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72.113-56/02

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

Report # 7-0400-05
Sheet # 001-1 Issue 23
Prepared By: K. Griffin
Checked By: E. Burnett

INTRODUCTION

The following is a revised Weight & C.G. Summary for the C-105 Aircraft, based on the latest weight estimates available on January 31st, 1956. All Weight and C.G. changes are relative to Issue 22.

GENERAL

- (a) As in Issue 22 Pratt & Whitney J75 Engines comprise the Interim Power Plant (6,175 lb each).
- (b) The Falcon Missile Pack of 8 Missiles, previously carried, has been replaced by a redesigned Pack containing 4 Sparrow Missiles.
- (c) The Hughes MX 1179 Radar System is currently retained but the Missile Control Equipment is removed and replaced by Douglas equipment.
- (d) As in Issues subsequent to 15, the extended leading edge is recorded here.

1. STRUCTURE

WEIGHT (lb)

(a) Wings

O/W Leading Edge - Skin gauge reduction etc.

- 11

Weight Change Decrease

- 11

Ref. 002-1

(b) Fin & Rudder

No Weight Change.

(c) Fuselage to Sta. 255"

Radome - Elongated Nose (Apex Sta. - 26.0), but foam filled honeycomb Laminate used.

- 61

Radar Nose Structure and Access Doors - new lines

- 7

Intake Ramp - miscellaneous production drawing changes

- 2

Weight Change Decrease

- 70

Ref. 002-1

(d) Fuselage Sta. 255" to 485"

Armament Bay Floor - Production Drawing estimate misc. changes

+ 13

Dorsal Fairing over Tank - Titanium structure replaces fibreglass

- 7

Weight Change Increase

+ 6

Ref. 002-1



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INTRODUCTION

1. STRUCTURE (Continued)

WEIGHT (lb)

(e) Fuselage Sta. 485" Aft.

Dive Brake Accommodations - redesign of Sealing and
correction of door allowance

+ 9

Miscellaneous changes to centre beam, Top Longeron
Access Panels & Heavy Formers E.B.
Engine Tunnel E.B. - Addition of Compressor Air Bleed
& Air Conditioning Outlets

+ 4

+ 14

Weight Change Increase

+ 27

Ref. 002-2

TOTAL STRUCTURE WEIGHT DECREASE

- 48

2. LANDING GEAR

No Weight Change

3. POWER PLANT & SERVICES

Engines - C.G. moved 0.8" Aft.

-

Engine Mounts - Front I/B Beam Steel was Al. also minor changes
to forward O/B Mounting.

+ 13

Fuel System - Completely re-estimated to current schemes

+ 26

+ 39

Ref. 002-2

TOTAL POWER PLANT & SERVICES INCREASE

+ 39

4. FLYING CONTROLS GROUP

Dive Brake Hydraulics - completely re-estimated- equipment
Weight allowance was too high

- 12

Ref. 002-3

TOTAL FLYING CONTROLS DECREASE

- 12

5. EQUIPMENT

Sparrow Missile Pack with associated hydraulics, mechanisms
and Electronics (in remov. pack) replaces Falcon Package -
4 submerged Sparrows are currently considered

+ 682

Electronic Missile Control - Douglas' Equipment for 4 Sparrows
replaces Hughes' for 8 Falcons

- 125

Alternator System - 30 KVA System replaces 20 KVA

+ 38

Electrical Harness - Estimate completely revised

+ 44

Radar Power Supply - Revised Weights for Hughes equipment

ARN 6 Radio Compass - Revised weight data

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continued

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INTRODUCTION

5. EQUIPMENT (Continued)

WEIGHT (lb)

Radio & Radar Fixed Equipment - complete re-estimate of antennas, mountings, cable, connectors etc.	+ 17
Fin Pitot System - 2 Pitot masts added to Fin	+ 12
Cockpit Sealing - Previous allowance was too high	- 15
Ejector Seats - R.C.A.F. Weights available for Survival Kits	- 18
Air-Conditioning - completely re-estimated - some actual Weights and Manufacturers' Weights available, and lighter Laminate insulation	+ 8
Weight Change Increase	+ 604

Ref. 002-4

TOTAL EQUIPMENT INCREASE

+ 604

6. OPERATIONAL LOAD

Falcon Missiles (8) replaced by Sparrow Missiles (4)	+ 686
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Ref. 002-4

TOTAL OPERATIONAL LOAD INCREASE

+ 686

SUMMARY

Weight Change - Aircraft Weight Empty

Structure	- 48 lb.
Power Plant & Services	+ 39 lb.
Flying Controls	- 12 lb.
Equipment	+ 604 lb.
	+ 583 lb.

Weight Change - Operational Load Less Fuel

Missiles	+ 686 lb.
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Weight Change - Operational Weight Empty (A/C Less Fuel)

Issue 22

Issue 23

43,922

45,191

= 1,269 lb.

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WEIGHT CHANGES TO 7-0400-05 ISSUE 22

WEIGHT CHANGES

Wing:

- 11.05	O/W Leading Edge - Skins Rib 3-6 .091 were .102 Al.	- 3.37
	Skins Rib 6-14 .072 were .081 Al.	- 5.57
	Ribs 4,5,& 6 .081 were .064 Al.	+ 0.91
	Doublers ribs 6-9 .02 were .32 Al.	- 3.02
		<u>- 11.05</u>

- 11.05

Front Fuselage (Fwd. Sta. 255")

- 61.02	Radome - New lines - Apex of Radome A/C Sta. 26.0 Aft limit A/C Sta. 68.5. Foam filled honeycomb Laminate now used - estimate based on information from McMillan Industries Ltd.	
- 4.23	Radar Nose Structure - Length of structure reduced by 3.5" due to new lines - fwd. former at Sta. 68.5 was at Sta. 65.0	
- 2.81	Radar Nose Access Doors - Structure 3.5" shorter see above	
- 2.25	Intake Ramp etc. - Production drawing estimate of Lips & Ramp Sta. 188.4 - 214.4 Intercostals A, B, C & D gauge reduced General refinement of estimate	- 1.23 - 1.02 <u>- 2.25</u>

- 70.31

Centre Fuselage (Sta. 255" - 485")

+ 13.27	Armament Bay Floor - Completely re-estimated to production drawings .051 Top Hat replaced by .081 channel Addition of .051 Strap at Sta. 485" Addition of piping mounting brackets Alterations to Aft Stiffeners etc.	+ 1.75 + 1.11 + 2.04 + 8.37 <u>+ 13.27</u>
- 6.94	Dorsal Fairing over Tank - Structure redesigned in Titanium was fibreglass Addition of Insulation	- 12.82 + 5.88 <u>- 6.94</u>

+ 6.33

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WEIGHT CHANGES TO 7-0400-05 Issue 22

WEIGHT CHANGES

Aft Fuselage (Sta. 485" aft.)

+	8.75	Dive Brake Accommodations - redesign of D.B. Sealing	+	3.11
		Redesign Limiter and Refuel Access Door	+	0.27
		Addition of Door as above - only one door previously accounted for	+	5.37
			+	8.75
+	0.89	Centre Beam E.B. - redesigned and re-estimated		
-	0.51	Top Longeron E.B. - Completely re-estimated to current schemes		
+	3.50	Heavy Formers E.B. - Production drawing estimates of 'V' braces on heavy formers - some minor design changes incorporated.		
+	0.47	Access Panels E.B. - redesign of doors and surrounding structure		
		Access Door # 3	+	1.16
		Access Door # 4	+	2.26
		Structure at Door # 3	-	1.90
		Structure at Door # 4	-	1.05
			+	0.47
+	13.79	Engine Tunnel, E.B. - Addition of Compressor Air Bleed outlet	+	7.60
		Addition of Air-Conditioning Opening	+	5.75
		Redesign Gear Box drive Seal	+	0.44
			+	13.79

+ 26.89

Power Plant & Services

-		Engines - C.G. of the Engines J75 has moved 0.8" Aft.		
+	26.15	Fuel System - Completely re-estimated - pipes rerouted etc.		
		Pressurization system	+	9.14
		Fuel Flow System	+	2.35
		Capacitor Units added (no previous allowance)	+	14.66
			+	26.15
+	13.56	Engine Mounts - Production Drawing estimate, forward		
		O/B mount - wall thickness increased	+	1.56
		Front I/B Beam Steel was Al.	+	12.00
			+	13.56

+ 39.71

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WEIGHT CHANGES TO 7-0400-05 ISSUE 22

WEIGHT CHANGES

Flying Controls Group

- 12.00	Dive Brake Hydraulics - Completely re-estimated, equipment Weight allowances were too heavy.	
	Dive Brake Jacks	- 12.44
	Selector Valves	- 5.50
	Re-estimate of piping, joints etc.	+ 7.30
	Re-estimate of fluid in jacks and pipes	- 1.36
		<hr/> - 12.00

- 12.00

Equipment - Fixed & Removable

- 676.17	Falcon Missile Pack Structure - Deleted and replaced by Sparrow Package.	
- 410.48	Falcon Missile Pack Mechanisms - Deleted - see above	
- 293.00	Falcon Missile Pack Hydraulics - Deleted - see above	
- 318.00	Falcon Missile Pack Electronics - Deleted - see above	
+1424.10	Sparrow Missile Pack Structure - New Item - this package replaces the Falcon Package. A Sparrow Package of 4 "submerged" Missiles is currently considered.	
+ 399.50	Sparrow Missile Pack Mechanisms - new item - see above	
+ 505.65	Sparrow Missile Pack Hydraulics - new item - Douglas equipment in package.	
- 125.00	Electronic Missile Control - Douglas' equipment for 4 Sparrows replaces Hughes' equipment for 8 Falcons.	
+ 38.10	Alternator System - 30 KVA system replaces 20 KVA Transformer - rectifier Alternators Cables - re-estimated Relays & Protection	+ 12.00 + 10.00 + 12.28 + 3.82 <hr/> + 38.10
+ 43.85	Electrical Harness - a revision of estimate made clipping - previous allowance too small Connectors - more details Panels and sub-assy. wiring	+ 8.75 + 3.45 + 31.65 <hr/> + 43.85
- 18.00	Radar Power Supply - Revised Weights from Hughes for Voltage regulator	
- 21.30	ARN 6 Radio Compass - new weight data received	
-	OMNI-DME - C.G. changes made	
-	Data-Link - C.G. changes made	
- 2.00	Radio Removable - Deletion of ARC 34 Antenna see Radio & Radar fixed report.	
- 10.00	Radar Removable - Deletion of ARA 25 Antenna - as above Increase in ARA 25 Units	

continued.

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WEIGHT CHANGES TO 7-0400-05 Issue 22

WEIGHT CHANGES

Equipment - Fixed & Removable

-	5.00	I.F.F. - Deletion of Antenna in Fin - as above	
+	34.31	Radio & Radar Fixed - this has been checked and many items calculated whereas allowances were previously made.	
		Addition of ARA 25 Antenna & Mounting	+ 27.31
		Addition of VHF Antenna & Mounting	+ 20.00
		Addition of Antenna in Fin & Mounting	+ 7.00
		Revision of Connector Weights in cockpit	- 10.00
		Estimate of some junction boxes and revision of cable and structure allowances	- 10.00
			<u>+ 34.31</u>
+	12.30	Fin Pitot System - 2 pitot masts with associated piping and wiring added to Fin	
+	8.00	Probe - Inclusion of plumbing etc. see Instruments	
-	8.00	Instruments - deletion of plumbing etc. see above	
-		Radome De-Icing - relocation of spinner etc., resulting from new lines of Radar Nose.	
-	0.20	Canopy Actuation - Production Drawing estimate, Idler levers	- 2.12
		Production drawing estimate, Shock Absorbers	+ 0.16
		Allowance for sequence valves	+ 0.76
		Manufacturer's Weight Electronic Jacks	- 1.00
		Allowance for pneumatic jacks	+ 2.00
			<u>- 0.20</u>
-	15.00	Cockpit Sealing - Revised estimate previous allowance too high - this does not include canopy seal	
-	18.00	Ejector Seats - R.C.A.F. estimated Weight of pack 28 lb each 37 lb each previously allowed.	
+	8.26	Air-Conditioning - System completely re-estimated	
		Manufacturer's weight of boiler	+ 26.50
		Actual Weight of Turbine	+ 2.50
		Actual Weight of Press. relief Valves	+ 1.00
		New type laminate insulation	- 44.90
		Cabin pressure controller added	+ 2.00
		Radar Shut Off Valve added	+ 3.10
		Re-estimate of clamping weights	+ 23.40
		Ducting etc. - re-estimated	- 5.34
			<u>+ 8.26</u>
+	603.92		
<u>Operational Load</u>			
-	1,042.40	Falcon Missiles - deleted - package of 8 Falcon Missiles replaced by one of 4 Sparrow Missiles	
+	1,728.00	Sparrow Missiles - new item - see above	
+	685.60		
+	1,269.09	<u>TOTAL WEIGHT CHANGE</u>	

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Prepared By: J. Murphy
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WEIGHT AND C.G. SUMMARY

REF. No.	DESCRIPTION	WEIGHT lb.	H. ARM ins.	V. ARM ins.
	STRUCTURE	16,972.99	565.45	138.54
1000000	Wing	9,636.28	641.84	142.30
2000000	Fin & Rudder	912.02	756.74	211.22
3000000	Fuselage Structure Fwd. 255"	2,149.77	185.72	130.18
	255" to 485"	1,540.00	369.60	131.44
	Aft 485"	2,734.92	641.29	111.65
4000000	UNDERCARRIAGE - Up Position	2,868.35	483.63	133.67
4010100	Main Undercarriage	1,839.60	540.47	141.00
4010200	Main U/C Doors and Fairings	287.32	539.21	136.40
4010300	Main U/C Hydraulics	295.56	535.95	135.20
4020100	Nose Wheel Undercarriage	314.47	168.91	99.82
4020200	Nose U/C Doors & Fairings	25.92	163.71	89.22
4020300	Nose U/C Hydraulics	105.48	211.35	105.92
5000000	POWER PLANT & SERVICES	13,971.18	654.58	118.63
5010000	Engines J75	12,703.00	663.23	117.86
5020000	Gear Box & Drive	150.00	606.00	94.66
5030000	Engine Controls	25.10	356.68	119.39
5040000	Pneumatic Starting System	70.00	610.00	94.75
5050000	Engine De-Icing	69.35	565.60	115.95
5060000	Fire Extinguishing System	64.27	700.07	123.00
5070000	Engine Mountings & Brackets	217.96	641.14	125.25
5080000	Fuel System	671.50	526.79	138.78
6000000	FLYING CONTROLS GROUP	1,711.76	647.68	139.59
6010000	Mechanical Flying Controls	784.89	671.88	145.39
6030000	Flying Controls Electronics	108.00	222.33	131.43
6000000	Flying Controls Hydraulics	818.87	680.58	135.10
	EQUIPMENT - FIXED & REMOVABLE	7,144.46	316.03	111.74
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	46.12	220.36	138.15
7040000	Air Conditioning System	633.21	326.11	133.87
7050000	Hydraulics Main System	215.66	591.04	117.41
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	849.69	408.86	116.65
7100000	Low Pressure Pneumatics	16.60	217.17	133.41
7110000	Oil & Hydraulic Fluid Cooling	119.80	567.91	104.22
7120000	Intake De-Icing	101.72	210.14	118.95
7000000	Radio & Radar Fixed, Power Supplies	937.41	220.85	110.58
7130000	Radome Anti-icing	16.80	124.84	124.84
7160000	Canopy Actuation	46.80	223.54	151.60
7170000	Cabin Consoles	20.65	125.37	125.37
7180000	Radar Door Actuation	10.00	268.00	268.00

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Prepared By: J. Murphy

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WEIGHT AND C.G. SUMMARY

REF. No.	DESCRIPTION	WEIGHT lb.	H. ARM ins.	V. ARM ins.	C.G. POSITIO % M.A.C.
	<u>Equipment (Fixed & Remov.) (Cont'd)</u>				
8010100	Ejector Seats	186.00	201.10	136.25	
8010200	Emergency Provisions	16.95	166.01	130.65	
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	1,424.10	375.42	96.81	
8050200	Sparrow Pack Mechanisms	399.50	353.32	100.22	
8050300	Sparrow Pack Hydraulics	505.65	409.15	98.84	
8050400	Sparrow Pack Electronics	50.00	436.15	103.20	
	AIRCRAFT WEIGHT EMPTY	42,668.74	550.67	127.25	
9000000	USEFUL LOAD	18,357.87	516.70	137.48	
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	15,836.00	539.20	142.28	
9030000	Missiles (Armament)	1,728.00	385.76	94.27	
9040000	Oxygen Charge	13.39	259.69	159.91	
	U/C Up Normal Combat Mission	61,026.61	540.45	130.33	28.85
	U/C Down		541.99	128.22	29.28
	Half Combat Mission Fuel 1,015 @ 7.8 lb. gal.	7,918.00	540.80	139.55	
	U/C Up Combat Weight (Half Combat Mission Fuel	53,108.61	540.88	128.14	28.97
	U/C Down		542.66	125.74	29.46
	U/C Up Operational Weight Empty	45,190.61	540.89	126.14	28.98
	U/C Down		542.97	123.32	29.55
	U/C Up Operational Weight Empty (Less Missiles)	43,462.61	547.06	127.41	30.68
	U/C Down		549.22	124.47	31.27
	Maximum Internal Fuel 2,544 gal. @ 7.8 lb/gal. Water (Air-Conditioning System)	19,843.00 125.00	538.88 268.00	144.32 95.00	
	U/C Up A.U.W. Max. Internal Fuel	65,158.61	539.75	131.62	28.66
	U/C Down		541.19	129.66	29.06
	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. Max. Internal and External Fuel	69,368.61	539.09	127.39	28.48
	U/C Down		540.44	127.55	28.85

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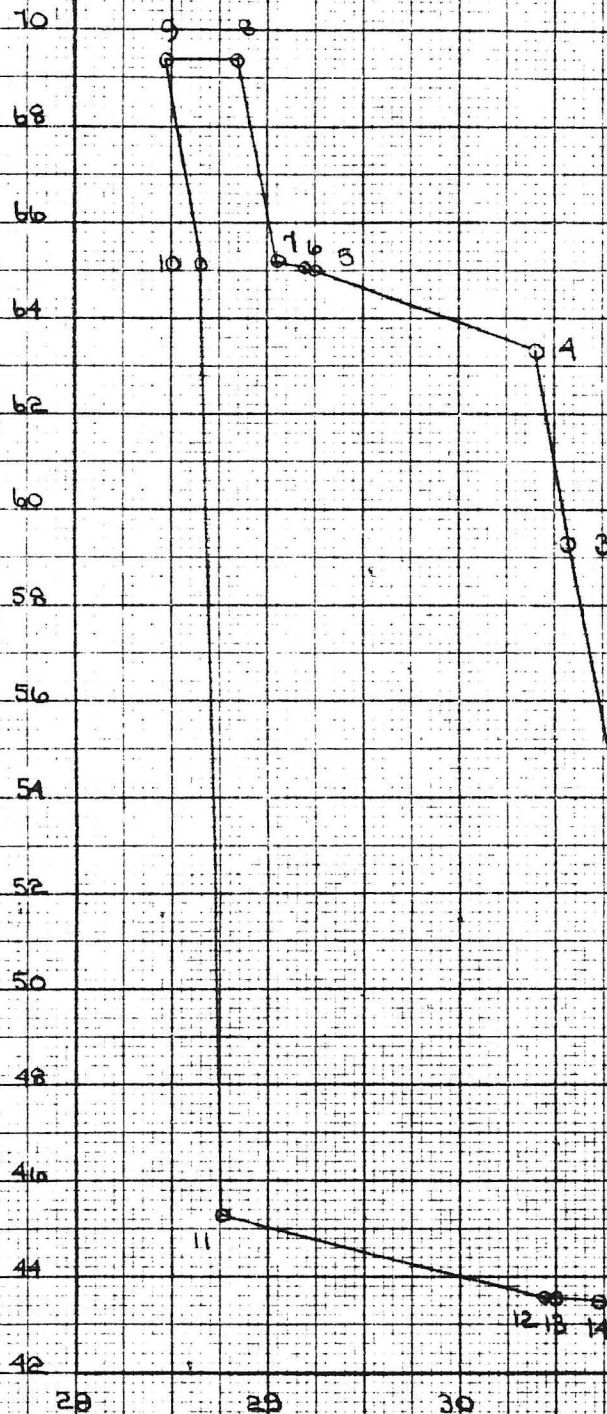
REPORT NO: 7-0400-05 ISSUE 23

BY: Kathleen Ruffin

DATE: Jan 31st 1955

CLOS A/C C.G. ENVELOPE
FOR A/C FLIGHT CONDITIONS
WITH JTS A25 ENGINES

WEIGHT ~ THOUSANDS LB.



No	CONDITION	COMBAT MISSION FUEL	NORMAL MISSION FUEL	MAX INTERNAL FUEL	EXT. FUEL TANKS	MISSILES	ENGINE FUEL	WATER	U/C UP	U/C DOWN
1										*
2	*									*
3			*							*
4				*						*
5				*		*				*
6				*		*	*			*
7				*		*	*	*		*
8				*	*	*	*	*		*
9				*	*	*	*	*	*	*
10				*		*	*	*	*	*
11					*	*	*	*	*	*
12						*	*	*	*	*
13							*	*	*	*
14									*	*

N.B. IN ORDER TO BRING
POINT 1 TO THE AFT LIMIT
2 31% M.A.C. HOLD BALLAST
MUST BE INSTALLED AT
STA 120 IN.

C.G. POSITION = % M.A.C.

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