

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

Report # 7-0400-05
Sheet # 002-1 Issue 27
Prepared By: K. Griffin
Checked By: E. Burnett

UNCLASSIFIED
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WEIGHT CHANGES TO 7-0400-05 ISSUE 26
of May 1st, 1956

WEIGHT CHANGES

Wing:

- | | | |
|------------|---|--|
| + 95.01 | Structure for Main U/C - Completely re-estimated, previous allowances were unrealistic.
Side Stay Attachment
Aft Pivot
Jack Pick-Up
Main Pivot fitting
Bushings & bearings main pivot
Main U/C Up-locks - omitted | + 27.54
+ 14.66
+ 2.16
+ 8.74
+ 28.32
+ 13.69
<u>+ 95.01</u> |
| - 15.22 | I/W Leading Edge - Completely estimated to Production
Drawings
An allowance for doublers at O/B end was carried - these do not exist
Hardware - previous allowance too low
Cuff Assy.
Stiffeners - Allowance too low
Skins - Allowance too low | - 32.00
+ 1.42
+ 0.22
+ 4.88
<u>+ 20.02</u>
- 15.22 |
| + 144.51 | I/W Structure F/S to M/S - Estimated mainly to Production
Drawings.
Tanks # 3 & 4 early estimates omitted most of internal structure, trusses etc.
2 Point refuelling door added
U/C Door Up-locks - allowance was too low
Fixed Structure pivot door etc, included F/S Hardware 20 lb of which was deleted from F/Spar (see I/W Spars), largely omitted
Joint U/C Fitting L/E & F/Spar added here
Fuselage Side Rib - re-estimated
Aux. Rib A/C C/L, Aux. Spar to Main Spar duplicated in C/L Joints.
Aux. Spar & Joint to Fuselage side rib re-estimate
Joint Aux. Spar to Front Spar
Joint Aux. Spar at A/C C/Line
Other Misc. Changes | + 59.97
+ 17.60
+ 9.46
+ 64.50
+ 17.06
- 13.49
- 8.50
- 0.24
+ 1.11
+ 4.20
- 7.16
<u>+ 144.51</u> |
| - 2,581.21 | I/W Structure M/S to R/Spar - Skins, ribs & Strut pick-ups are now in separate reports see below, however, remaining structure increased by + 59.64 lb due to underestimation of miscellaneous internal structure. | |

4035
continued.

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Wing:

+ 2,179.80	I/W Skins - This is a new report, Skins were in M/S to R/S Structure. The skins have been completely re-estimated to nominal thicknesses, since checked by Actual Weighings.	
	Machined skins - gauge changes	+ 10.47
	Access Doors - decrease in gauge of pump doors etc.	- 7.66
	Hardware - previous allowances were far too low, now fully detailed	+ 94.12
	Actual Increase in Skins	+ 96.93
+ 517.56	I/Wing Ribs # 1-9 - New report were included in M/S to R/Spar Structure	
	Actual Weight Changes are as follows:	
	Rib.# 1 - Included hardware allowance and some strut. pick-ups etc.	- 13.14
	Rib.# 2 - redesigned machined fittings added	+ 32.14
	Rib.# 3 - reinforced, capping etc. increased for duct pick-up	+ 22.44
	Rib.# 4 - redesigned Aft Web .125 was .156 fwd. web .09 was .12, delete 5.8 lb former pick-up, too heavy hardware etc.	- 36.26
	Ribs. # 5 to 9 - Minor Changes	+ 1.29
	Actual Changes	+ 6.47
- 31.04	I/W Spars - Re-estimate of Main Spar	- 3.44
	Re-estimate of C/F, C/R, Front and Rear Spars	- 7.60
	F/Spar hardware now in F/S to M/S Structure.	- 20.00
		- 31.04
+ 55.68	I/W Fuselage Pick-Up Brackets - New Report, were included in M/S to R/S Structure.	
	Re-estimate of former pick-ups with Rib.#4.	+ 1.72
	Re-estimate of Engine Mounting Pick-Ups	+ 4.76
	Marry-Up bolts struts to fittings omitted	+ 2.82
	Miscellaneous changes	- 4.02
	Duct Pick-Up brackets - omitted	+ 11.96
	Strut Pick-Up at 538.77 - omitted	+ 9.02
	Actual Changes	+ 26.26

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WEIGHT CHANGES TO 7-0400-05 ISSUE 26
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WEIGHT CHANGES

Wing:

-	347.97	Joints I/W - Delete joint to Fuselage - now separate report see below	- 146.70
		Re-estimate of C/L Joint including thrust mounting which was in M/S to R/S Structure.	+ 38.13
		Delete Trans. Joint allowance and Rib.# 10 - now considered separately below	- 239.40
			<u>- 347.97</u>
+	110.44	Rib.# 10 - New report - was included in Wing Joints - see above, completely re-estimated - actual increase	+ 0.44
+	179.38	I/W Hinge Joint to Fuselage - New report was in Wing Joints - see above Stainless Steel Seal added at Fus. side Rib. Hardware allowance was too low Wing to C.F. Joint - omitted Joint Aft of R/Spar - omitted Miscellaneous changes	+ 14.25 + 4.58 + 8.76 + 7.70 - 2.61
		Actual Change	<u>+ 32.68</u>
+	29.30	Elevator - An Actual Weight was obtained Recent addition of adjustment plates etc. Recent addition of links at attach. Omission of superseded design Marry-up	+ 9.33 + 4.52 + 4.00 + 11.45
			<u>+ 29.30</u>
+	4.84	I/W Elevator Control Box - Re-estimate some Actual Weights Joint of Centre Box was omitted	- 1.34 + 6.18
			<u>+ 4.84</u>
-	2.39	I/W Structure Aft R/Spar - entirely re-estimated, mainly to Production Drawings.	
+	57.64	I/W Dorsal Fairing - New report was included with Wing Fairings below. Complete re-estimate to Schemes, previous allowance was 45 lb., hence actual increase	+ 12.64

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Wing:

+	99.81	Transport Joint I/W to O/W - Previously titled Wing Fairings	
		Aileron Link fairings now called up	
		with Aileron Marry-up (see below)	- 16.80
		Delete Fairings at Dorsal area (see	
		above)	- 45.00
		Complete re-estimate of Transport	
		Joint	- 143.61
		Fairing at Joint - previous allowance	
		too low	+ 18.00
			<hr/>
			+ 99.81
★ It should be noted here that 71.10 lb butt straps were			
allowed on Rib.# 12 O/Wing (now deleted - see below) also			
121.0 lb on Wing Joints (see above) hence actual decrease			
of -48.49 lb on complete Transport Joint.			
-	69.54	O/W Rib.# 12 - Delete butt straps and hardware now included	
		in Transport Joint (see above)	- 71.10
		Miscellaneous Changes to Production	
		Drawings.	+ 1.56
			<hr/>
			- 69.54
+	125.21	O/W Skins - Completely re-estimated to Production Drawings	
		Addition of stringers (see below)	+ 104.52
		Addition of Attach. to ribs (see	
		also O/W Ribs.)	+ 13.90
		Addition of Hoist fittings	+ 2.32
		Correction to D.O. errors in hardware	
		call up etc.	+ 4.47
			<hr/>
			+ 125.21
-	100.27	O/W Posts & Intercostals - this report used to contain	
		stringers now called up with skins	
		Removal of Stringers (see above)	- 97.85
		Re-estimate of Posts	- 1.15
		Re-estimate of Intercostals	- 1.27
			<hr/>
			- 100.27
-	11.68	O/W Ribs - Drawings checked to latest Production Issues.	+ 12.68
		Removal of Aileron Jack fitting	
		(see below)	- 10.46
		Skin Attach. now with skins	- 13.90
			<hr/>
			- 11.68

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WEIGHT CHANGES

Wing:

+	10.46	Aileron Jack Fitting - New report was previously included with Ribs (see above)	
+	34.56	O/W Leading Edge - Marry-Up to F/Spar omitted Estimated entirely to Production Drawings, previous estimate to early schemes	+ 4.59 + 29.97 <hr/> + 34.56
-	14.18	O/W Aileron Control Box - completely checked to Production Drawings, too high an allowance was previously made for stiffeners and hardware.	
+	5.24	O/W Spars - Spar joints to Rib # 12 omitted Production Drawing estimate of Main Spar Production Drawing estimate of C/Spar fwd. Decrease in caps of F/Spar Production drawing estimate of C/Spar aft. Rear Spar hardware allowance etc. too low	+ 3.20 - 6.82 + 4.36 - 2.89 + 1.78 + 5.61 <hr/> + 5.24
+	5.96	Aileron - Completely checked, skins were underestimated, many actual weights of parts etc. Marry-up bolts now included separately	+ 14.92 - 8.86 <hr/> + 5.96
+	32.93	Aileron Marry-Up - New report includes all bolts and fairings above allowances for which were too low	
+	514.83		

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WEIGHT CHANGES

Fin & Rudder

+	4.22	Fin - Changes to jacking supports and provision for rudder feel and trim	+	5.87
		Miscellaneous change to Production Drawings	-	1.65
			+	4.22

4.22

Front Fuselage (Fwd. Sta. 255")

+	7.14	Pilot's Canopy - Detailed estimate to Production Drawings of Canopy and attachments - previously some schemes used.		
+	3.47	Navigator's Canopy - Installation of attach. bolts to longerons.		
+	0.41	Windscreen - details of installation		
+	10.51	Canopy Arches - Entirely re-estimated to Production Drawings.		
		Addition of steam outlets	+	3.00
		Addition of switch box	+	0.49
		Detailed estimate of hardware	+	3.39
		Alterations to some gauges of stiffeners etc.	+	3.63
			+	10.51
+	4.95	Formers F.F. - General revisions to angles, doublers etc. on re-issued Production Drawings		
+	5.54	Bulkhead Sta. 255 - Production Drawing estimate including slinging fittings (see also Centre Fuselage)		
+	110.05	Intake Ramp - Fwd. of Sta. 201" Structure has been entirely redesigned due to un- satisfactory boundary layer bleed etc.		
-	3.69	Nose U/C Structure - Pivot bolts etc. for assy. of U/C to structure now with U/C see Landing Gear Group.		
+	14.80	Lower Longerons - Many small design changes to Production Drawings since last scheme estimate was made.		
		Lower Longeron Left Hand	+	7.74
		Lower Longeron Right Hand	+	7.06
+	153.18		+	14.80

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WEIGHT CHANGES

Centre Fuselage (Sta. 225-485)

-	9.57	Slinging Fittings - These should not have been included in the C. F. since they are part of Bulkhead Sta 255" assy. F.F. and are now included there.	
-	2.02	Radar Access Door - General re-estimate to Production Drawings. Reduction in weight of fastener allowance, Kaylocks replace AN Nuts etc.	
-	2.26	Duct C.F. - Actual weights of Production Aircraft ducts were obtained.	
+	3.45	Formers - Misc. minor Production Drawing changes.	
+	0.79	Sealing Missile Bay - Production Drawing estimate	
-	7.95	Integral Fuselage Tank - Dorsal Angles and Buttstraps. now called up on C.F. Skins	- 13.32
		Addition of Toggle attach. Stiffeners	+ 2.58
		Misc. Production Drawing changes	+ 2.79
			<hr/> - 7.95
+	0.60	Dorsal Deflector - Shield estimate to Production Drawings	+ 3.19
		Fuse. attach. now with skins	- 2.59
			<hr/> + 0.60
+	79.89	C. F. Skins - Completely re-estimated to Production Drawings	
		Stringers now called up on skins (see below)	+ 51.73
		Skins 469" Aft .04 Al. were Mg.	+ 2.31
		Addition of Access Door Aft Sta. 458"	+ 2.15
		Addition of Wing Side Rib Sealing Clips etc.	+ 2.47
		Addition of Dorsal Angle, Longerons etc. (see C.F. Tank)	+ 13.32
		Addition of Steel insert aft end	+ 0.74
		Sta. 469", alterations to splices etc.	+ 7.17
			<hr/> + 79.89
-	51.73	Stringers C.F. - Report deleted, now called up with C.F. Skins (see above)	
-	0.49	Dorsal 268" - 317" - Mostly to Production Drawings, redesign of aft end.	
-	1.49	Dorsal Fairings over Fuel Tank - Production Drawing estimates	
		Weight changes due to refinement.	

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Centre Fuselage (Cont'd.)

+	2.13	Equipment Bay Structure - Access Door added on I/Skin	+	0.38
		Addition of cross Strut Sta. 292"	+	1.33
		Addition of Turbine Mounting Brkt.	+	0.42
			+	2.13
-	4.38	Longerons C.F. - Production Drawing estimates		
		Alterations to End Fittings Top		
		Outer Longeron	+	0.82
		Deletion of hardware allowance		
		on Lower Longerons - hardware		
		called up on Skins	-	5.20
			-	4.38
+	3.64	Armament Bay Roof - added equipment, brackets etc.	+	2.40
		Minor alterations to floor	+	1.24
			+	3.64
+	4.20	Structure below Lower Longeron - Production Drawing		
		estimates of panels in Radar Bay		
		many small changes		
+	1.45	Bulkhead Sta. 485" ★ - Revision to re-issue of Production		
		Drawings	+	3.52
		Stabilizers at Stringers # 13 & 15		
		now on Skins	-	2.07
			+	1.45
+	16.26	★ Although Bulkhead Sta. 485" was previously always		
		considered to be in the C.F. for the Weights Component		
		breakdown, in Summaries up to Issue 26 the Bulkhead was		
		included with the Duct Bay at Stress Office request.		
		Now, however, it will be transferred to the C.F. as it		
		is called up and assembled with this component. This		
		results in a further apparent increase in the C.F. of		
		+ 109.84 lb and a corresponding decrease of -109.84 lb		
		in the Aft Fuselage - in the Weight and C.G. Summary		
		only.		

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Aft. Fuselage (Sta. 255" Aft.)

+	7.26	Longerons D.B. - Production Drawing estimate, alterations to extrusion since last estimate	+	4.74
		.072" thick plate has been widened	+	0.58
		Detailed estimate of hardware	+	1.94
			+	7.26
+	0.21	Dive Brake Accommodations - Addition of Mounting Brackets to decking.		
+	1.96	Dive Brakes - Re-estimate of main lever and bushing		
-	0.16	Longitudinal Beams D.B. - Re-issue Production Drawings fore and aft beam		
+	2.13	Mounting Brackets Side Panels D.B. - new report to cover misc. mounting brackets for Air-Conditioning etc.		
-	5.00	Stringers D.B. - This allowance is now absorbed in the lower panel assy. Weight.		
-	24.37	Skin D.B. - Lower Panels removed and included with lower panel assy.	-	25.64
		Misc. changes due to detailed information	+	1.27
			-	24.37
-	69.99	Formers D.B. - Now side members only, for convenience all lower beams and formers are now included in a separate report		
+	76.06	Formers Lower Panel D.B. - New report, these formers include some items previously designated on schemes as heat exchanger mountings. Actual increase in formers (20 off) is	+	22.39
+	62.85	Lower Panel D.B. - New report to include all mounting brackets, intercostals, diaphs. etc.		
		Addition of equipment mounting brackets	+	3.14
		Redesign of heat exchanger assy.	+	8.39
		Diaphragms, intercostals, stiff.etc.	+	6.95
		Actual Increase	+	18.48

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WEIGHT CHANGES

Aft. Fuselage (Cont'd)

+	60.83	Duct D.B. - Production Drawing estimates have now been made, incorporating many design changes.	
		.051" Al. aft skin now spliced at Sta. 540.2" was at Sta. 545.35	+ 2.04
		Addition Splice ring & packing at 540.2"	+ 4.00
		Splice Strap at Sta. 510.4 .04 Al. was .032"	+ 0.47
		Gill Doors redesigned	+ 12.34
		Attach. struts heavier fork ends etc.	+ 4.80
		Side Torque boxes and attach. beams - redesign end fittings, pick-ups etc.	+ 14.37
		Pressure Seal - increase in brackets, retainer CSE772 was CSE639, extruded lower seal added etc.	+ 6.08
		Addition of Spring Retainers for Door	+ 0.91
		Addition of Stiffs. near side torque boxes	+ 1.62
		Redesign of aft Torque Box - larger cross section etc.	+ 8.92
		Increase in number of diaphs; gussets added etc.	+ 5.28
			<u>+ 60.83</u>
+	4.55	Longerons E.B. - Estimated now to Production Drawings previous estimate made to incomplete information on splice plates, finger plates etc.	+ 6.55
		Delete hardware allowance now with skins	- 2.00
			<u>+ 4.55</u>
+	0.07	Top Longerons E.B. - Production Drawing estimate	
+	27.66	Torsion Box E.B. - Some redesign, estimates now made to Production Drawings; the previous allowance made was too low.	

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Aft Fuselage (Cont'd.)

+	15.14	Service Access Doors E.B. - Production Drawing estimates	
		No. 4 panel increased in size	+ 3.49
		Beam I/B Longerons omitted	+ 2.32
		Increase in hinges etc, some now called up here that were with Engine Doors	+ 4.55
		Estimate of structure for Doors # 3 & 4 (includes 4.49 lb of structure at press vents # 7 & 8 See also Tunnel)	+ 4.78
			<u>+ 15.14</u>
+	56.42	Engine Access Doors E.B. - Engine Access Doors # 1 & 2 have been completely redesigned at R.C.A.F's request.	
		Engine Door # 1	+ 34.00
		Engine Door # 2	+ 23.80
		Surround Structure Door # 1	+ 4.00
		Hinges now with Torsion boxes etc.	- 5.38
			<u>+ 56.42</u>
+	6.48	Light Formers E.B. - Production Drawing estimates of formers	+ 4.68
		Splices at Longerons now included	+ 1.80
			<u>+ 6.48</u>
+	58.08	Skins E.B. - Completely estimated to Production Drawings	
		Skin splices & Manifold access hole added	+ 8.61
		Skins - more details cut-outs etc.	- 2.87
		Hardware allowance was too low	+ 11.54
		Pressure Vents added here (see Tunnel)	+ 21.56
		Engine Mounting Access Doors (See Intermediate Formers)	+ 8.77
		Air Bleed Outlet (see Tunnel)	+ 6.97
		Misc. Production Drawing changes	+ 3.50
			<u>+ 58.08</u>
+	11.76	Intermediate Formers E.B. - Redesign and re-estimate of formers 712.34, 717.36 & 663.65	
		Webs .064 were .04, lower booms .125 were .064 etc.	+ 16.59
		Wing Attach. Brackets 712.3 & 717.3 now called up with Engine Mtg. Access Door (see skins)	- 4.83
			<u>+ 11.76</u>

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Aft. Fuselage (Cont'd.)

+	6.85	Longitudinal Members E.B. - Production Drawing estimates - this item was duplicated in the Tunnel report and allowance in this report of 4.19 lb was outdated (now deleted from Tunnel)		
+	23.48	Heavy Formers E.B. - Production Drawing estimates I/B Rail Supports called up on former drawings	★	+ 13.27
		O/B Rail Supports called up on former drawings	★	+ 3.94
		Redesign & Misc. changes to Production Drawings		+ 6.27
				<u>+ 23.48</u>
		★ See also Power Plant Group		
+	9.12	Misc. Structure E.B. - Items of structure on G.A.'s not readily assigned to existing reports, mounting brackets etc.		
-	2.30	Engine Tunnel E.B. - Completely estimated to Production Drawings.		
		Increased gauges lower shroud		+ 13.77
		Insulation - more details - lighter fasteners		- 10.08
		Airflow restrictor - cover .025 was .032		- 1.86
		Engine Firewall		+ 1.55
		Beam Shroud Att. O/B some gauges .064 were .04 etc.		+ 3.48
		Delete Longitudinal Supports (duplicated above)		- 10.54
		Pressure Vents etc. partially in Skins (actual increase per A/C + 10.21)		- 14.43
		Angle - seal attach. Sta. 742.5 added		+ 3.65
		Misc. Production Drawing changes hardware etc.		+ 12.16
				<u>- 2.30</u>
+	1.38	Formers Fixed R.F - Former Sta. 803 redesigned		+ 3.77
		Production Drawing estimates of Formers 753, 783, 788, 793 & 798		- 2.39
				<u>+ 1.38</u>

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Aft. Fuselage (Cont'd.)

- + 1.30 Tunnel Fixed R.F. - Addition of stops on I/B Rail
- + 15.18 Nacelles R.F. - Completely estimated to Production Drawings incorporating some design changes and increases in former gauges since last scheme drawing estimates were made.

+ 346.95

Landing Gear Group:

- + 103.38 Main Undercarriage - Wheels increase in Weight (Goodyear) + 7.60
Dowty Increase in leg Assy. + 86.50
Actual Weight Dowty parts by
Avro resulted in further in-crease + 9.28
+ 103.38
 - 284.84 Main U/C Hydraulics - now included with Main Hydraulic System - see Equip. Group
 - + 7.04 Main U/C Doors & Fairings - Completely re-estimated to Production Drawings
 - + 18.34 Nose U/C - Actual Weights of Jarry supplied parts + 10.55
Actual Weight of Dowty liquid spring assy. + 3.13
Pivot added- previously included in the basic structure + 4.66
+ 18.34
 - 1.38 Nose U/C Door and Fairing - Fairing links now with U/C Redesign of Fairing end - 0.84
Door addition of angles etc. - 0.44
Jack pick-up fitting on door + 0.90
- 1.00
- 1.38
 - 99.55 Nose U/C Hydraulics - now included with Hydraulic Main System - see Equip. Group
-
- 257.01

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Interim Power Plant

Report # 7-0400-05
Sheet # 002-14 Issue 27
Prepared By: K. Griffin
Checked By: E. Burnett

UNCLASSIFIED
NON CLASSIFIED

WEIGHT CHANGES TO 7-0400-05 ISSUE 26
of May 1st, 1958

WEIGHT CHANGES

Power Plant & Services

+	87.06	Accessories Gear Box Fuselage - There has been a considerable increase in weights supplied by Sargent, previously 150 lb was allowed for the engine installation - this report now contains only that part mounted on the fuselage (237.06 lb). Deareator tanks (6 lb) have been transferred from Oil & Hydraulic Fluid Cooling report.	
+	98.18	Gear Boxes & Starters on Engine - This report previously only contained the Starters now includes that part of the Gear Boxes which is mounted on the Engine (includes re-estimate of piping for Drives 10 lb was previously allowed on Engine)	
-	77.30	Engine Mounts - Items included on Engine now in a separate report (see below)	- 55.53
		Duplication of rail aft Sta. 742.5 also included in R.F. Tunnel assy.	- 9.60
		Rail Supports now on Heavy Formers (see also Structure Sta. 485" Aft)	- 13.02
		Production Drawing estimates	+ 0.85
			- 77.30
+	50.42	Engine Mounting Accessories - new report - see above completely re-estimated.	
		Housing assy. centre fitting redesign	+ 3.36
		Engine Brackets (4) gauge decreases	- 1.93
		Bearings - type changed	- 3.57
		Roller bolts etc. more details	- 2.97
		Actual change	- 5.11
+	2.27	Engine Anti-icing - Ice detectors & wiring are included in electrics	- 5.00
		Production Drawing estimates of Fairings	+ 4.19
		Production Drawing estimates of Struts	+ 3.08
			+ 2.27

continued.

Date: December 1st, 1956
Aircraft: C-105 With J75
P.5 Engines as
Interim Power Plant

Report # 7-0400-05
Sheet # 002-15 Issue 27
Prepared By: K. Griffin
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WEIGHT CHANGES TO 7-0400-05 Issue 26
of May 1st 1956

WEIGHT CHANGES

Power Plant & Services (Cont'd.)

+	152.38	Engine Service Accessories - New report for recording convenience including drives, pipes etc.	
		Oil Breather pipe - no allowance	+ 2.14
		Nozzle Air Ejection primary no allow.	+ 14.25
		Systems disconnect bracket and cover	+ 3.47
		Alternator Drives (4.5 lb Oil now in Operational Load, 10 lb piping in Engine Gear Boxes (see above))	- 14.50
		Actual change	+ 5.36
-	127.85	Engines - Constant Speed Drives now in Engine Accessories (see above)	- 138.50
		Addition of Pressure Oil Filler liners were previously installed by Pratt & Whitney	+ 4.80
		Lower Engine Can attachment - re-design etc.	+ 5.85
		Engine Can - increase in stiff. gauges etc.	+ 9.46
		Adaptor Ring - Skin decrease .04 to .032 etc.	- 3.30
		Thermocouples - inclusive with Engine Weight	- 10.00
		Heat Exchanger Exhaust Duct - now part of Engine Assy. was with Oil & Hydraulic Fluid Cooling (see Equip. Group)	+ 6.07
		Brackets Fire Can Support - no allowance	+ 2.52
		Fairing - Production Drawing Estimate	+ 0.38
		Oil Filler & Pressure Switch - with accessories (see above)	- 8.52
		Misc. changes packing etc.	- 0.39
		Air-Bleed outlet - that part of assy. on Engine added, was previously on Tunnel	+ 3.78
			- 127.85
+	78.49	Fuel System - Addition of Heat Exchanger & Control Valves (see Oil & Hydraulic Fluid Cooling)	+ 70.90
		Addition of Mtg. Casting for H/Exch.	+ 6.90
		Revised Weight of Fuselage Bag Tanks	+ 11.32
		Capacitor Units - actual weights	+ 2.05
		Condensate drains - revised estimate	+ 1.47
		Piping etc. excluding H/Exch. inst.	- 15.31
		Piping etc. H/Exch. inst. added (22.5 lb. was allowed in Oil & Hyd. Fluid Cooling - equip.)	+ 7.09
		Flow Proportioners Unit - Mnfg. & Spec Wts	- 5.93
+	263.65		+ 78.49

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WEIGHT CHANGES TO 7-0400-05 ISSUE 26
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WEIGHT CHANGES

Flying Controls Group

+	65.00	Mechanical Flying Controls - Steel links replace Al. links for Elevator, Aileron & Rudder controls, due to difficulties encountered with bearings & expansion problems.	
-	41.00	Dive Brake Hydraulics - deleted from this group, now Integral part of Utilities System (see Equip.)	
-	12.01	F/C Hydraulics I/Wing - Elevator jacks, previous estimate was based on prototype jacks General piping changes etc.	- 10.98 - 1.03 - 12.01
-	4.07	Rudder Hydraulics - Jack support bracket with Fin Jack & Linkage - actual weight Piping etc. - Production Drawing estimate	- 3.76 + 2.58 - 2.89 - 4.07
-	16.20	F/C Hydraulics O/Wing - Aileron jack attach. bracket duplicated - already in O/W Structure Filters & fluid - too high allowance Jacks - actual weight Misc. re-estimate to Production Drawings	- 7.25 - 5.12 - 2.48 - 1.35 - 16.20
+	63.79	F/C Hydraulics Main System - Heat Exchangers added were with Oil & Hydraulic Fluid Cooling equip. group. Filters - Actual weights, allowance too low Ground Service Connectors - Actual Weight Pumps, compensators etc. Spec. Weights of Servos incorp. Miscellaneous changes added piping D.B., flex hose replaces Al. tube etc. etc.	+ 11.30 + 15.22 + 3.78 + 4.77 + 3.50 + 25.22 + 63.79
-	108.00	Auto Pilot & Tie-in - Forms an integral part of the R.C.A. System and will in future be considered part of the Equipment Group see note * in that Section.	

- 52.49

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WEIGHT CHANGES TO 7-0400-05 ISSUE 26
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WEIGHT CHANGES

Equipment Group

+	3.22	Intake De-icing - Increase due to redesign of Intake Ramp.	
-	0.16	Oxygen System - Converter - Manufacturer's Weight	+ 2.50
		Addition Manual Controls on Seat	+ 0.92
		Piping etc. on seats	- 0.58
		General piping re-estimates	- 3.00
			<u>- 0.16</u>
+	20.00	Alternator System - This is a 30KVA system, the weight increase is due to addition of an emergency pack.	
+	7.61	Canopy Actuation - Actual Weight of Martin Baker Jacks	+ 1.75
		Actual Weight of Sequence Valves	+ 0.94
		Plumbing now Steel was Al. & flexible tubing.	+ 2.42
		Miscellaneous changes links re-place shock absorbers etc.	+ 0.15
		Addition of Emergency Operation	+ 2.35
			<u>+ 7.61</u>
+	3.78	Windscreen De-misting - re-estimated, increase mostly due to cable weights.	
-	12.30	Fin Pitot System - Weights now included in Fin Structure and low pressure pneumatics.	
+	22.41	L. P. Pneumatics - addition of Pressure Ratio Transducers	+ 15.68
		Addition of Diff. Pressure Switch	+ 2.41
		Addition of Pitot lines, fin etc.	+ 7.28
		Cockpit windscreen press. seal pipes removed.	- 2.96
			<u>+ 22.41</u>
+	4.93	Air Conditioning - Stress approved Schemes of Exhaust ducts now estimated.	
-	108.00	Oil & Hydraulic Fluid Cooling - Various items are being called up with their respective systems and are removed from this report.	
		Fuel Oil Exchangers now in Fuel System	- 26.00
		Control Valves now in Fuel System	- 13.30
		Oil in Exchangers now in Op. Load	- 20.25
		Deareator tanks - see Engine Group	- 6.00

continued.

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WEIGHT CHANGES TO 7-0400-05 ISSUE 26
of May 18, 1956

WEIGHT CHANGES

Equipment Group(Cont'd.)

Oil & Hydraulic Fluid Cooling (Cont'd.)

H/Exchanger Mounting allowance - see
D. B. Structure = 2.90
H/Exchanger Ducts - see Engine Group = 5.00
4 Air Oil Exchangers now with
Flying Control Hydraulics & Main
System, allowances were however too
low and remaining 4 show an increase
in weight over previous allowance
for 8 + 0.60
Piping Mountings etc. absorbed in
various other reports = 35.15
= 108.00

- 231.00 Utility Hydraulics - This report is deleted and a new set of reports instituted (see below) incorporate Dive Brakes, Main & Nose U/C Hydraulics as an integral part of Main Utilities System.
- + 85.35 Utility Hydraulics F.F. - New report see Introduction for explanation of weight changes (see also Landing Gear Group)
- + 43.33 Utility Hydraulics C.F. - New report - See above
- + 228.29 Utility Hydraulics D.B. - New report - See above
- + 73.28 Utility Hydraulics E.B. - New report - See above
- + 158.11 Utility Hydraulics I/Wing - New report - See above

★ A Weight Breakdown has now been received from R.C.A. quoting preliminary weights of the Astra I System. This will merely be sub-divided into fixed and removable equipment - no attempt will be made at this stage to further sub-divide into various sub-systems, except for the Missile Auxiliaries to be housed within the Sparrow package, hence the following cancellation of detailed Radar reports temporarily until more information is available.

- + 1,078.60 Radio & Radar Removable - incorporates all units for the entire R.C.A. Astra I System, except the Missile Auxiliaries in the Missile Package.

continued.

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WEIGHT CHANGES TO 7-0400-05 ISSUE 26
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WEIGHT CHANGES

Equipment Group(Cont'd.)

+ 62.94 Radio & Radar Fixed - Based on the weight breakdown from
R.C.A. there is a weight decrease of - 55.41
Addition of Antennae not included
in R.C.A. weight + 118.35
+ 62.94

- 329.00 Radar Power Supplies - Report deleted - see note ★ above

- 48.00 Radio Removable - Report deleted - see note ★ above

- 15.00 Interphone - Report deleted - see note ★ above

- 65.20 ARN 6 Compass - Report deleted - see note ★ above

- 119.70 I.F.F. - Report deleted - see note ★ above

- 70.00 OMNI=DME - Report deleted - see note ★ above

- 68.00 Data Link - Report deleted - see note ★ above

- 15.50 Flare-out Altimeter - Report deleted - see note ★ above

- 48.00 Electronic Missile Control - Report deleted - see note ★ above

+ 3.14 Electrics for Sparrow Pack - New report for circuits in
the Aircraft to the pack discon-
nects and pertaining to it.

- 50.00 Sparrow Pack Structure - Completely re-estimated, pre-
viously only an allowance was made
(Pack sealing absorbs 106 lb of the
weight included here)

+ 300.32 Sparrow Pack Mechanisms - entirely re-estimated, previous
figure was known to be unrealistic
and was based on 60" launchers etc.,
these are now 150" long and mechanism
has been entirely redesigned.

- 155.46 Sparrow Pack Hydraulics - System completely redesigned since
last estimate made. Previous system
included 2 accumulators at 100 lb
each that are now obsolete etc.

+ 64.10 Sparrow Pack Electrics - New report for switches, relays,
cable etc. installed within the pack.

Continued.

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WEIGHT CHANGES

Equipment Group (Cont'd.)

+ 128.00 Sparrow Pack Electronics - R.C.A. propose to house 178 lb of Missile auxiliaries & installation within the pack, previously only 50 lb of cable was allowed here.

+ 100.00 Surface Finish - 1 coat etch primer, 1 coat chromate primer and 2 coats finish, plus allowance for skin filler.

+ 1,052.09

Operational Load:

+ 34.02 Oil Usable - The trapped and usable oil for the Engine Oil System and the Gear Box Oil System has been completely re-estimated. Only allowances were previously carried, some in Oil Hydraulic Fluid Cooling (Equip. Group) some in Engine Installation with Drives (Engine Group) etc. Weight removed from other groups 34.50 lb.

+ 11.29 Oil Trapped - See note above. Weight change per Aircraft for Total Oil System = $(34.02 + 11.29 - 34.50 = + 10.81 \text{ lb.})$

+ 125.00 Water For Air-Conditioning - Now a requirement for all missions. Figure quoted is for Mach. 2.

+ 170.31

+ 2,211.99 TOTAL WEIGHT CHANGES