.80	99.81
4020200	Nose U/C Doors & Fairings	25.92	163.71	89.22
4020300	Nose U/C Hydraulics	99.55	210.03	106.57
5000000	POWER PLANT & SERVICES	13,904.88	655.33	120.46
5010000	Engines J 75	12,647.50	664.02	119.81
5020000	Gear Box & Drive	150.00	606.00	94.66
5030000	Engine Controls	29.19	377.46	118.91
5040000	Pneumatic Starting System	52.00	610.00	94.75
5050000	Engine De-Icing	68.10	561.78	115.69
5060000	Fire Extinguishing System	70.52	701.99	127.72
5070000	Engine Mountings & Brackets	216.07	643.18	125.29
5080000	Fuel System	671.50	526.79	138.78
6000000	FLYING CONTROLS GROUP	1,766.27	653.57	140.00
6010000	Mechanical Flying Controls	839.40	682.71	145.88
6030000	Flying Controls Electronics	108.00	222.33	131.43
6000000	Flying Controls Hydraulics	818.87	680.58	135.10
	EQUIPMENT - FIXED AND REMOVABLE	6,683.93	312.01	113.12
7010000	Instruments	53.30	153.98	140.27
7010003	Probe	23.00	- 9.74	108.00
7020000	Cockpit Pressure Sealing	5.00	186.00	130.00
7030000	Oxygen System	43.60	226.99	140.27
7040000	Air Conditioning System	703.98	325.98	134.27
7050000	Hydraulics Main System	215.66	591.04	117.46
7060000	Fin Pitot System	12.30	596.69	198.16
7070000	Cabin Insulation	11.91	179.24	130.00
7080000	Brake Parachute	69.69	784.88	131.17
7090000	Electrical System	935.20	400.94	116.16
7100000	Low Pressure Pneumatics	16.60	217.17	133.41
7110000	Oil & Hydraulic Fluid Cooling	130.00	573.07	102.64
7120000	Intake De-icing	82.62	206.33	118.82
7000000	Radio & Radar Fixed, Power Supplies	937.41	220.85	110.58
7130000	Radome Anti-Icing	23.46	62.92	126.04
7160000	Canopy Actuation	46.80	223.54	154.60
7170000	Cabin Consoles	20.65	177.37	125.23
7180000	Radar Door Actuation	10.00	268.00	91.00

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 As Antisubmarine Power Plant

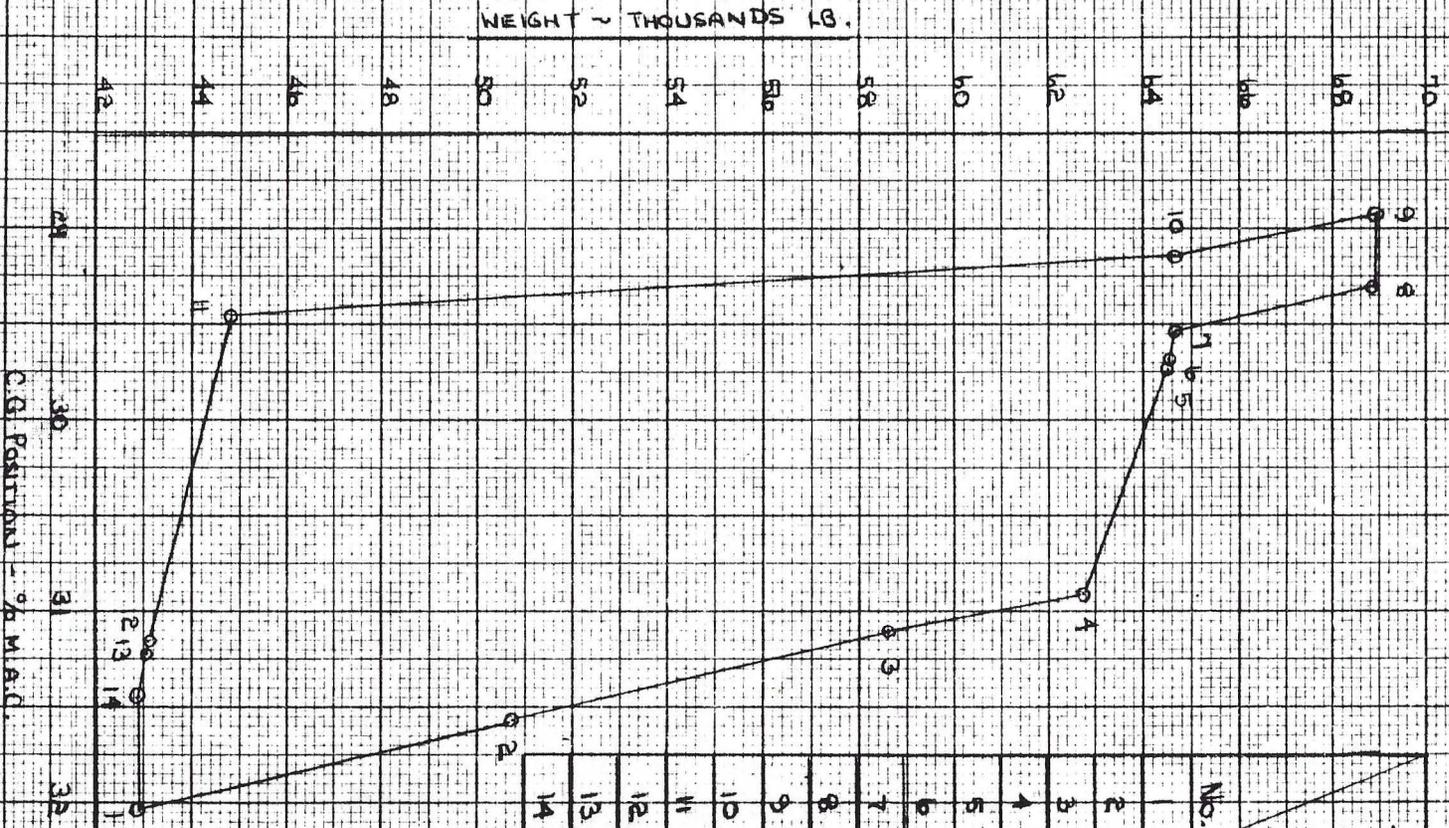
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WEIGHT AND C.G. SUMMARY

REF. No.	DESCRIPTION	WEIGHT lb.	H. ARM ins.	V. ARM ins.	C.G. POSITION % M.A.C.
<u>Equipment (Fixed & Remov.) (Cont'd.)</u>					
8010100	Ejector Seats	186.00	201.10	136.25	
8010200	Emergency Provisions	3.50	181.50	133.20	
8020000	Radar Removable	1,124.70	140.94	113.19	
8000000	Radio Removable & I.F.F.	247.90	291.13	112.19	
8050100	Sparrow Pack Structure	900.00	375.42	96.00	
8050200	Sparrow Pack Mechanisms	325.00	353.32	100.00	
8050300	Sparrow Pack Hydraulics	505.65	409.15	98.84	
8050400	Sparrow Pack Electronics	50.00	436.15	103.20	
AIRCRAFT WEIGHT EMPTY		42,168.07	553.26	129.36	
9000000	USEFUL LOAD	18,194.87	516.84	136.82	
9010000	Crew	430.00	194.00	136.50	
9020000	Oil	85.08	611.71	135.00	
9050000	Alcohol For Radome De-icing	22.00	93.00	138.00	
9060000	Engine Fire Extinguisher Fluid	25.00	730.00	129.00	
9070000	Residual Fuel	218.40	553.98	134.04	
9090000	Fuel For Combat Mission	15,673.00	539.20	142.22	
9030000	Missiles (Armament)	1,728.00	389.29	88.30	
9040000	Oxygen Charge	13.39	259.69	159.91	
	U/C Up Normal Combat Mission	60,362.94	542.28	131.61	29.36
	U/C Down		543.84	129.48	29.79
	Half Combat Mission Fuel 1,005 gal. @ 7.8 lb/gal.	7,836.00	540.85	139.53	
	U/C Up Combat Weight (Half Combat Mission Fuel)	52,525.94	542.99	129.62	29.56
	U/C Down		544.79	127.17	30.05
	U/C Up Operational Weight Empty	44,689.94	543.36	127.88	29.66
	U/C Down		545.47	124.99	30.24
	U/C Up Operational Weight Empty (Less Missiles)	42,961.94	549.56	129.47	31.37
	U/C Down		551.76	126.48	31.97
	Maximum Internal Fuel 2,544 gal. @ 7.8 lb/gal. Water (Air Conditioning System)	19,843.00	538.88	144.32	
	U/C Up A.U.W. Max. Internal Fuel	64,657.94	541.45	132.93	29.13
	U/C Down		542.91	130.94	29.53
	Max. External Fuel 500 gal. @ 7.8 lb/gal. and Drop Tank	4,210.00	528.88	62.00	
	U/C Up A.U.W. Maximum Internal and External Fuel	68,867.94	540.68	128.59	28.92
	U/C Down		542.09	124.72	29.30

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C105 A/C C.G. ENVELOPE
FOR A/C FLIGHT CONDITIONS
WITH J75 A25 ENGINES
AND FUEL PROPORTIONERS



C.G. Position - % M.A.C.

NO.	CONDITION		COMBAT MISSION FUEL	NORMAL MISSION FUEL	MAX. INTERNAL FUEL	EXT. FUEL TANK	MISSILES	DRAINING FLUID	WATER	W/UP	W/DOWN
	COMBAT MISSION FUEL	NORMAL MISSION FUEL									
1	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*

N.B. IN ORDER TO BRING POINT \odot TO THE NET LIMIT (E. 31°/D/M.A.C. 35.0) AGAINST MUST BE INSTALLED AT STA. 30.145

BY: Kathleen Gillon
 DATE: April 1st 1955

UNCLASSIFIED
~~SECRET~~
 NON-CLASSIFIED

UNCLASSIFIED
 NON-SECRETID