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ENGINEERING REPORT NO.

R107B-004

SUBJECT

MASS MOMENTS OF INERTIA CALCULATIONS

RESTRICTED

MODEL: XC-120



FAIRCHILD AIRCRAFT

Division of
FAIRCHILD ENGINE & AIRPLANE CORPORATION
HAGERSTOWN, MARYLAND

Date: 6 May 1948

Prepared By

J. W. O. Baker

No. Pages: 45 (PART I)
21 (PART II)
5 (PART III)
5 (PART IV)

Checked By

Approved By

C. F. Constock

REVISIONS

Date	Pages Affected	By	Remarks
2/14/49	All pages.	J.W.O.Baker	PART I completely revised.
2/14/49	All pages.	J. Myers	PART II completely revised.
2/14/49	All pages.	J.W.O.Baker	PART III completely revised.
2/14/49	Pages 72, 73, 74, 75, 76	J.W.O.Baker	PART IV Added.

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Subject: MASS MOMENTS OF INERTIA CALCULATIONS		APPROVED BY _____ DATE 6 May 1948 REVISED 9 July 1948 21 July 1948 14 Feb 1949
RESTRICTED		
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Subject:— MASS MOMENTS OF INERTIA CALCULATIONS				DATE: 6 May 1948 REVISED: 14 Feb 1949			

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P R E F A C E

The purpose of this report is to give a preliminary figure for the Mass Moments of Inertia for airplane model XC-120 to agree with Specification R107-000A.

The airplane was assumed to be composed of six sections. The Outer Wing Panel; the Center Wing Section; the Engine Section, the Nacelle and Boom, which includes the propeller, engine, landing gear, and vertical tail; the Detachable Fuselage; Crew Nacelle; and the Horizontal Tail.

Each section is accompanied by a diagram showing the distributed loads in lbs. per linear inch and concentrated loads shown by arrows. In addition, the distributed and concentrated load center of gravities are shown on either a plan or profile view.

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FAIRCHILD ENGINE AND AIRPLANE CORP., FAIRCHILD AIRCRAFT
DIV., HAGERSTOWN, MD. (ENGINEERING REPORT NO. R107B-004)

MASS MOMENTS OF INERTIA CALCULATIONS - MODEL XC-120

J.W. O. BAKER; J. MYERS; HAWLEY AND OTHERS 6 MAY'48 {
(REVISIONS 20 MARCH'50) 90PP. DIAGRS

STRUCTURES (7)
DESIGN AND DETAILS (3)

AIRPLANES - MOMENTS OF INERTIA
AIRPLANES, CARGO
C-120

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MODEL XC-120

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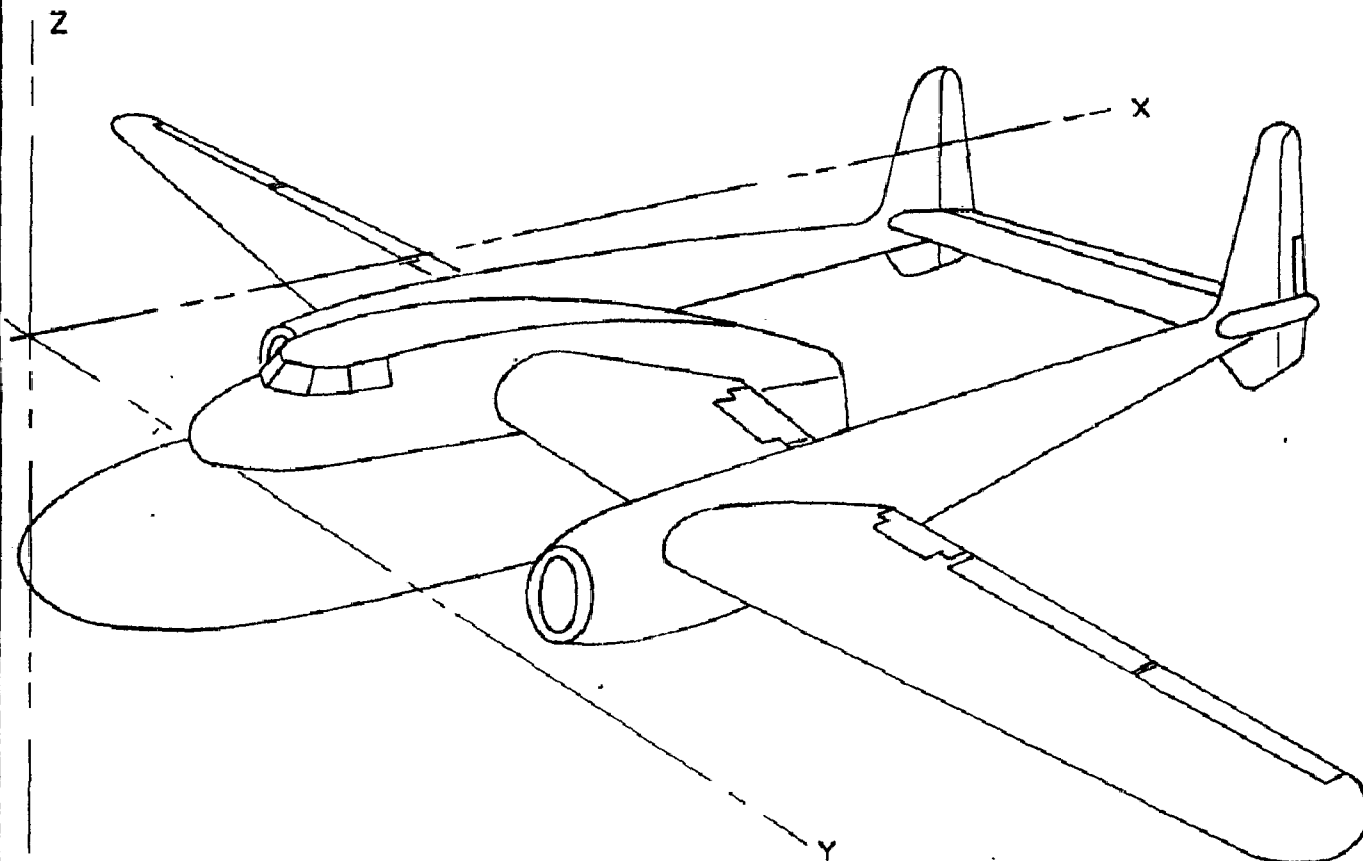
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REFERENCE DATA

X-Axis = Parallel to $\bar{C}$ Fuselage and 172.2" above thrust line.

Y-Axis = Parallel to 40% chord and 370 ahead.

Z-Axis = Perpendicular to $\bar{C}$ Fuselage 370 inches ahead of 40% chord.

Distance along Y-Axis noted as Y positive left.

Distance along X-Axis noted as X positive aft.

Distance along Z-Axis noted as Z positive down.

I Values given in lb. $\overline{\text{in}}^2$.

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Subject: <u>MASS MOMENTS OF INERTIA CALCULATIONS</u>						DATE	<u>6 May 1948</u>
						REVISED	<u>14 February 1949</u>

WEIGHT DISTRIBUTION

(A-)	Items in Outer Panel
(B-)	Items in Center Section
(C-)	Items in Boom and Vertical Tail
(D-)	Items in Nacelle and Engine Section
(E-)	Items in Detachable Fuselage
(F-)	Items in Detachable Fuselage
(G-)	Items in Horizontal Tail
(H-)	Items in Crew Nacelle
(J-)	Items in Crew Nacelle

(1) Wing - C.S. = 3723.7

B-1	= 2335.5
B-2	= 52.7
B-3	= 98.8
B-4	= 58.8
B-5	= 43.5
B-6	= 775.8
B-7	= 9.9
B-8	= 7.5
B-9	= 82.6
B-10	= 30.0
B-11	= 122.6
B-12	= 106.0

(2) Wing - O.P. = 2769.5

A-1	= 1972.8
A-3, 4A, & 4B	= 20.9
A-5	= 97.7
A-6	= 400.8
A-7	= 70.2
A-8	= 155.8
A-22	= 51.3

(3) Tips

A-2	= 72.0	= 72.0
-----	--------	--------

(4) Ailerons

A-3	= 65.6	= 212.2
A-4A	= 79.6	
A-4B	= 67.0	

(5) Flaps

A-22	= 86.9	= 171.5
B-2	= 84.6	

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<u>WEIGHT DISTRIBUTION</u>						
(6)	Stabilizer - Main					
	G-2	=	444.4	=	444.4	
(7)	Stabilizer - Tips					
	G-1	=	71.3	=	71.3	
(8)	Elevator					
	G-3	=	209.5	=	209.5	
(9)	Fins					
	C-4	=	203.0	=	203.0	
(10)	Rudders					
	C-3	=	161.2	=	161.2	
(11)	Detachable Fuselage					
	F-1 to F-18	=	4820.1	=	4820.1	
(12)	Crew Nacelle					
	H-1 to H-18	=	2372.1	=	2372.1	
(13)	Booms					
	C-1	=	180.0	=	955.4	
	C-2	=	755.4			
(14)	Main Landing Gear					
	B-17	=	495.2	=	4034.3	
	D-24	=	1370.4			
	D-25	=	1292.0			
	D-26	=	289.2			
	D-27	=	375.6			
	D-28	=	34.6			
	J-1	=	177.3			
(15)	Auxiliary Gear - Bwd.					
	D-33	=	310.0	=	1421.6	
	D-34	=	269.6			
	D-35	=	240.0			
	D-36	=	90.0			
	D-37	=	270.0			
	D-38	=	242.0			

MODEL XC-120

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DATE 6 May 1948

REVISED 14 Feb. 1949

WEIGHT DISTRIBUTION

(16) Nacelle
D-1 to D-11 = 3213.0 = 3213.0

(17) Engine
D-12 = 7066.0 = 7066.0

(18) Engine Accessories
B-13 = 60.0
D-13 = 354.2
D-15 = 50.3
D-16 = 16.0
D-14 = 25.4 = 505.9

(19) Power Plant Controls
B-14 = 12.0
J-2 = 64.2
J-3 = 28.6 = 104.8

(20) Propeller and Controls
D-17 = 1320.0
D-18 = 37.8
J-4 = 7.0
J-5 = 25.0
J-6 = 42.4
J-7 = 3.8 = 1436.0

(21) Starting System
D-19 = 56.0 = 56.0

(22) Lubricating System
D-20 = 203.3
D-21 = 112.3
D-22 = 152.3 = 467.9

(23) Fuel System
A-12 = 245.0
B-18 = 126.3
D-23 = 160.3 = 531.6

(24) Instruments
A-23 = 6.0
A-24 = 6.0
B-19 = 6.0
D-32 = 21.8
J-8 = 77.2 = 196.5

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Subject: <u>MASS MOMENTS OF INERTIA CALCULATIONS</u>			DATE <u>6 May 1948</u> REVISED <u>14 Feb. 1949</u>		
<u>WEIGHT DISTRIBUTION</u>					
(24) Instruments (cont'd.)					
J-9	=	0			
J-10	=	54.7			
J-11	=	24.8			
(25) Surface Controls					
A-9	=	21.7		=	944.7
A-10	=	50.0			
A-11	=	5.5			
B-15	=	38.4			
G-4	=	38.0			
C-7 to C-12	=	92.7			
J-12 to J-19	=	698.4			
(26) Electrical					
B-16	=	53.8		=	874.6
D-29	=	92.0			27.1
D-31	=	53.5			<u>901.7</u>
E-1	=	27.1			
J-20 to J-27	=	675.3			
(27) Communicating					
A-13	=	11.2		=	818.7
E-2	=	4.5			4.5
J-28 to J-30	=	807.5			<u>823.2</u>
(28) Furnishings - Personnel Accom.					
J-31 to J-40	=	401.6		=	401.6
(29) Furnishings - Emergency Accom.					
D-30	=	89.7		=	223.3
J-41 to J-44	=	133.6			8.8
E-7	=	8.8			<u>232.1</u>
(30) Furnishings - Prov. For Flight					
E-3	=	182.6		=	184.8
E-4	=	56.4			260.7
E-5	=	2.0			<u>455.5</u>
E-6	=	19.7			
J-45 to J-48	=	184.8			

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Subject: MASS MOMENTS OF INERTIA CALCULATIONS			DATE 6 May 1948 REVISED 14 Feb. 1949			
<u>WEIGHT DISTRIBUTION</u>						
(31) Furnishings - Air Conditioning Equip.				=	212.0	
J-49	=	212.0				
(32) Anti-Icing Equipment				=	704.4	
B-20	=	42.0				
B-21	=	50.0				
C-5	=	33.4				
C-6	=	24.0				
J-50	=	331.5				
J-51	=	223.5				
(33) Acc. Power Plant				=	162.0	
J-52	=	162.0				
(34) Hoisting Mechanism	=	418.3		=	418.3	
(35) TOTAL W.E. less Detachable Fuse.				=	35,343.8	
"A" Items	=	3,486.0				
"B" Items	=	4,692.0				
"C" Items	=	1,469.7				
"D" Items	=	17,807.3				
"G" Items	=	763.2				
"H" Items	=	2,372.1				
"J" Items	=	4,753.5				
(36) TOTAL W.E. Detachable Fuse.				=	5,121.2	
"E" Items	=	301.1				
"F" Items	=	4,820.1				
(37) TOTAL W.E.				=	40,465.0	

MODEL XC-120

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OUTBOARD PANEL,AILERONS,
OUT'B. FLAPS, TIPS & EQUIPMENT

The following weights were considered:

(A-1) Bending Material consisting of -

Front Spar	=	425.4		
Rear Spar	"	186.2		
Stringers	"	131.1		
Covering	"	1066.6		
Tank Covers	"	75.3		
Rivets, etc.	"	79.8		
Inspection Doors	"	5.8		
Handling Bolts	"	2.6		
		1972.8	x 1/2	= 986.4

(A-2) Tips 72.0 x 1/2 = 36.0

(A-3) Outboard Ailerons

End Reaction	= 3/16 x 65.6	= 12.3		
Fitting	= 1/6 x 20.9	= 3.5		
Inboard		= 15.8	x 1/2	= 7.9
Outboard		= 15.8	x 1/2	= 7.9
Center Reaction	= 5/8 x 65.6	= 41.0		
Fitting	= 1/6 x 20.9	= 3.5		
		44.5	x 1/2	= 22.3

(A-4A) Rt. Inboard Aileron

End Reaction	= 3/16 x 79.6	= 14.9		
Fitting	= 1/12 x 20.9	= 1.7		
Inboard		= 16.6		= 16.6
Outboard				= 16.6
Center Reaction	= 5/8 x 79.6	= 49.7		
Fitting	= 1/12 x 20.9	= 1.7		
		51.4		= 51.3

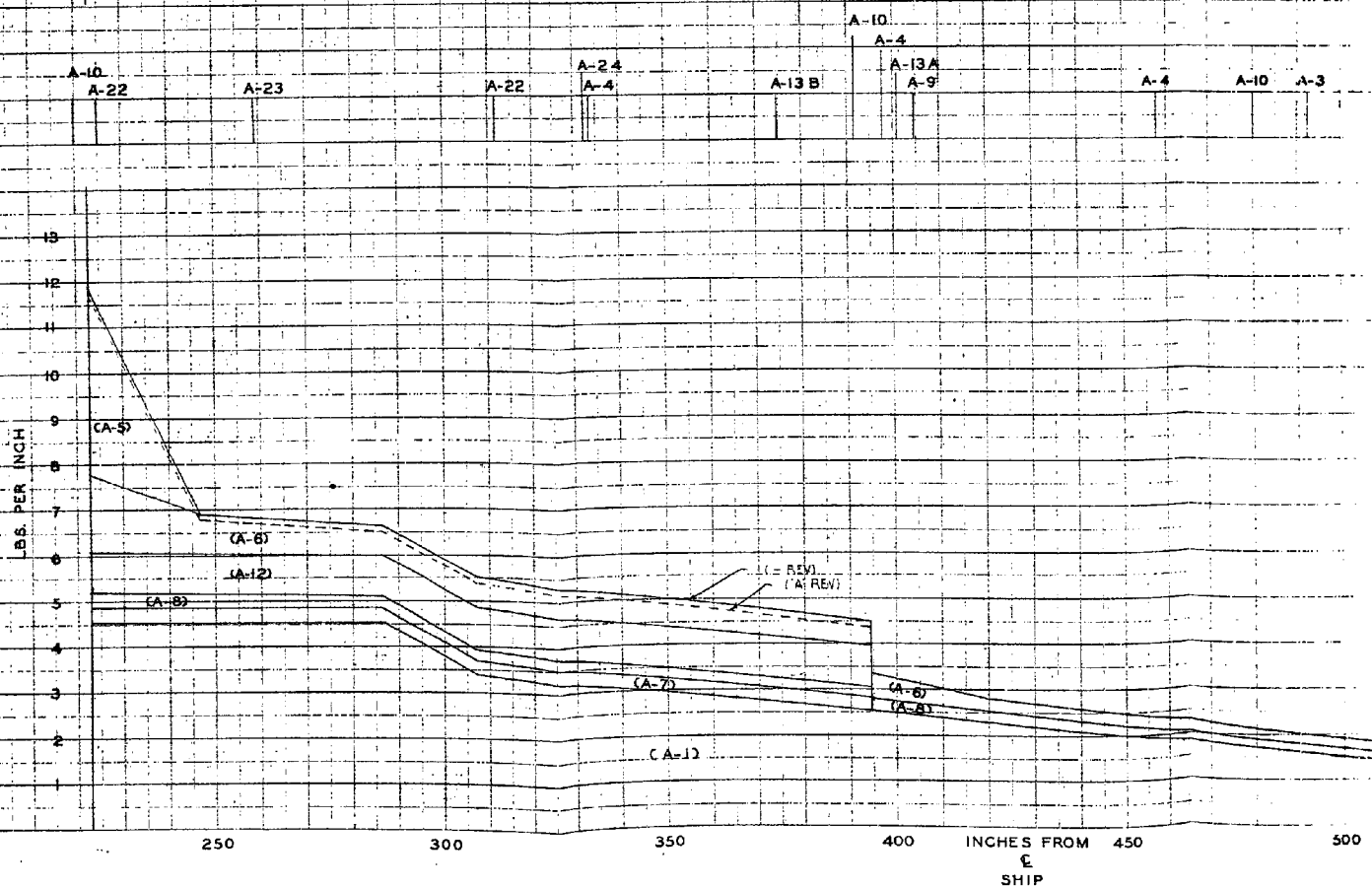
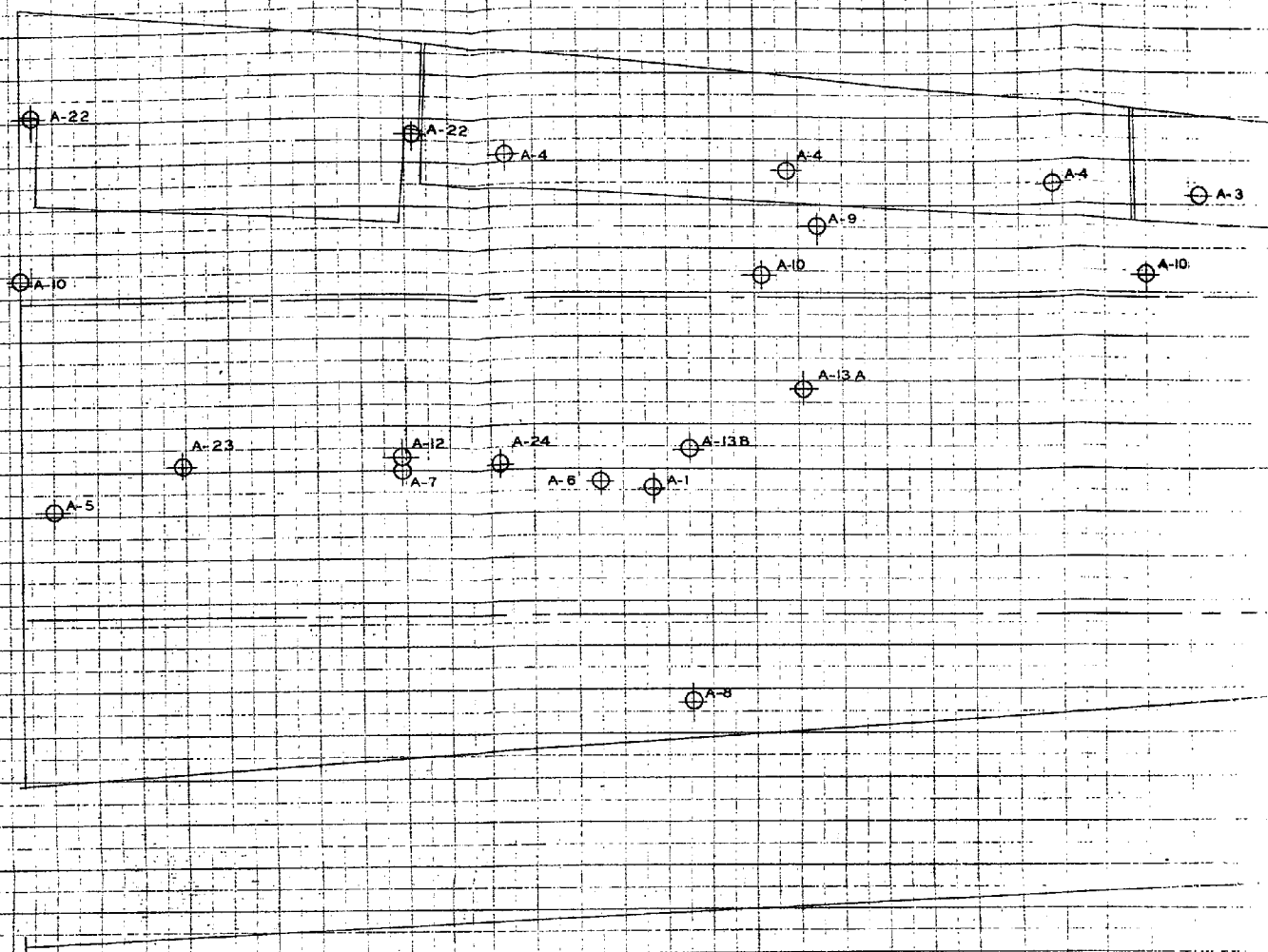
(A-4B) Lt. Inboard Aileron

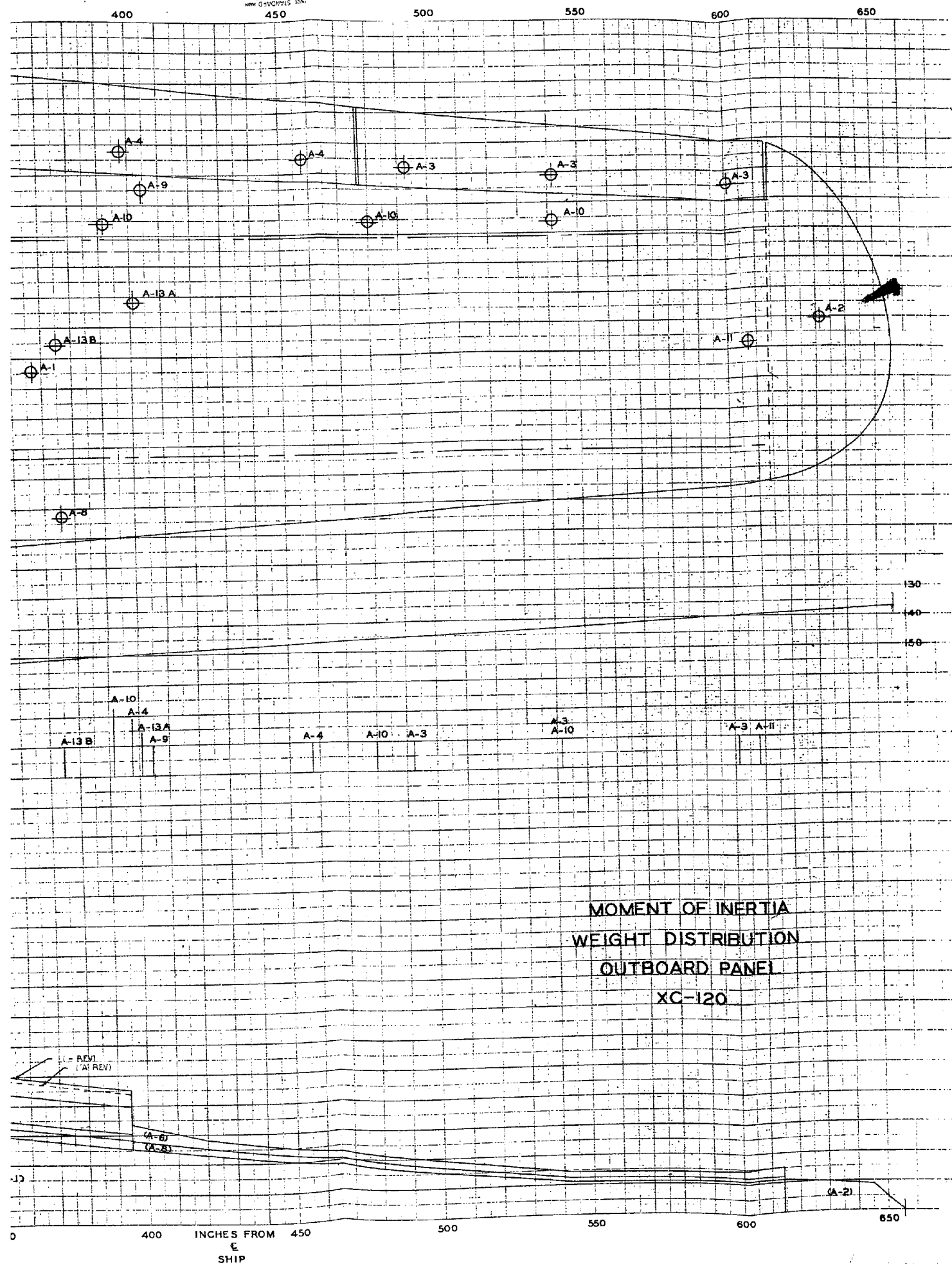
End Reaction	= 3/16 x 67.0	= 12.6		
Fitting	= 1/12 x 20.9	= 1.7		
Inboard		14.3		= 14.3
Outboard				= 14.3

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<u>OUTBOARD PANEL, AILERONS,</u> <u>OUTB. FLAPS, TIPS & EQUIPMENT</u>						
(A-4B) Lt. Inboard Aileron (cont'd.)						
$\begin{array}{rcl} \text{Center Reaction} & = & 5/8 \times 67.0 = 41.8 \\ \text{Fitting} & = & 1/12 \times 20.9 = 1.7 \\ & & \underline{43.5} \end{array} \quad = \quad 43.5$						
(A-5) Hinges, etc.						
$\begin{array}{rcl} \text{Hinges} & = & 62.9 \\ \text{Fairings} & = & 18.7 \\ \text{Corrugation Fittings} & = & 16.1 \\ & & \underline{97.7} \times 1/2 \end{array} \quad = \quad 48.8$						
(A-6) Ribs and Formers						
$\begin{array}{rcl} \text{Ribs} & = & 386.4 \\ \text{Formers} & = & 14.4 \\ & & \underline{400.8} \times 1/2 \end{array} \quad = \quad 200.4$						
(A-7) Fuel Cell Liner $= 70.2 \times 1/2 = 35.1$						
(A-8) Prov. for Equipment Less (A-7)						
$\begin{array}{rcl} & = & 226.0 \\ & - & 70.2 \\ & \underline{155.8} \times 1/2 \end{array} \quad = \quad 77.9$						
(A-9) Controls - Aileron Droop $21.7 \times 1/2 = 10.9$						
(A-10) Controls - Aileron Rods, etc. $(24 + 26) 1/2 = 25.0$						
(A-11) (Lt. Only) Auto-Pilot - Gyro Flux Gate Compass $= 5.5$						
(A-12) Fuel Cells $245.0 \times 1/2 = 123.5$						
(A-13A) Antenna - AN/APN-12 (outb'd.) $5.6 \times 1/2 = 2.8$						
(A-13B) Antenna - AN/APN-12 (inb'd.) $5.6 \times 1/2 = 2.8$						
(A-14) Fuel - Cell No. 5A $= 118.7 \text{ gal.} = 712.2$						
(A-15) Fuel - Cell No. 5 $= 115.6 \text{ gal.} = 693.6$						
(A-16) Fuel - Cell No. 6 $= 111.4 \text{ gal.} = 668.4$						
(A-17) Fuel - Cell No. 7 $= 104.1 \text{ gal.} = 624.6$						

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Subject: MASS MOMENTS OF INERTIA CALCULATIONS			DATE 6 May 1948 REVISED 14 Feb. 1949		
<u>OUTBOARD PANEL, AILERONS, OUTB. FLAPS, TIPS & EQUIPMENT</u>					
(A-18)	Fuel - Cell No. 8	= 98.5 gal.	=	591.0	
(A-19)	Fuel - Cell No. 9	= 90.7 gal.	=	544.2	
(A-20)	Fuel - Cell No. 10	= 82.8 gal.	=	496.8	
(A-21)	Fuel - Cell No. 10A	= 90.2 gal.	=	541.2	
(A-22)	Flaps & Hinges				
	Flaps	= $1/2 \times 86.9$	=	43.5	
	Hinges	= $1/2 \times 51.3$	=	25.7	
	Inboard		=	$69.2 \times 1/2$	34.6
	Outboard		=		34.6
(A-23)	Instruments - Tank Unit - Inb'd.	= 6.0 x 1/2	=	3.0	
(A-24)	Instruments - Tank Unit - Outb'd.	= 6.0 x 1/2	=	3.0	

Number of people per acre	Yield of wheat in bushels per acre
200	10
300	85
350	95
400	85
450	80
500	75



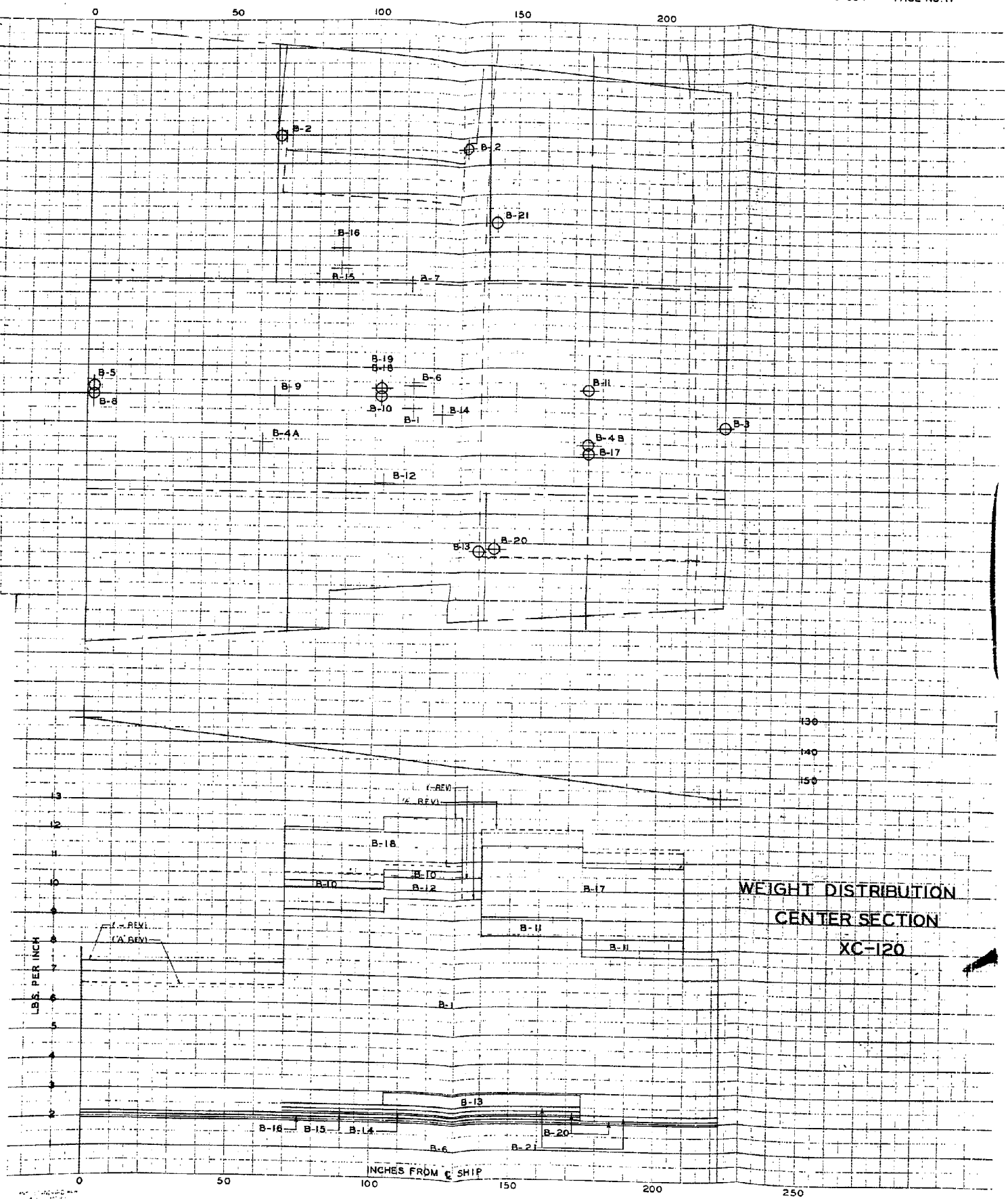


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Subject: MASS MOMENTS OF INERTIA CALCULATIONS			DATE 6 May 1948		
			REVISED 14 Feb. 1949		
<u>CENTER SECTION, INB'D. FLAPS AND EQUIPMENT</u>					
The following items were considered:					
(B-1) Bending Material consisting of -					
	Front Spar	=	600.0		
	Rear Spar	=	352.0		
	Stringers	=	26.0		
	Covering	=	1088.5		
	Tank Covers	=	123.8		
	Handling Bolts	=	22.5		
	Rivets, Nuts	=	122.7		
			<u>2335.5</u>	x 1/2	= 1167.8
(B-2) Flaps and Hinges					
	Flaps	=	1/2 x 84.6	=	42.3
	Hinges	=	1/2 x 52.7	=	26.3
	Inboard		68.6	x 1/2	= 34.3
	Outboard				= 34.3
(B-3) Misc. at 222.5					
	Hinges	=	80.6		
	Fairing	=	4.6		
	Corrugation Fitting	=	13.6		
			98.8	x 1/2	= 49.4
(B-4A) Fairing Sta. 61					
		=	34.5	x 1/2	= 17.3
(B-4B) Fairing Sta. 175					
		=	24.3	x 1/2	= 12.1
(B-5) Corr. Fitting at Sta. 2					
		=	43.5	x 1/2	= 21.8
(B-6) Rib and Formers					
	Ribs	=	710.6		
	Formers	=	65.2		
			<u>775.8</u>	x 1/2	= 387.9
(B-7) Jack Points					
			9.9	x 1/2	= 5.0
(B-8) Misc. Fittings Sta. 2					
			7.5	x 1/2	= 3.7
(B-9) Misc. Fittings Sta. 65					
			82.6	x 1/2	= 41.3
(B-10) Fuel Cell Liner					
			30.0	x 1/2	= 15.0
(B-11) Prov. for Equip. at Nacelle					
			122.6	x 1/2	= 61.3

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<u>CENTER SECTION, INB'D.</u> <u>FLAPS AND EQUIPMENT</u>					
(B-12)	Prov. for Equipment - Anti-Icing	106.0	$\times 1/2$	=	53.0
(B-13)	Air Intake - Carb.	60.0	$\times 1/2$	=	30.0
(B-14)	Controls - Engine	12.0	$\times 1/2$	=	6.0
(B-15)	Controls - Surface	38.4	$\times 1/2$	=	19.2
(B-16)	Electrical	53.8	$\times 1/2$	=	26.9
(B-17)	Main Landing Gear - Less Brake Oper. Mechanism and Basic Structure				
	M.L.G.	=	4034.3		
	Brake Oper. Mech.	=	- 177.3		
	Basic Struct.	=	-3361.8		
			495.2	$\times 1/2$	= 247.6
(B-18)	Fuel System				
	Fuel Cells	=	110.4		
	Booster Pumps	=	16.3		
			126.3	$\times 1/2$	= 63.1
(B-19)	Instruments - Tank Unit	=	6.0	$\times 1/2$	= 3.0
(B-20)	Anti-Icing - Ducts - Fwd.	=	42.0	$\times 1/2$	= 21.0
(B-21)	Anti-Icing - Ducts - Aft	=	50.0	$\times 1/2$	= 25.0

REPORT NO. 1074-204		FAIRCHILD AIRCRAFT DIVISION		45	PAGES	PAGE 16
FORM. KC-120		PREPARED BY		CHECKED BY		
Subject: MASS MOMENT OF INERTIA CALCULATIONS		CENTER SECTION		DATE 6 MAY 1945		
				REVISED 21 JULY 1945		
				14 Feb. 1949		

STATION	AVER. W	W	X	Y	ΔY	WY	WY ²	Z	WZ	WZ ²	Io(XX)	Io(YY)	Io(ZZ)	Ixx	Iyy	Izz	WIZ			
Column No. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Operation																				
210 to 222.5	7.02	88.5	165.3	72.0	32.59	12.00	216.3	12.5	10.77	6.82	156.5	13.98	2.18	11.00	14.22	20.86	5.11			
192 to 210	11.43	171.5	363.9	72.0	62.41	22.71	202.5	15.0	34.73	7.03	155.2	26.62	4.13	11.16	24.51	29.91	9.09			
175 to 195	11.43	228.5	363.9	72.0	63.15	30.26	185.0	20.0	42.77	7.82	153.0	34.96	5.35	13.18	35.71	38.18	12.72			
160 to 175	12.16	182.4	362.8	72.0	66.17	24.00	167.5	15.0	30.55	5.12	152.2	27.58	4.17	9.29	28.35	27.40	13.00			
140 to 160	12.16	213.2	362.8	72.0	88.23	32.01	150.0	20.0	36.18	5.41	147.1	34.26	5.11	10.89	37.53	37.59	13.16			
133 to 140	97.2	68.0	361.1	165.0	24.76	9.01	136.5	7.0	9.28	1.27	147.8	10.25	1.49	2.76	13.05	10.44	3.66			
120 to 133	10.96	112.5	365.2	140.0	52.04	19.01	126.5	13.0	15.33	2.28	146.7	20.90	4.07	3.35	22.31	21.52	7.63			
105 to 120	12.76	161.1	365.2	140.0	60.04	21.93	112.5	15.0	18.59	2.38	145.0	23.84	3.46	5.54	25.67	24.47	8.71			
90 to 105	12.53	154.0	366.5	140.0	57.25	21.26	97.5	15.0	11.11	1.50	143.4	22.63	3.24	4.74	24.77	23.03	8.30			
70 to 90	10.53	210.4	366.5	157.0	77.25	28.34	80.0	20.0	16.85	1.45	141.4	24.76	1.21	5.57	32.98	30.12	10.92			
60 to 70	7.56	66.6	369.0	72.0	24.58	9.07	65.0	10.0	4.23	.26	139.2	9.31	1.30	1.58	10.10	8.44	3.40			
50 to 60	6.66	66.6	369.0	72.0	24.58	9.07	55.0	10.0	3.66	.20	137.4	9.22	1.28	1.48	10.35	8.24	2.37			
40 to 50	6.66	66.6	369.0	72.0	24.58	9.07	45.0	10.0	3.00	.14	135.3	9.14	1.25	1.39	10.34	7.18	3.35			
30 to 40	6.66	66.6	369.0	72.0	24.58	9.07	35.0	10.0	2.23	.08	133.2	9.07	1.24	1.32	10.34	6.14	3.32			
20 to 30	6.66	66.6	369.0	72.0	24.58	9.07	25.0	10.0	1.46	.04	131.1	9.00	1.22	1.26	10.30	5.10	3.29			
10 to 20	6.66	66.6	369.0	72.0	24.58	9.07	15.0	10.0	1.00	.03	129.0	8.92	1.20	1.22	10.28	4.10	2.27			
0 to 10	6.66	66.6	369.0	72.0	24.58	9.07	5.0	10.0	.33	.00	127.4	8.85	1.18	1.18	10.26	3.10	0.65			
222.5		147.4	361.0		17.83	6.44	222.5		10.99	2.15	157.4	17.78	1.22	3.67	7.56	5.89	2.51			
175.0		34.3	358.0		4.23	1.52	175.0		2.12	.37	152.0	1.84	.28	1.34	7.87	7.73	2.50			
132.0		34.3	358.0		15.64	7.13	132.0		4.53	.60	147.1	5.85	.74	1.16	8.94	5.90	0.30			
112.0		5.0	409.0		2.05	.84	112.0		1.56	.06	144.8	3.72	.10	.09	.48	.45	0.16			
102.0		3.0	373.0		1.12	.42	102.0		.31	.03	143.6	0.63	.09	.03	.93	.41	0.21			
86.0		34.3	370.0		15.78	7.26	86.0		2.26	.15	137.8	4.80	.67	.98	6.46	5.82	2.13			
66.0		11.3	370.0		15.28	5.65	66.0		2.68	.17	137.0	5.77	.91	.39	2.50	2.23	0.85			
61.0		17.3	352.0		6.12	2.17	61.0		1.06	.06	137.0	7.40	.33	.39	3.41	3.03	1.08			
2.0		21.8	373.0		8.13	4.03	2.0		.04	0	136.4	2.89	.38	.35						
2.0		3.7	370.0		1.37	.51	2.0		.01	0	136.4	0.49	.06	.06	.57	.51	0.18			
Total 14. Side		2346.0	368.4		864.25	318.99	129.5		303.75	17.51	145.0	342.76	50.03	97.43	370.57	368.33	126.01			
Total 16. Side		2346.0	368.4		864.25	318.99	129.5		303.75	17.51	145.0	342.76	50.03	97.43	370.57	368.33	126.01			
*** 122.5		1032.0	372.5	71.9	384.42	143.20	122.5	21.0	126.4	15.49	145.0	150.67	22.00	37.53	165.64	159.13	55.12			
*** 101.5		1068.0	372.5	71.9	397.83	148.19	101.5	21.0	108.4	11.00	145.7	153.47	22.05	33.07	170.70	159.65	57.17			
*** 80.5		1038.0	372.5	71.9	386.66	144.03	80.5	21.0	83.6	6.73	141.4	146.67	20.72	27.49	165.20	151.21	54.64			



NOT TO SCALE
 1/4" = 1'-0"
 1/8" = 1'-0"
 1/16" = 1'-0"

CROSS SECTION

REPORT NO. R107B-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		45 PAGES	PAGE 18
MODEL XC-120	PREPARED BY	CHECKED BY	APPROVED BY		
Subject: MASS MOMENTS OF INERTIA CALCULATIONS			DATE 6 May 1948 REVISED 14 Feb. 1949		
<u>POWER PLANT, NACELLE, LANDING GEAR, BOOMS AND VERTICAL TAIL</u>					
(C-1)	Aft Boom (Structure Only)	180.0 x 1/2	=	90.0	
(C-2)	Fwd. Boom (Structure Only)	955.4 - 180.0 775.4 x 1/2	=	387.7	
(C-3)	Rudders	161.2 x 1/2	=	80.6	
(C-4)	Fins	203.0 x 1/2	=	101.5	
(C-5)	Anti-Icing Ducts	33.4 x 1/2	=	16.7	
(C-6)	Anti-Icing Ducts	24.0 x 1/2	=	12.0	
(C-7)	Controls Sta. 675	1/2 x 5.4	=	2.7	
(C-8)	Controls Sta. 820	1/2 x 14.1	=	7.1	
(C-9)	Controls Sta. 862	1/2 x 5.8	=	2.9	
(C-10)	Controls Sta. 917	1/2 x 36.6	=	18.3	
(C-11)	Controls Sta. 947	1/2 x 4.9	=	2.5	
(C-12)	Controls Sta. 952	1/2 x 25.9	=	12.9	
(D-1)	Nacelle Skin, Stringers	= 595.2 x 1/2	=	297.6	
(D-2)	Misc. Structure Frames, Fittings, Rivets, etc.	= 204.0 x 1/2	=	102.0	
(D-3)	Nacelle Structure & Fr. Landing Gr. Support	= 854.0 x 1/2	=	427.0	
(D-4)	Doors and Fittings	= 316.6 x 1/2	=	158.3	
(D-5)	Structure at 547	= 20.2 x 1/2	=	10.1	
(D-6)	Firewall	= 70.0 x 1/2	=	35.0	
(D-7)	Vibration Absorbers	= 145.0 x 1/2	=	72.5	
(D-8)	Engine Mount	= 146.0 x 1/2	=	73.0	
(D-9)	Engine Flaps & Secondary Cowl	= 282.2 x 1/2	=	141.1	
(D-10A)	Primary Cowl	= 317.1 x 1/2	=	158.6	
(D-10B)	Support Bay Cowl	= 208.4 x 1/2	=	104.2	
(D-11)	Prov. for Equipment	= 54.3 x 1/2	=	27.1	
(D-12)	Engine	= 7066.0 x 1/2	=	3533.0	

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MODEL XC-120	PREPARED BY	CHECKED BY	APPROVED BY		
Subject: MASS MOMENTS OF INERTIA CALCULATIONS			DATE 6 May 1948		
			REVISED 14 Feb. 1949		
POWER PLANT, NACELLE, LANDING GEAR, BOOMS AND VERTICAL TAIL					
(D-13)	Exhaust Collectors	354.2 x 1/2	=	177.1	
(D-14)	Vacuum Pump & Lines	25.4 x 1/2	=	12.7	
(D-15)	Air Intake System	50.3 x 1/2	=	25.2	
(D-16)	Blast Tubes	16.0 x 1/2	=	8.0	
(D-17)	Propeller	1320.0 x 1/2	=	660.0	
(D-18)	Prop. - Elect. De-Icing Hub Parts	37.8 x 1/2	=	18.9	
(D-19)	Starter	56.0 x 1/2	=	28.0	
(D-20)	Oil Cooler & Acc.	203.3 x 1/2	=	101.6	
(D-21)	Oil Tank & Supports	112.3 x 1/2	=	56.1	
(D-22)	Misc. Oil Lines	152.3 x 1/2	=	76.1	
(D-23)	Misc. Fuel Lines	160.3 x 1/2	=	80.1	
(D-24A)	Main Landing Gr. - Rolling Items (Extended)	= 1370.4 x 1/2	}	-----	685.2
(D-24B)	Main Landing Gr. - Rolling Items (Retracted)				
(D-25A)	Main Landing Gr. - Shock Strut (Extended)	= 1292.0 x 1/2	=	646.0	
(D-25B)	Main Landing Gr. - Shock Strut (Retracted)				
(D-26A)	Main Landing Gr. - Upper Truss (Extended)	} --- 289.2 x 1/2	=	144.6	
(D-26B)	Main Landing Gr. - Upper Truss (Retracted)				
(D-27A)	Main Landing Gr. - Drag Struts (Extended)	} --- 375.6 x 1/2	=	187.8	
(D-27B)	Main Landing Gr. - Drag Struts (Retracted)				
(D-28A)	Main Landing Gr. - Basic Structure	} --- 3361.8			
(D-28B)	Main Landing Gr. - Basic Structure				
	Less D-24, D-25, D-26, D-27 (Extended)	-3327.2			
	Less D-24, D-25, D-26, D-27 (Retracted)	34.6	x 1/2	=	17.3
(D-29)	Generator	92.0 x 1/2	=	46.0	

REPORT NO. <u>R107B-004</u>		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		45 PAGES	PAGE 20
MODEL <u>XC-120</u>	PREPARED BY	CHECKED BY	APPROVED BY		
Subject: <u>MASS MOMENTS OF INERTIA CALCULATIONS</u>			DATE <u>6 May 1948</u> REVISED <u>14 Feb. 1949</u>		
<u>POWER PLANT, NACELLE, LANDING GEAR, BOOMS AND VERTICAL TAIL</u>					
(D-30)	Fire Extinguisher	89.7 x 1/2	=	44.8	
(D-31)	Elec. Junction Box	53.5 x 1/2	=	26.7	
(D-32)	Misc. Instrument Transmitters	21.8 x 1/2	=	10.9	
(D-33A)	Nose Landing Gear Lower - Truss & Fairing(Extended)	)---			
(D-33B)	Nose Landing Gear - Truss, Etc. (Retracted)	)---	310.0 x 1/2	=	155.0
(D-34A)	Nose Landing Gear - Wheels, Etc. (Extended)	)---			
(D-34B)	Nose Landing Gear - Wheels, Etc. (Retracted)	)---	269.6 x 1/2	=	134.8
(D-35A)	Nose Landing Gear - Oleo Axle & Steer.(Extended)	)---			
(D-35B)	Nose Landing Gear - Oleo & Steer.(Retracted)	)---	240.0 x 1/2	=	120.0
(D-36)	Nose Landing Gear - Retracting Mech.		90.0 x 1/2	=	45.0
(D-37A)	Nose Landing Gear - Drag Truss & Extension Struts(Extended)	)---			
(D-37B)	Nose Landing Gear - Drag Truss & Extension Struts(Retracted)	)---	270 x 1/2	=	135.0
(D-38)	Upper Truss		- 242.0 x 1/2	=	121.0

MODEL XC-120

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DATE 6 May 1948

REVISED 14 Feb. 1949

Subject: MASS MOMENTS OF INERTIA CALCULATION

NACELLE I_o of Engine

$W = 3533.0$

From P & W Installation Handbook Sec. III, Supp. F,
Page 7, Jan. 1948.

$$I_o(xx) = 0.76 \times 10^6$$

$$I_o(yy) = I_o(zz) = 1.72 \times 10^6$$

 I_o of Propeller

$W = 660.0$

$$\begin{aligned} I_o(xx) &= 0.5 W \bar{r}^2 \\ &= 0.5 \times 660.0 \times 90.5^2 \\ &= 2.71 \times 10^6 \end{aligned}$$

$$\begin{aligned} I_o(yy) &= I_o(zz) = 0.25 W \bar{r}^2 \\ &= 0.25 \times 660.0 \times 90.5^2 \\ &= 1.35 \times 10^6 \end{aligned}$$

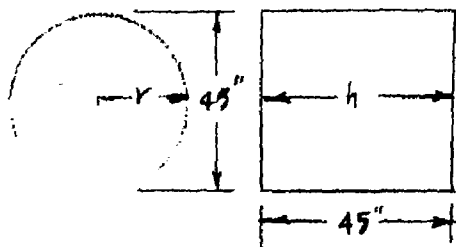
 I_o of Main Landing Gear Rolling Items

$W = 685.2$

$$I_o(xx) = I_o(zz) = \frac{W}{12} (3r^2 + h^2)$$

$$= \frac{685.2}{12} (3(22.5)^2 + (45)^2)$$

$$= .20 \times 10^6$$



$$\begin{aligned} I_o(yy) &= 0.5 W r^2 = 0.5 \times 685.2 \times 22.5^2 \\ &= 0.17 \times 10^6 \end{aligned}$$

 I_o of Auxiliary Landing Gear Rolling Items

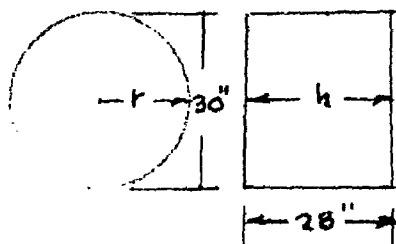
$W = 134.8$

$$I_o(xx) = I_o(zz) = \frac{134.8}{12} (3(15)^2 + (28)^2)$$

$$= .02 \times 10^6$$

$$I_o(yy) = 0.5 \times 134.8 \times 15^2$$

$$= 0.2 \times 10^6$$



MODEL XC-120

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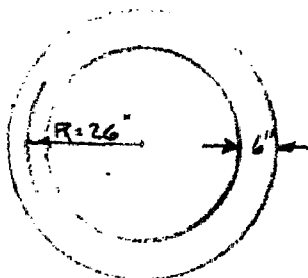
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Subject: MASS MOMENTS OF INERTIA CALCULATIONS

DATE 6 May 1948

REVISED 14 Feb. 1949

NACELLE I_o of Collector Ring

$$I_{xo} = \frac{W}{12} (4R^2 + 3r^2)$$

$$= \frac{177.1}{4} (4 \times 26^2) + (3 \times 6^2)$$

$$= 0.12 \times 10^6$$

$$I_{yo} = I_{zo} = \frac{W}{8} (4R^2 + 5r^2) = \frac{177.1}{8} (4 \times 26^2) + (5 \times \frac{2}{6})$$

$$= 0.06 \times 10^6$$

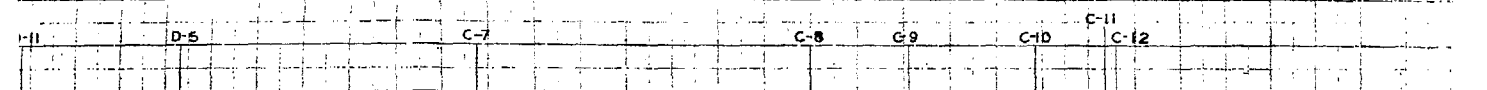
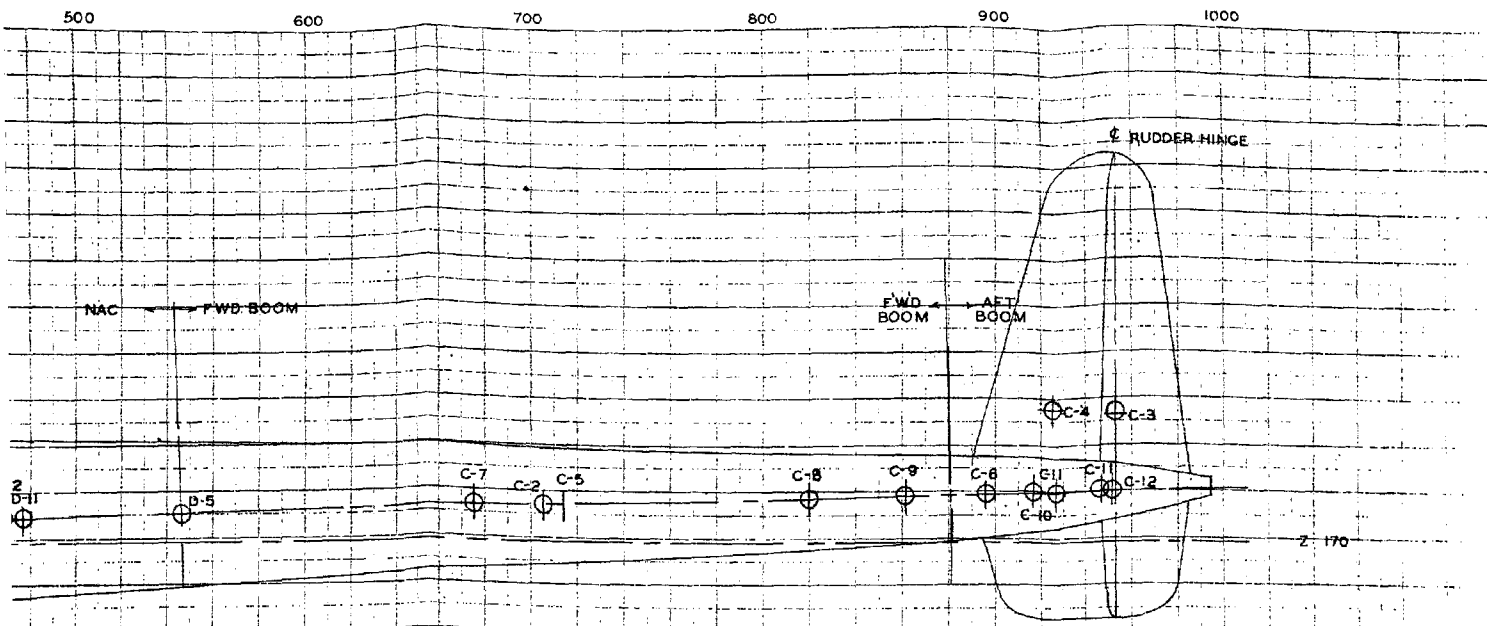
Subject:—MASS MOMENTS OF INERTIA CALCULATIONS

STATION	AYER.	W	X	Δ X	WX	WX ²	Z	Δ Z	WZ	WZ ²	Y	WY	WY ²	Io(xy)	Io(x)	Io(y)	Ixy	Ixx	Iyy	Ixy	Ixx	Iyy
Column No. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Operation	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
985 to 994	0.20	1.8	989.5	9.0	1.78	1.76	119.0	10.0	0.27	0.04	175.0	0.32	0.06	.00	.00	.00	.10	1.80	1.82	.2		
994 to 985	1.42	29.04	978.5	21.0	28.30	28.30	119.8	135.0	3.57	0.43	175.0	5.22	0.91	.00	.05	.00	1.39	28.91	29.01	3.4		
985 to 994	3.95	27.7	960.5	7.0	25.56	25.56	123.8	137.0	3.43	0.42	175.0	4.85	0.85	.00	.09	.00	1.36	26.41	26.41	3.2		
985 to 994	4.45	44.5	952.0	10.0	42.36	40.33	122.8	200.0	5.46	0.67	175.0	7.79	1.36	.15	.15	.00	2.18	41.00	41.69	5.2		
985 to 994	3.16	70.8	937.0	20.0	65.67	65.67	123.0		9.20	1.13		13.09	2.29	.12	.12	.00	3.66	66.80	67.96	8.6		
985 to 994	3.16	50.6	919.0	16.0	42.73	42.73	124.9		6.32	0.79		8.86	1.55	.24	.00	.00	2.46	43.52	44.28	5.8		
985 to 994	2.16	41.0	901.5	19.0	36.96	33.32	136.9		5.61	0.77		7.18	1.26	.03	.03	.00	2.06	34.09	34.58	5.0		
985 to 994	1.42	33.6	886.5	11.0	33.83	32.48	149.3		2.33	0.35		2.73	0.48	.00	.00	.00	.83	12.61	12.74	2.4		
985 to 994	1.07	33.2	865.5	31.0	28.73	24.87	155.0		5.12	0.80		5.81	1.02	.00	.00	.00	1.82	25.67	25.89	4.4		
985 to 994	1.10	33.0	835.0	30.0	27.56	23.01	155.0		5.12	0.79		5.78	1.01	.00	.00	.00	1.80	23.80	24.02	4.2		
985 to 994	1.13	33.9	805.0	30.0	27.29	21.97	155.0		5.25	0.81		5.93	1.04	.00	.00	.00	1.85	22.78	23.01	4.2		
985 to 994	1.18	34.5	775.0	30.0	26.74	20.72	155.0		5.35	0.83		6.20	1.06	.00	.00	.00	1.89	21.55	21.78	4.1		
985 to 994	1.21	36.3	745.0	30.0	26.37	19.65	155.0		5.63	0.87		6.35	1.11	.00	.00	.00	1.94	20.50	20.74	4.0		
985 to 994	1.24	37.2	685.0	30.0	25.48	17.45	155.0		5.77	0.89		6.51	1.14	.00	.00	.00	2.04	18.34	18.59	3.9		
985 to 994	1.27	38.1	655.0	30.0	24.96	16.35	155.0		5.91	0.92		6.67	1.17	.00	.00	.00	2.10	17.27	17.52	3.8		
985 to 994	1.29	38.7	625.0	30.0	24.19	15.12	155.0		6.00	0.93		6.77	1.18	.00	.00	.00	2.12	16.05	16.30	3.7		
985 to 994	1.32	39.6	595.0	30.0	23.56	14.02	155.0		6.14	0.95		6.93	1.21	.00	.00	.00	2.17	14.97	15.23	3.6		
985 to 994	1.35	40.6	563.5	33.0	25.13	14.16	155.0		6.91	1.07		7.81	1.37	.00	.00	.00	2.45	15.23	15.53	3.9		
985 to 994	2.53	68.3	533.5	36.44	36.44	19.44	160.0		10.93	1.75		11.95	2.09	.02	.00	.00	3.86	21.19	21.53	5.		

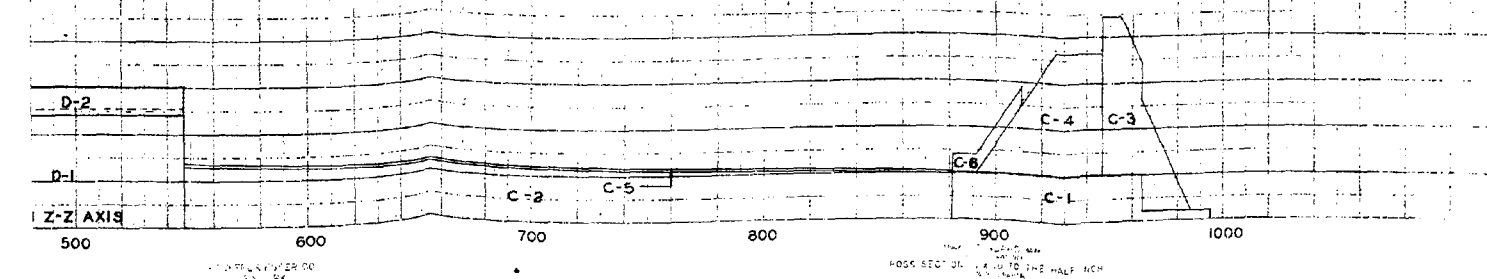
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REPORT NO. R107B-001				FAIRCHILD AIRCRAFT DIVISION				45 PAGES		PAGE 24	
MODEL XC-120				PREPARED BY				CHECKED BY		APPROVED BY	
Subject: MASS MOMENTS OF INERTIA CALCULATIONS				DATE 6 May 1948				REVISED 21 July 1948		14 Feb. 1949	

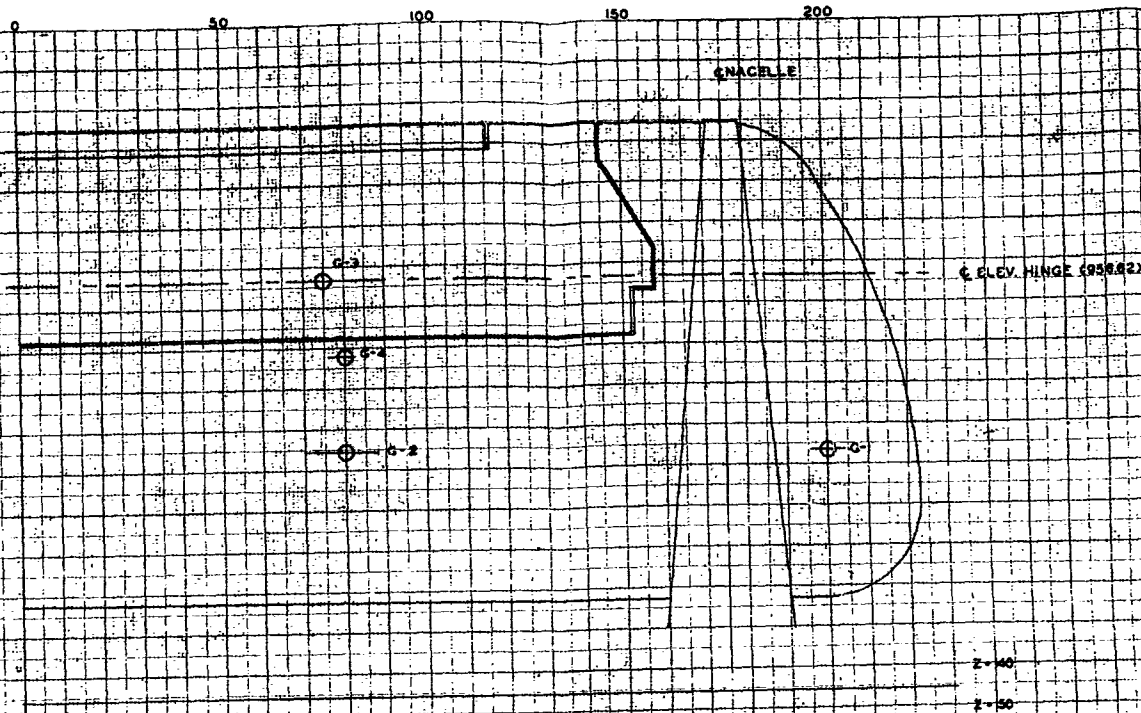
STATION	AVEN.	W	X	ΔX	WX	WX ²	Z	ΔZ	WZ	WZ ²	Y	WY	WY ²	Io(xx)	Io(zz)	Io(yz)	Ixx	Iyy	Izz	WXY
Column No. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Operation																				
290		135.0	217.0		33.34	31.10	230.4		7.17	0.24	175.0	23.63	4.14				11.31	15.10	12.37	5.83
296		6.0	256.0		2.05	1.38	172.0		0.24	0.05	175.0	1.00	0.25				0.49	0.76	0.77	0.35
236		46.0	256.0		11.78	7.91	172.0		1.36	0.85	175.0	6.05	1.41				2.77	4.38	4.43	2.03
252		28.0	256.0		7.03	4.82	172.0		0.83	0.39	175.0	4.90	0.86				1.69	2.61	2.64	1.21
252		12.7	256.0		3.20	2.16	172.0		0.37	0.12	175.0	2.22	0.39				0.76	1.18	1.20	0.56
248		121.0	248.0		30.01	21.18	192.0		4.07	3.71	175.0	21.18	3.71				7.78	11.51	11.15	5.55
244		73.0	244.0		17.81	12.56	172.0		2.16	1.78	175.0	12.78	2.34				4.50	6.52	6.69	3.12
237		171.1	237.0		42.97	30.46	172.0		5.24	5.42	175.0	30.98	5.42				10.78	15.25	15.43	7.34
236		10.9	236.0		2.57	1.40	128.0		0.18	0.33	175.0	1.91	0.33		0.06		0.51	0.79	0.94	0.33
230		72.5	230.0		16.68	12.47	172.0		2.14	2.22	175.0	12.69	2.22				4.36	5.98	6.06	2.87
211		3533.0	210.8		744.76	607.68	172.0		104.52	108.20	175.0	638.38	108.20	0.76	1.72		213.16	263.23	260.91	130.33
200		135.0	330.0		31.30	38.44	248.0		9.53	1.75	175.0	27.13	1.75				11.28	15.73	10.95	5.43
189		120.0	189.0		22.66	33.72	261.0		3.58	3.48	175.0	3.48	3.48				13.77	13.77	7.91	3.97
187		134.8	187.0		25.21	39.23	251.0		11.47	4.13	175.0	23.59	4.13	0.02	0.02		45.17	16.15	8.86	4.41
166		16.9	166.0		3.14	3.25	172.0		0.56	0.36	175.0	3.31	0.36				1.14	1.36	1.10	0.55
165		680.0	166.0		109.54	113.53	172.0		19.53	20.71	175.0	115.50	20.71	1.74	1.35		66.45	39.07	39.15	19.17
Total Lt. Side (WH. DN)		9638.5	306.3		2952.75	1621.30	190.0		362.50	295.32	175.0	1686.81	295.32	5.32	3.47		65.14	1545.49	1478.34	544.93
Total Rt. Side (WH. DN)		9638.5	306.3		2952.75	1621.30	190.0		362.50	295.32	175.0	1686.81	295.32	5.32	3.47		65.14	1545.49	1478.34	544.93
** 442		685.2	421.5		288.90	125.89	163.7		23.13	20.96	175.0	119.91	20.96	0.20	0.27		44.31	115.10	112.98	53.07
** 401		646.0	401.0		259.05	119.99	165.7		22.28	19.78	175.0	113.95	19.78				42.96	126.16	123.66	48.11
** 380		187.8	380.0		71.36	34.93	186.0		6.50	5.75	175.0	32.67	5.75				12.25	33.62	32.87	13.27
** 373		144.5	373.0		53.54	24.29	168.0		4.08	4.13	175.0	25.31	4.13				6.51	24.20	24.55	9.06
** 355		17.3	355.0		6.24	2.94	170.0		0.50	0.33	175.0	3.03	0.33				1.03	2.68	2.71	1.04
** 327		134.8	327.0		44.68	14.41	188.0		4.76	4.13	175.0	23.59	4.13	0.02	0.02		8.91	19.19	18.56	8.29
** 310		135.0	310.0		41.85	26.55	167.0		3.77	3.68	175.0	23.53	3.68				7.91	16.74	17.11	6.99
** 290		120.0	290.0		34.40	21.16	204.0		4.95	3.68	175.0	21.00	3.68				8.67	15.02	13.77	7.10
** 275		155.0	275.0		42.63	32.86	212.0		6.97	4.75	175.0	27.13	4.75				11.72	19.69	16.47	9.04
Total Lt. Side (WH. UP)		9638.5	317.1		3055.25	1657.50	172.0		260.93	295.32	175.0	1686.81	295.32	5.32	3.47		597.57	1536.50	1514.92	518.01
Total Rt. Side (WH. UP)		9638.5	317.1		3055.25	1657.50	172.0		260.93	295.32	175.0	1686.81	295.32	5.32	3.47		597.57	1536.50	1514.92	518.01
Diff. (DN. to UP) Lt. Side		0			+103.20	-166.89			-25.57			0	0	0	0		-75.57	-8.99	+66.58	-26.92
Diff. (DN. to UP) Rt. Side		0			+103.20	-166.89			-25.57			0	0	0	0		-75.57	-8.99	+66.58	-26.92



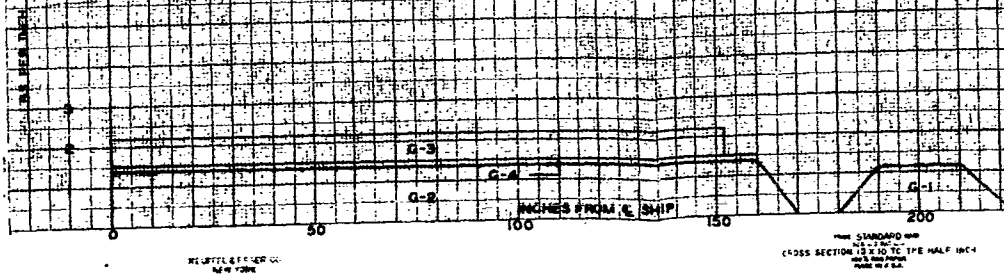
**WEIGHT DISTRIBUTION
ENGINE SECTION
NACELLE & BOOM
XC-120**



REPORT NO. R107B-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		45 PAGES	PAGE 26
MODEL	XC-120	PREPARED BY	CHECKED BY	APPROVED BY	
Subject: — MASS MOMENTS OF INERTIA CALCULATIONS				DATE 6 May 1948	
				REVISED 14 Feb. 1949	
<u>HORIZONTAL TAIL SURFACES & EQUIPMENT</u>					
(G-1)	Stabilizer Tips	71.3 x 1/2	=	35.7	
(G-2)	Stabilizer	444.4 x 1/2	=	222.2	
(G-3)	Elevator	209.5 x 1/2	=	104.7	
(G-4)	Controls	(20.5 + 17.5) 1/2	=	19.0	
FA-800-23					



WEIGHT DISTRIBUTION
HORIZONTAL TAIL
XC-120



MODEL XC-120

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Subject: MASS MOMENTS OF INERTIA CALCULATIONS

DETACHABLE FUSELAGE & CONTENTS

(E-1) Electrical - Junction Box, Wiring, Lights	= 27.1
(E-2) Communicating - Jumpmasters Station	= 4.5
(E-3) Furnishings - Tie Down Rings	= 182.6
(E-4A) Furnishings - Jacks Nose Supporting	= 28.2
(E-4B) Furnishings - Jacks Tail Supporting	= 28.2
(E-5) Furnishings - Driftmeter	= 2.0
(E-6) Furnishings - Static Lines	= 19.7
(E-7) Not Used	
(E-8) Furnishings - First Aid Kit	= 8.8

MODEL XC-120

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Subject: MASS MOMENTS OF INERTIA CALCULATIONS

DETACHABLE FUSELAGE & CONTENTS

(F-1) Floor Beams - Inboard & Outboard	=	223.5
(F-2) Flooring & Supports - Cargo & Paratainer	=	877.1
(F-3) Top Beams	=	68.9
(F-4) Dust Covers	=	33.0
(F-5) Cargo Windows	=	73.7
(F-6) Door - Cargo Comp. Hatch	=	20.0
(F-7) Door - Escape Hatch	=	63.1
(F-8) Prov. For Paratainer Door	=	43.2
(F-9A) Fuselage Hoist Fittings - Fore	=	25.0
(F-9B) Fuselage Hoist Fittings - Aft	=	35.0
(F-10A) Fuselage Attach. Fittings - Fore	=	28.0
(F-10B) Fuselage Attach. Fittings - Aft	=	123.2
(F-11A) Fittings - Ground Handling - Fore	=	50.0
(F-11B) Fittings - Ground Handling - Aft	=	50.0
(F-12A) Fittings - Cargo Doors - Fore	=	12.5
(F-12B) Fittings - Cargo Doors - Aft	=	12.5
(F-13) Miscellaneous - Finish, Etc.	=	92.8
(F-14) Provisions For Equipment	=	112.0
(F-15) Cargo Doors - Fore	=	410.0
(F-16) Cargo Doors - Aft	=	420.0

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Subject: MASS MOMENTS OF INERTIA CALCULATIONS

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DETACHABLE FUSELAGE & CONTENTS

(F-17) Frames

	Sta.	Wt.
106 + 116.5	129.3	108.6
130	148.	8.0
144 & 150	165.	126.8
161.5	179.5	11.4
179	197.	25.3
196.5	214.5	43.1
214.	232	17.3
231.5	249.5	50.9
249.	267.0	16.4
266.5	284.5	57.2
284.	302	17.0
301.5	319.5	43.2
319.	337	57.0
387.	355	6.5
355.	373	51.2
373.	391	19.4
391 + 397	412	177.7
409	427	55.7
426.5	444.5	6.0
444.	462	49.6
461.5	479.5	5.9
479	497	48.5
496.5	514.5	5.8
514.	532	46.3
531.5	549.5	5.6
546.4 & 549	565.7	78.7

1139.1

= 1139.1

(F-18) Skin & Stringers

= 907.5

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DETACHABLE FUSELAGE

$I_o(xx)$ of Frames

Ratio of I_o to I_x

$$I_x = W \bar{r}^2 = W (216.2)^2 = 46,742 W$$

Sta. 124 to 232

$$I_o(xx) = \frac{W}{4} (4 \times 59^2) + (3 \times 12^2) = 3,589 W$$

$$\text{Ratio} = 3589 \div 46,742 = 0.08$$

Sta. 232 to 444.5

$$I_o(xx) = \frac{W}{4} (4 \times 61^2) + (3 \times 12^2) = 3,829 W$$

$$\text{Ratio} = 3829 \div 46,742 = 0.08$$

Sta. 444.5 to 567

$$I_o(xx) = \frac{W}{4} (4 \times 58^2) + (3 \times 12^2) = 3,472 W$$

$$\text{Ratio} = 3472 \div 46,742 = 0.07$$

$I_o(xx)$ of Skin Stringers

$$I_o(xx) = W \bar{r}^2 = 907.5 \times 60^2 = 3.27 \times 10^6$$

Subject: MASS MOMENTS OF INERTIA CALCULATIONS
 DETACHABLE FUSELAGE

(a) $I_{0(xz)} = I_{0(yz)} = 0.0833 \text{ Wt}^2$
 (b) $I_{0(yz)} = I_{0(xz)} = 0.0833 \text{ Wt}^2$

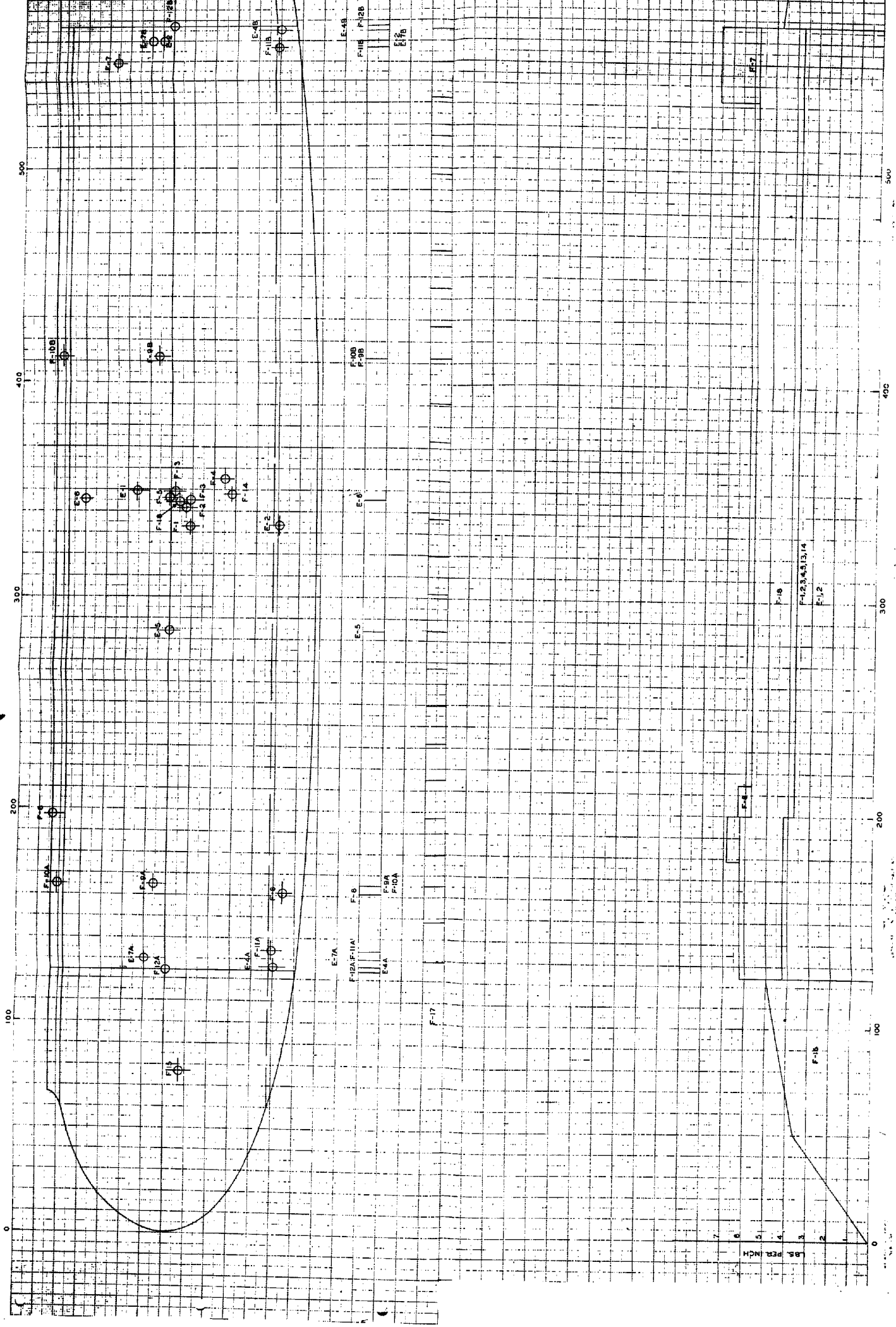
STATION	AVR. W	W	X	Δ X	WX	WY	WZ	Δ Z	WZ	WY	WZ	WY	WZ	WY	WZ	WY	WZ	WY	WZ
Column No. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Operation	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt
650 to 671.3	3.49	74.3	660.7	21.3	49.09	32.43	220.0	84.0	16.35	3.60	0.00	0.00	0.00	0.00	0.00	3.90	36.03	32.43	10.50
620 to 690	3.82	121.5	635.0	30.0	72.77	46.21	220.0	97.0	25.21	5.55	0.01	0.01	0.01	0.01	0.01	6.01	51.77	46.21	16.01
590 to 620	4.22	126.6	605.0	30.0	76.59	46.34	220.0	105.0	27.85	6.13	0.01	0.01	0.01	0.01	0.01	6.64	52.48	46.34	16.01
567 to 590	4.59	105.6	578.5	23.0	61.09	35.34	220.0	110.0	23.23	5.11	0.00	0.00	0.00	0.00	0.00	5.54	40.45	35.34	15.85
532 to 567	7.58	265.3	549.5	35.0	115.78	86.11	240.3	114.0	63.75	15.32	0.03	0.03	0.03	0.03	0.03	16.60	95.46	80.14	25.34
500 to 532	5.80	193.6	516.0	32.0	95.77	49.42	241.5	117.0	44.82	10.82	0.02	0.02	0.02	0.02	0.02	11.72	60.26	49.42	23.13
470 to 500	5.81	174.2	485.0	30.0	84.49	40.98	241.5	119.0	42.07	10.16	0.01	0.01	0.01	0.01	0.01	11.01	51.15	40.98	22.82
440 to 470	5.81	174.2	425.0	30.0	79.26	36.06	241.5	122.0	42.07	10.16	0.01	0.01	0.01	0.01	0.01	11.01	46.23	36.06	19.14
380 to 440	5.81	174.2	395.0	30.0	74.04	31.47	241.5	122.0	42.07	10.16	0.01	0.01	0.01	0.01	0.01	11.01	41.54	31.47	17.86
350 to 380	5.81	174.2	365.0	30.0	68.81	27.18	241.5	122.0	42.07	10.16	0.01	0.01	0.01	0.01	0.01	11.01	37.35	27.18	16.62
320 to 350	5.81	174.2	335.0	30.0	63.58	23.21	241.5	122.0	42.07	10.16	0.01	0.01	0.01	0.01	0.01	11.01	33.38	23.21	15.35
290 to 320	5.81	174.2	305.0	30.0	58.36	19.55	241.5	122.0	42.07	10.16	0.01	0.01	0.01	0.01	0.01	11.01	29.72	19.55	14.09
260 to 290	5.81	174.2	275.0	30.0	53.13	16.70	241.5	122.0	42.07	10.16	0.01	0.01	0.01	0.01	0.01	11.01	26.31	16.70	12.83
230 to 260	5.81	174.2	245.0	30.0	47.91	13.88	241.5	122.0	42.07	10.16	0.01	0.01	0.01	0.01	0.01	11.01	23.35	13.88	11.57
211.5 to 230	5.78	89.6	222.3	15.5	42.68	10.46	241.5	121.0	42.07	10.16	0.00	0.00	0.00	0.00	0.00	11.01	20.63	10.46	10.31
200.0 to 211.5	6.34	91.9	207.2	14.5	19.92	4.43	240.9	121.0	42.07	10.16	0.00	0.00	0.00	0.00	0.00	5.63	9.63	4.43	8.89
178.5 to 200	6.84	117.1	189.3	21.5	19.04	3.95	240.9	120.0	22.11	5.33	0.01	0.01	0.01	0.01	0.01	5.77	9.28	3.95	4.59
160 to 178.5	6.28	116.2	169.2	18.5	27.85	5.27	241.5	118.0	35.52	8.58	0.01	0.01	0.01	0.01	0.01	9.29	13.86	5.28	6.73
140 to 160	6.28	125.6	150.0	20.0	18.84	2.53	241.5	117.0	28.06	6.78	0.00	0.00	0.00	0.00	0.00	7.34	10.11	3.33	4.75
124 to 140	5.68	90.9	132.0	16.0	12.00	0.94	223.0	114.0	20.27	4.52	0.00	0.00	0.00	0.00	0.00	7.93	10.15	2.83	4.13
110 to 124	4.90	68.6	117.0	14.0	8.03	0.94	223.0	112.0	15.30	3.41	0.00	0.00	0.00	0.00	0.00	4.90	6.10	1.58	2.68
90 to 110	4.55	91.0	100.0	10.0	9.10	0.91	223.0	109.0	9.54	4.52	0.00	0.00	0.00	0.00	0.00	3.59	4.35	0.94	1.79
80 to 90	4.28	42.8	85.0	10.0	3.64	0.31	223.0	107.0	9.44	2.13	0.00	0.00	0.00	0.00	0.00	3.49	5.43	0.91	2.03
70 to 80	4.10	41.0	75.0	10.0	3.08	0.23	223.0	104.0	2.04	2.04	0.00	0.00	0.00	0.00	0.00	2.31	2.44	0.31	0.81
60 to 70	3.91	39.1	65.0	10.0	2.54	0.17	223.0	98.0	8.72	1.94	0.00	0.00	0.00	0.00	0.00	2.21	2.27	0.23	0.69
50 to 60	3.72	37.2	55.0	10.0	2.05	0.11	223.0	94.0	8.30	1.85	0.00	0.00	0.00	0.00	0.00	2.10	2.11	0.21	0.57
40 to 50	3.25	32.5	45.0	10.0	1.46	0.07	223.0	88.0	7.25	1.62	0.00	0.00	0.00	0.00	0.00	2.00	1.96	0.11	0.46
30 to 40	2.53	25.3	35.0	10.0	0.89	0.03	223.0	80.0	5.84	1.26	0.00	0.00	0.00	0.00	0.00	1.75	1.69	0.07	0.33
20 to 30	1.80	18.0	25.0	10.0	0.45	0.01	223.0	70.0	4.01	0.89	0.00	0.00	0.00	0.00	0.00	1.36	1.29	0.03	0.20
10 to 20	1.09	10.9	15.0	10.0	0.16	0.00	223.0	55.0	2.43	0.54	0.00	0.00	0.00	0.00	0.00	0.96	0.90	0.01	0.10
0 to 10	0.38	3.8	5.0	10.0	0.02	0.00	223.0	31.0	0.85	0.19	0.00	0.00	0.00	0.00	0.00	0.59	0.54	0.01	0.04
		124.0	124.0		1.55	0.19	216.2		2.70	0.58	0.00	0.00	0.00	0.00	0.00	0.58	0.54	0.01	0.04
		126.0	126.0		3.55	0.45	206.0		7.50	2.00	0.00	0.00	0.00	0.00	0.00	2.00	2.45	0.00	0.00
		130.0	130.0		0.57	0.07	206.0		0.91	0.19	0.00	0.00	0.00	0.00	0.00	0.19	0.19	0.00	0.00
		134.0	134.0		6.70	0.90	265.0		13.25	3.51	0.00	0.00	0.00	0.00	0.00	3.51	4.41	0.07	0.12
		161.0	161.0		6.96	1.12	270.0		11.66	3.15	0.00	0.00	0.00	0.00	0.00	3.15	4.27	0.07	0.12
		165.0	165.0		4.13	0.68	210.0		5.25	1.11	0.00	0.00	0.00	0.00	0.00	1.11	1.79	0.07	0.12
		165.0	165.0		7.00	0.91	176.0		5.54	0.91	0.00	0.00	0.00	0.00	0.00	0.91	1.82	0.07	0.12
		355.5	355.5		11.42	2.49	176.0		3.47	0.61	0.00	0.00	0.00	0.00	0.00	0.61	1.82	0.07	0.12
		412.0	412.0		18.45	5.94	210.0		7.00	1.47	0.00	0.00	0.00	0.00	0.00	1.47	3.10	0.07	0.12
		557.0	557.0		27.85	19.96	165.0		19.40	3.20	0.00	0.00	0.00	0.00	0.00	3.20	7.41	0.07	0.12
		560.0	560.0		2.52	1.41	211.0		13.25	3.51	0.00	0.00	0.00	0.00	0.00	3.51	19.96	0.07	0.12
		560.0	560.0		2.46	1.38	206.0		0.91	0.20	0.00	0.00	0.00	0.00	0.00	0.20	23.16	0.07	0.12
		565.0	565.0		15.91	9.00	266.0		7.50	0.19	0.00	0.00	0.00	0.00	0.00	0.19	19.02	0.07	0.12
		567.0	567.0		7.09	4.02	226.0		2.70	0.58	0.00	0.00	0.00	0.00	0.00	0.58	1.61	0.07	0.12
		284.0	284.0		0.57	0.16	216.0		0.43	0.09	0.00	0.00	0.00	0.00	0.00	0.09	1.57	0.07	0.12
		179.3	179.3		15.33	1.98	238.6		28.30	6.75	0.00	0.00	0.00	0.00	0.00	6.75	11.00	0.07	0.12
		148.0	148.0		1.18	0.17	238.6		1.91	0.16	0.00	0.00	0.00	0.00	0.00	0.16	4.02	0.07	0.12
		165.0	165.0		22.57	3.72	238.6		32.54	7.76	0.00	0.00	0.00	0.00	0.00	7.76	8.73	0.07	0.12
																	11.51	3.72	5.39

Subject: MASS MOMENTS OF INERTIA CALCULATIONS
DETACHABLE FUSELAGE

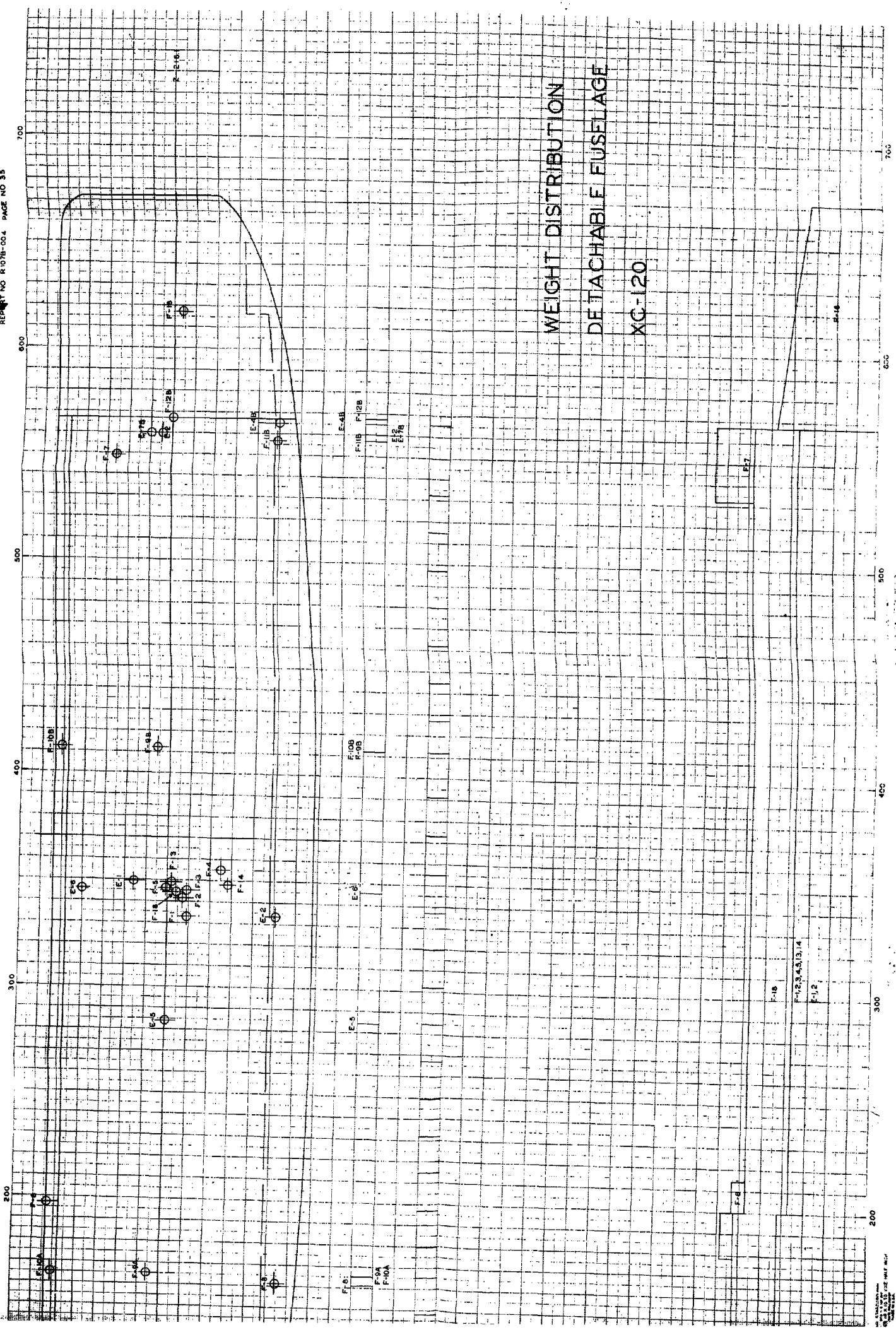
STATION	AVER. W	W	X	Δ X	WX	WX ²	Z	Δ Z	WZ	WZ ²	Y	YZ	YZ ²	Io(xy)	Io(yz)	Io(xy) ²	Io(yz) ²	Io(xy)	Io(yz)	WZ	WZ ²	WZ	WZ ²	WZ	WZ ²
Column No. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21					
CONVERSION	2 x 5	3 x 4	4 x 6	5 x 8	6 x 10	7 x 12	8 x 16	9 x 20	10 x 25	11 x 30	12 x 36	13 x 40	14 x 48	15 x 56	16 x 64	17 x 72	18 x 80	19 x 90	20 x 100	21 x 110	22 x 120	23 x 130	24 x 140	25 x 150	
	11.4	25.3	179.5	4.98	2.05	0.37	238.6	9	2.72	0.65		1.14	10.28	.03	0.63	1.02	0.63	1.02	0.63	1.02	0.63	1.02	0.63	1.02	0.63
	25.3	179.5	197.0	9.24	4.98	0.98	238.6		6.04	1.14		2.15	10.28	.06	1.52	2.82	1.52	2.82	1.52	2.82	1.52	2.82	1.52	2.82	1.52
	17.3	232.0	232.0	4.01	4.01	0.93	238.6		4.13	0.99		2.80	12.14	.07	1.06	4.13	1.06	4.13	1.06	4.13	1.06	4.13	1.06	4.13	1.06
	50.9	249.5	249.5	12.70	12.70	3.17	238.6		3.91	2.90		2.90	12.14	.25	3.15	6.07	3.15	6.07	3.15	6.07	3.15	6.07	3.15	6.07	3.15
	16.4	267.0	267.0	4.38	4.38	1.17	238.6		3.91	0.93		2.90	12.14	.09	1.02	2.10	1.02	2.10	1.02	2.10	1.02	2.10	1.02	2.10	1.02
	57.2	284.5	284.5	16.27	16.27	4.63	238.6		13.65	3.26		3.26	13.65	.37	3.63	7.89	3.63	7.89	3.63	7.89	3.63	7.89	3.63	7.89	3.63
	17.0	302.0	302.0	5.13	5.13	1.55	238.6		4.06	0.97		2.86	10.31	.12	2.81	2.52	2.81	2.52	2.81	2.52	2.81	2.52	2.81	2.52	2.81
	43.2	319.5	319.5	13.80	13.80	4.41	238.6		10.31	2.86		3.24	13.60	.35	3.76	6.87	3.76	6.87	3.76	6.87	3.76	6.87	3.76	6.87	3.76
	57.0	337.0	337.0	19.21	19.21	6.47	238.6		1.55	0.37		1.10	13.60	.52	0.44	1.19	0.44	1.19	0.44	1.19	0.44	1.19	0.44	1.19	0.44
	6.5	355.0	355.0	2.31	2.31	0.82	238.6		12.22	2.72		1.10	13.60	.57	0.44	1.19	0.44	1.19	0.44	1.19	0.44	1.19	0.44	1.19	0.44
	51.2	371.0	371.0	19.10	19.10	7.12	238.6		4.63	0.97		1.10	13.60	.57	0.44	1.19	0.44	1.19	0.44	1.19	0.44	1.19	0.44	1.19	0.44
	19.4	391.0	391.0	7.59	7.59	2.97	238.6		37.63	8.98		3.17	13.29	.24	1.34	4.07	1.34	4.07	1.34	4.07	1.34	4.07	1.34	4.07	1.34
	157.7	412.0	412.0	64.97	64.97	26.77	238.6		13.29	3.17		3.17	13.29	.81	11.12	35.75	11.12	35.75	11.12	35.75	11.12	35.75	11.12	35.75	11.12
	55.7	444.5	444.5	23.78	23.78	10.15	238.6		1.43	0.34		3.17	13.29	.81	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98
	6.0	462.0	462.0	2.67	2.67	1.19	238.6		11.83	2.82		3.17	13.29	.81	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98
	49.6	479.5	479.5	22.92	22.92	9.21	238.6		1.43	0.34		3.17	13.29	.81	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98
	5.9	497.0	497.0	2.83	2.83	1.36	238.6		1.41	0.34		3.17	13.29	.81	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98
	48.5	514.5	514.5	24.10	24.10	11.98	238.6		11.57	2.76		3.17	13.29	.81	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98
	5.8	534.5	534.5	2.98	2.98	1.53	238.6		1.38	0.33		3.17	13.29	.81	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98
	46.3	532.0	532.0	24.63	24.63	13.10	238.6		11.05	2.64		3.17	13.29	.81	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98
	5.6	549.5	549.5	3.08	3.08	1.69	238.6		1.34	0.32		3.17	13.29	.81	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98
	78.7	565.7	565.7	44.52	44.52	25.18	238.6		18.78	4.48		3.17	13.29	.81	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98	13.32	3.98
* 0 to 671.3																									
TOTAL	512.2	342.44			1753.70	741.10	235.0		1203.43	281.25	0	0	0	31.03	0.17	315.28	3025.52	741.27							

* Skin & Stringers
**800 P. 32

* Skin & Stringers
see P. 32



1/8" PER INCH



WEIGHT DISTRIBUTION DETACHABLE FUSELAGE XC-120

MODEL XC-120

PREPARED BY

CHECKED BY

APPROVED BY

Subject: MASS MOMENTS OF INERTIA CALCULATIONS

DATE 6 May 1948

REVISED 14 Feb. 1949

CREW NACELLE AND CONTENTS

(H-1) Frames

<u>Station</u>	<u>Weight</u>
----------------	---------------

80.0	3.0
90.5	5.0
105.0	4.0
124.0	4.0
143.0	5.0
162.0	46.5
179.5	21.0
197.0	12.0
214.5	12.0
232.0	12.0
248.5	12.0
267.0	12.0
284.3	12.0
302.0	12.0
319.5	12.9
337.0	33.4
335.0	15.0
373.0	15.0
391.0	15.0
409.0	86.3
427.0	10.0
444.5	10.0
462.0	10.0
479.5	10.0
497.0	10.0
514.5	7.0
532.0	7.0
549.5	7.0
567.0	7.0
591.0	7.0
608.0	6.0
624.0	6.0
641.0	5.0
658.0	4.0
671.3	3.0

= 459.1

(H-2A) Wing Attachment - Fr.

= 24.4

(H-2B) Wing Attachment - Rr.

= 24.5

(H-3) Covering, Stringers, Rivets, Etc.

= 881.0

(H-4) Cockpit Flooring = 25.6

= 93.0

= 135.0

= 253.6

(H-5) Equipment Comp. Floor =

= 17.2

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Subject: MASS MOMENTS OF INERTIA CALCULATIONS			DATE 6 May 1948		
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<u>CREW MACELLE AND CONTENTS</u>					
(H-6)	Pod Attachment - Fore	=	77.5		
(H-7)	Pod Attachment - Aft	=	77.5		
(H-8)	Cockpit Enclosure	=	200.0		
(H-9)	Navigator's Dome Hatch	=	10.0		
(H-10)	Windows	=	22.8		
(H-11)	Life Raft Compartment	=	31.4		
(H-12)	Door - Cockpit Hatch	=	10.0		
(H-13)	Grips	=	2.0		
(H-14)	Prov. for Equipment - Cockpit Section				
	Radio	=	25.0		
	Electrical	=	9.3		
	Controls - Surface	=	83.1		
	Controls - Engine	=	4.2		
	Instruments	=	1.8		
	Crew Seats	=	11.4		
				=	134.8
(H-15)	Prov. for Equipment - Equipment Sect.				
	Hydraulic System	=	4.8		
	Acc. Power Plant	=	12.3		
	Electrical	=	9.3		
	Radio	=	5.9		
	Anti-Icing	=	1.7		
	Pulley Covers	=	12.9		
	Oxygen	=	4.8		
	Hoisting	=	27.4		
				=	79.1
(H-16)	Upper Rear Hatch	=	27.2		
(H-17)	Upper Forward Hatch	=	30.0		
(H-18)	Rear Exit Door	=	10.0		

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<u>CREW NACELLE AND CONTENTS</u>					
(J-1)	Brake Operating System	=	177.3		
(J-2)	Power Plant Controls - Pedestal	=	64.2		
(J-3)	Power Plant Controls - Cables, etc.	=	28.6		
(J-4)	Propeller & Controls - Reversing Controls	=	7.0		
(J-5)	Propeller & Controls - Two-Engine - Synchronizer	=	25.0		
(J-6)	Propeller & Controls - Switches, Relays, & Misc.	=	42.4		
(J-7)	Propeller & Controls - De-Icer Timer	=	3.8		
(J-8)	Instruments - Instrument Panel	=	77.2		
(J-9)	Instruments - Not Used	=	0.		
(J-10)	Instruments - Tubing, Etc.	=	54.7		
(J-11)	Instruments - Amplifier and Calibration Unit	=	24.8		
(J-12)	Surface Controls - Control Column, Supports, Pedals	=	160.3		
(J-13)	Surface Controls - Flap Mech.	=	56.7		
(J-14)	Surface Controls - Main Sectors	=	50.0		
(J-15)	Surface Controls - Cables, Brkts. & Pulleys	=	268.9		
(J-16)	Surface Controls - Auto Pilot - Servos, Etc.	=	54.0		
(J-17)	Surface Controls - Auto Pilot - Junc. Box, Amplifier, etc.	=	28.0		
(J-18)	Surface Controls - Auto Pilot - Instruments	=	5.0		
(J-19)	Surface Controls - Auto-Pilot - Wiring & Misc.	=	75.5		
(J-20)	Electrical - Battery	=	74.0		
(J-21)	Electrical - Inverters	=	134.4		
(J-22)	Electrical - Regulators	=	12.6		
(J-23)	Electrical - External Power	=	14.8		
(J-24)	Electrical - Power Junction Box	=	13.6		
(J-25)	Electrical - Main Junction Box	=	15.9		

MODEL XC-120

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Subject:— MASS MOMENTS OF INERTIA CALCULATIONS

DATE 6 May 1948

REVISÉ 14 Feb. 1949

CREW NACELLE AND CONTENTS

(J-26)	Electrical - Nose Junc. Box	=	7.5
(J-27)	Electrical - Wiring & Misc.	=	402.5
(J-28)	Communicating - Pedestal	=	22.7
(J-29)	Communicating - at Cockpit Comp. ,	=	704.8
(J-30)	Communicating - Equipment - Compartment Floor	=	80.0
(J-31)	Furnishings - Seats, Pilot and Co-Pilot	=	124.0
(J-32)	Furnishings - Seats, Navigator & Crew Chief	=	36.4
(J-33)	Furnishings - Seat, Radio Operator	=	19.2
(J-34)	Furnishings - Safety Belts - Crew	=	15.0
(J-35)	Furnishings - Instrument Board - Pilot	=	34.9
(J-36)	Furnishings - Instrument Board - Navigator	=	4.0
(J-37)	Furnishings - Relief Tube	=	10.0
(J-38)	Furnishings - Lavatory Facilities	=	37.0
(J-39)	Furnishings - Entrance Ladder	=	20.5
(J-40)	Furnishings - Soundproofing - Cockpit	=	98.6
(J-41)	Furnishings - Fixed CO ₂ - Fire Extinguisher	=	96.5
(J-42)	Furnishings - Portable CO ₂	=	25.5
(J-43)	Furnishings - Portable CCL ₄	=	7.2
(J-44)	Furnishings - First Aid Kit	=	4.4
(J-45)	Furnishings - Misc.		
	Radio Tables	=	20.0
	Radio Shelves & Supports	=	40.0
	Navigation Table & Shelves	=	39.6
	Map Cases & Report Holders	=	5.5
	Stowage for Navigation Equip.	=	6.0
	Prov. for Driftmeter	=	3.1
	Prov. for Astrocompass	=	1.5
		=	115.7

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<u>CREW NACELLE AND CONTENTS</u>							
(J-46)	Furnishings - Stowage Handcrank	=	0.5				
(J-47)	Furnishings - Oxygen Install.	=	60.0				
(J-48)	Furnishings - Windshield Wipers	=	8.6				
(J-49)	Furnishings - Air Conditioning	=	212.0				
(J-50)	Anti-Icing - Heaters	=	303.5				
	Supports	=	28.0				
			<u>331.5</u>	=	331.5		
(J-51)	Anti-Icing - Ducting, etc.	=	223.5				
(J-52)	Acc. Power Plant	=	162.0				
(J-53A)	Hoisting Mechanism - Forward	=	209.2				
(J-53B)	Hoisting Mechanism - Aft.	=	209.1				

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<u>CREW NACELLE</u>					
$I_o(xx)$ of Frames Ratio of I_o to I_x $I_x = WZ^2 = W (120)^2 = 14,400 W$ $I_o(xx) = \frac{W}{4} (4 \times 38^2) + (3 \times 3^2) = 1,450 W$ Ratio = $1450 \div 14400 = 0.10$					
$I_o(xx)$ of Skin & Stringers $I_o(xx) = WR^2 = 881.0 \times 35^2 = 1.08 \times 10^6$					

* Skin & Stringers*

(a) $I_{xx} = I_{yy} = I_{zz} = I_{0zz} = 0.0833 W \Delta^2$

MASS MOMENTS OF INERTIA CALCULATIONS
 CHEN NACELLE

STATION	AVEN.	W	X	Δx	$\frac{WX}{10^3}$	$\frac{WX^2}{10^6}$	Z	Δz	$\frac{WZ}{10^3}$	$\frac{WZ^2}{10^6}$	V	WY	$\frac{WY^2}{10^6}$	$\frac{10(xy)}{10^6}$	$\frac{10(xz)}{10^6}$	$\frac{10(yz)}{10^6}$	$\frac{I_{xx}}{10^6}$	$\frac{I_{yy}}{10^6}$	$\frac{I_{zz}}{10^6}$	$\frac{I_{xy}}{10^6}$	$\frac{I_{yz}}{10^6}$	$\frac{I_{xz}}{10^6}$
Column No. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Operation		2 x 5			3 x 1	4 x 6			3 x 8	8 x 10		3 x 12	12 x 13	(a)	(b)	(b)	11 x 13	13 x 15	7 x 16			
658.0 to 671.3	1.36	18.1	664.7	13.3	12.05	8.00	42.9	20.0	2.59	0.37							0.37	8.37	8.00		1.72	
671.3 to 680.0	1.78	30.2	620.5	17.0	19.68	12.78	137.5	27.0	4.17	0.57							0.57	13.35	12.78		2.71	
680.0 to 691.0	6.98	230.4	520.5	33.0	76.88	49.45	644.5	32.0	31.29	1.81							1.93	94.68	89.87		20.79	
691.0 to 700.0	1.36	139.5	592.0	32.0	62.38	42.87	102.5	40.0	19.04	0.83							2.85	51.73	48.90		11.77	
700.0 to 710.0	4.83	43.5	571.5	9.0	21.36	14.41	182.5	15.0	6.18	0.08							0.85	15.09	14.21		3.53	
710.0 to 720.0	7.79	112.9	540.5	53.0	37.55	24.57	422.7	15.0	48.80	0.37							8.46	129.09	120.12		31.78	
720.0 to 730.0	8.27	140.6	505.5	12.0	31.07	19.93	139.8	59.0	19.74	2.15							2.79	38.58	35.23		9.94	
730.0 to 740.0	9.75	34.1	474.5	35.0	16.41	10.65	156.1	59.0	46.44	5.32							4.44	84.80	78.48		22.27	
740.0 to 750.0	4.67	81.7	433.5	11.5	27.23	17.79	189.7	69.0	10.36	1.36							1.39	16.15	16.79		4.78	
750.0 to 760.0	4.21	73.1	435.5	17.5	31.75	19.70	185.8	74.0	9.90	1.20							1.24	15.20	14.00		4.10	
760.0 to 770.0	5.88	211.7	381.0	36.0	37.77	24.56	176.5	77.0	26.78	3.39							3.49	35.77	32.38		10.47	
770.0 to 780.0	5.95	214.2	350.0	36.0	77.40	46.99	128.1	87.0	21.40	2.51							3.62	30.51	27.01		9.73	
780.0 to 790.0	8.69	182.1	378.5	11.5	49.23	26.39	125.6	84.0	18.77	2.41							2.50	18.80	16.39		6.41	
790.0 to 800.0	12.94	859.8	307.0	35.0	126.75	62.30	125.6	84.0	56.87	7.14							7.41	16.19	11.35		17.18	
800.0 to 810.0	13.00	430.1	275.8	35.0	62.74	36.75	125.6	84.0	28.57	3.59							3.71	20.90	17.31		7.88	
810.0 to 820.0	12.22	227.5	241.5	35.0	107.36	46.75	125.6	84.0	58.34	6.78							7.06	33.74	26.83		13.51	
820.0 to 830.0	12.30	130.6	188.4	35.0	91.72	19.67	125.6	84.0	27.24	3.43							7.01	26.49	19.71		11.55	
830.0 to 840.0	7.98	151.6	152.5	13.0	11.93	7.66	125.6	84.0	14.51	0.53							2.55	11.30	7.67		5.13	
840.0 to 850.0	10.30	195.1	133.5	13.0	24.12	3.53	125.6	84.0	19.36	2.67							2.09	5.09	3.06		2.49	
850.0 to 860.0	10.30	155.7	114.5	15.0	22.41	2.27	125.6	84.0	25.64	3.25							2.51	6.00	3.53		2.95	
860.0 to 870.0	8.45	67.6	101.0	8.0	6.85	0.69	125.6	84.0	8.67	1.11							3.42	6.84	3.50		3.42	
870.0 to 880.0	5.37	24.2	94.8	4.5	2.87	0.22	125.6	84.0	3.13	0.19							1.12	1.80	0.69		2.58	
880.0 to 890.0	3.25	11.0	80.3	12.5	3.24	0.31	125.6	84.0	5.66	0.78							0.89	0.71	0.22		0.32	
890.0 to 900.0	0.56	6.4	74.3	11.5	0.48	0.34	125.6	84.0	0.77	0.09							0.78	1.09	0.31		0.06	
900.0 to 910.0																	0.32	0.13	0.04		0.06	
910.0 to 920.0																	3.02	47.77	44.75		11.63	
920.0 to 930.0																	0.35	5.68	5.33		1.38	
930.0 to 940.0																	1.69	28.33	26.64		6.70	
940.0 to 950.0																	0.50	8.76	8.26		3.03	
950.0 to 960.0																	0.57	9.86	9.29		2.29	
960.0 to 970.0																	1.63	33.64	32.01		7.23	
970.0 to 980.0																	0.20	44.51	44.31		14.31	
980.0 to 990.0																	1.14	12.12	10.98		3.54	
990.0 to 1000.0																	0.01	0.11	0.10		0.03	
																	0.98	9.72	8.74		2.93	
																	1.14	10.57	9.43		3.27	
																	0.04	0.68	0.64		0.17	
																	0.30	4.42	4.12		1.11	
																	1.36	14.99	13.03		5.05	
																	0.18	2.80	2.62		0.69	
																	0.58	3.35	2.77		1.26	
																	0.14	0.90	0.76		0.33	
																	0.36	1.55	1.19		0.65	
																	0	0	0		0	
																	0.14	0.71	0.57		0.28	
																	1.37	3.99	2.62		1.89	
																	2.72	2.49	1.77		1.13	

REPORT NO. R107R-004		FAIRCHILD AIRCRAFT DIVISION		145 PAGES PAGE 144	
MODEL XC-130		PREPARED BY		APPROVED BY	
Subject: MASS MOMENTS OF INERTIA CALCULATIONS		DATE 6 May 1948		REVISION 21 July 1948	
		CREW NACELLE		14 Feb. 1949	

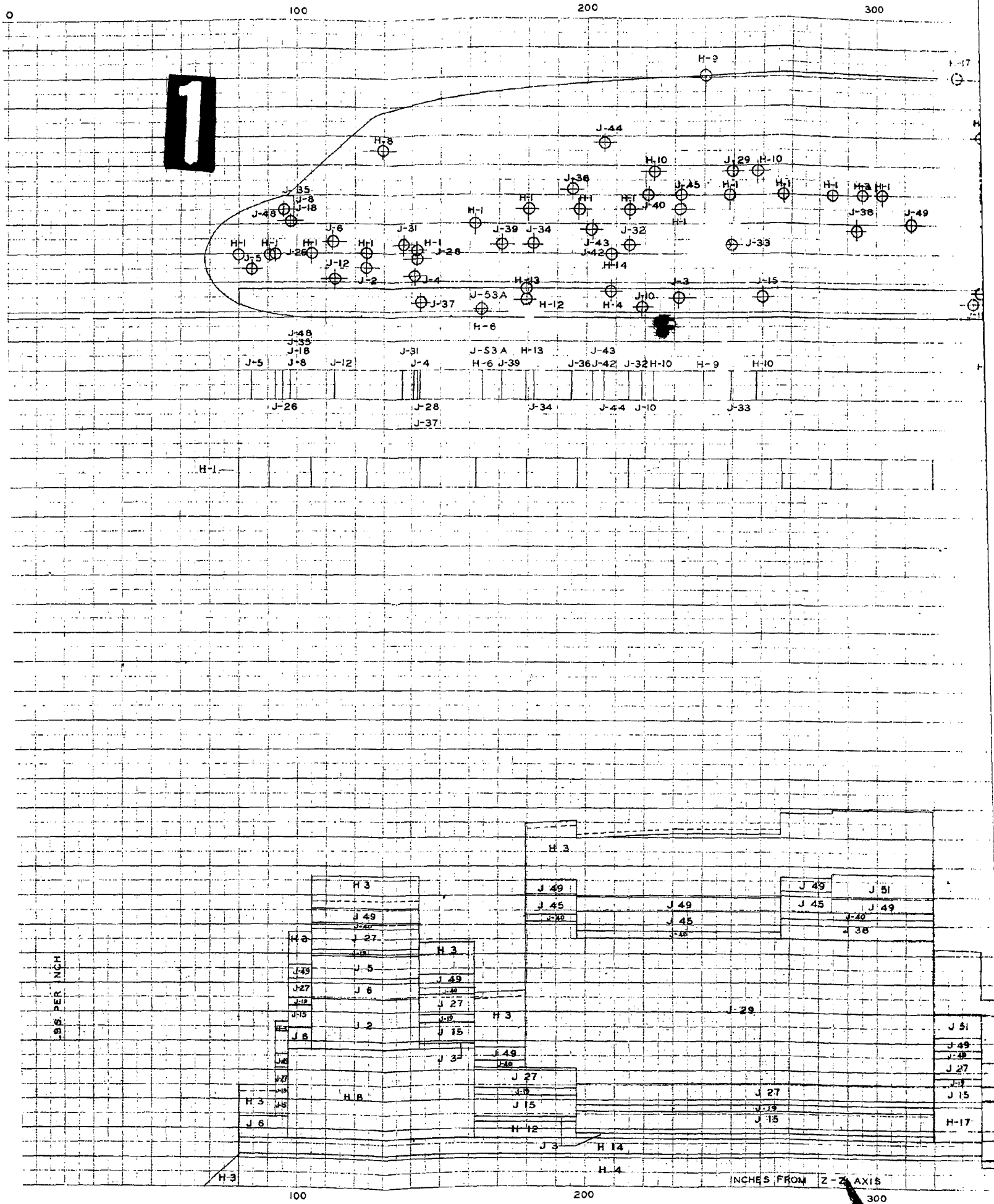
* Skin & Stringers

(a) $I_o(xx) = 0.0833 W \Delta^2$

(b) $I_o(yy) = I_o(zz) = 0.0833 W \Delta^2$

STATION	W	X	ΔX	$\frac{WX}{10^3}$	$\frac{WX^2}{10^6}$	Z	ΔZ	$\frac{WZ}{10^3}$	$\frac{WZ^2}{10^6}$	γ	$\frac{WY}{10^3}$	$\frac{WY^2}{10^6}$	$I_o(x-x)$	$I_o(y-y)$	$I_o(z-z)$	$I_o(xy)$	$I_o(yz)$	$I_o(xz)$	I_{xx}	I_{yy}	I_{zz}	WXZ
Column No. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Operation	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
* 68.5 to 671.3	4.0	124.0	4 x 6	0.50	0.05	140.0	0.56	0.56	0.08	0.08	0.19	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	4.0	105.0	4 x 5	0.42	0.04	140.0	0.56	0.56	0.08	0.08	0.19	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	5.0	90.0	4 x 4	0.35	0.03	140.0	0.56	0.56	0.08	0.08	0.19	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	3.0	80.0	4 x 3	0.24	0.02	140.0	0.56	0.56	0.08	0.08	0.19	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	10.0	240.0	4 x 2	2.40	0.58	79.5	0.80	0.80	0.06	0.06	0.42	0.12	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
	27.2	607.0	4 x 1	15.37	5.45	124.5	3.29	3.29	0.40	0.40	10.27	0.64	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
	10.0	480.0	4 x 0	5.84	3.17	159.0	1.59	1.59	0.25	0.25	3.66	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	209.2	161.0	4 x 0	30.31	5.63	159.0	33.27	33.27	5.19	5.19	10.97	1.26	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
	209.2	112.0	4 x 0	86.19	35.51	159.0	43.77	43.77	5.25	5.25	10.97	1.26	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
TOTAL	7125.6	333.4		2378.06	924.11		257.25	257.25	129.85	0	0	0	9.48	0.37	0.37	0.37	0.37	0.37	1124.43	959.48	322.51	

1457



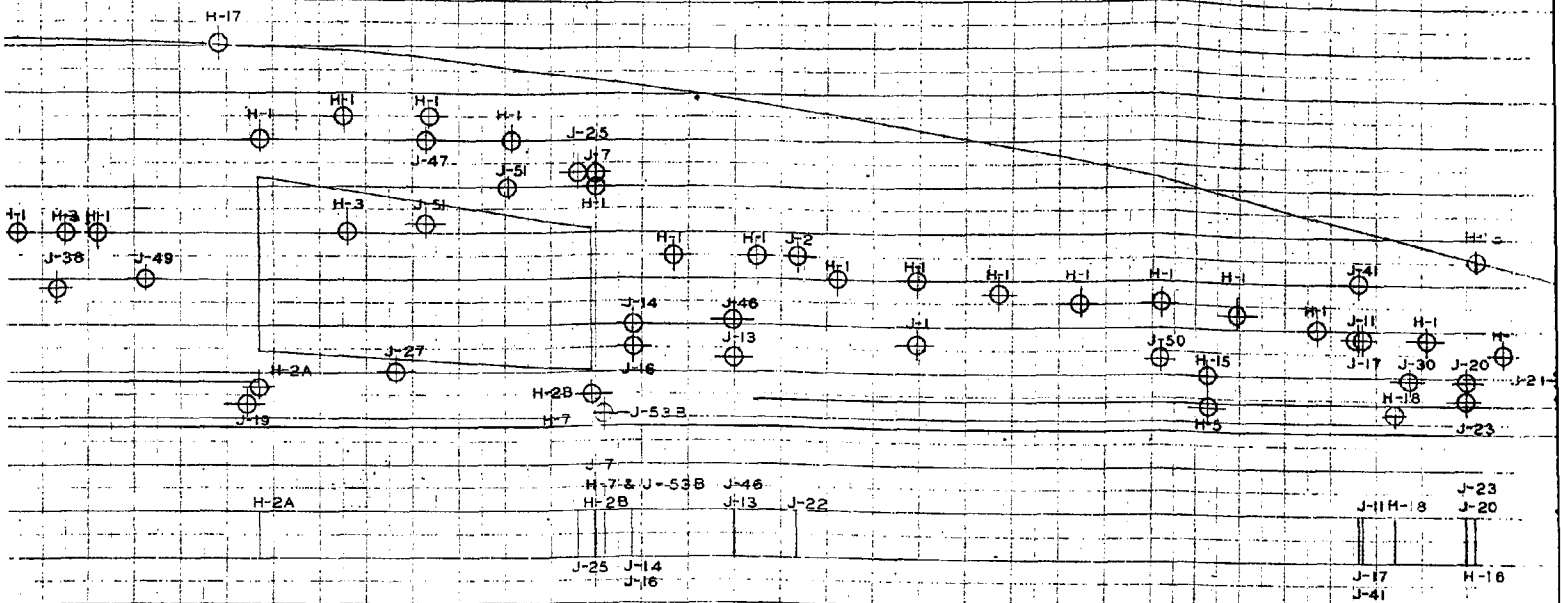
1

BS PER NCH

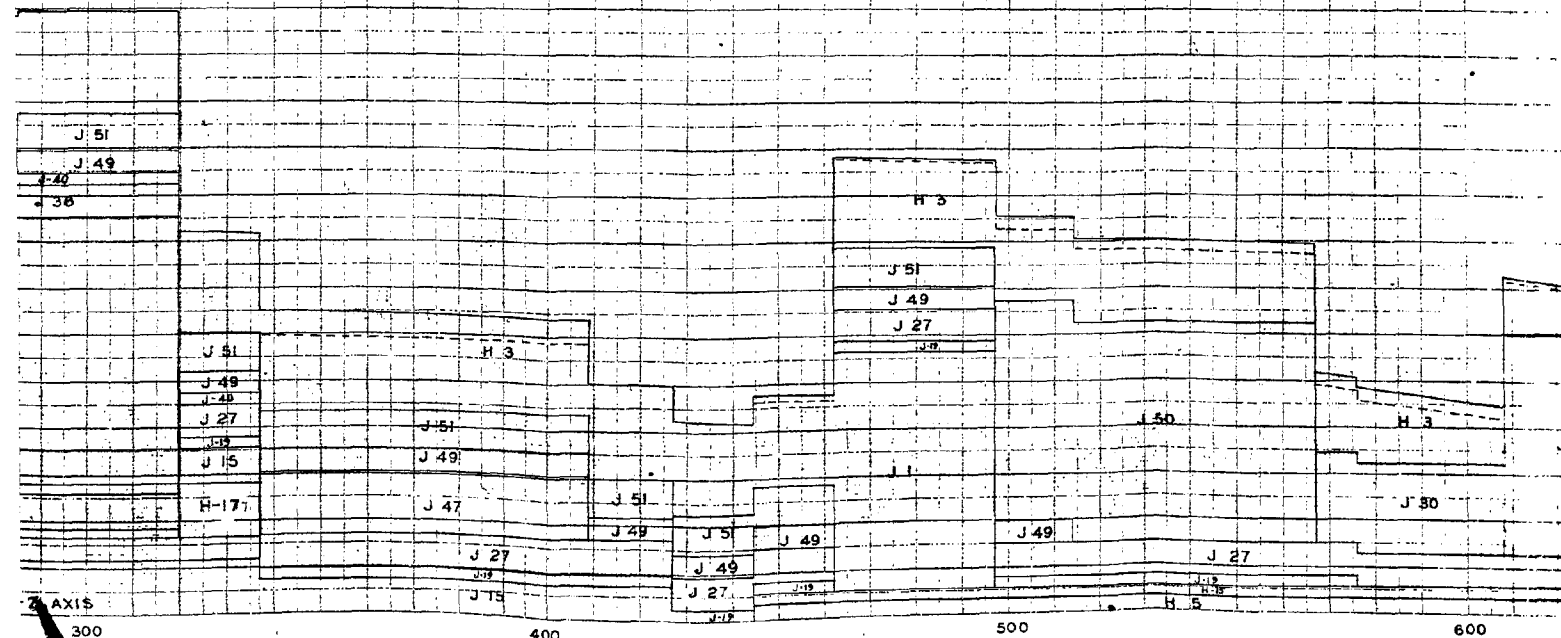
INCHES FROM Z-Z AXIS

NOT TO SCALE

CROSS SECTION IS A TO THE WALL FACE



2



2 AXIS

300

400

500

600

NOT TO SCALE
ELEVATION TO THE HALF INCH
FROM THE
GROUND

FROM 1:62,500
NOV 1954

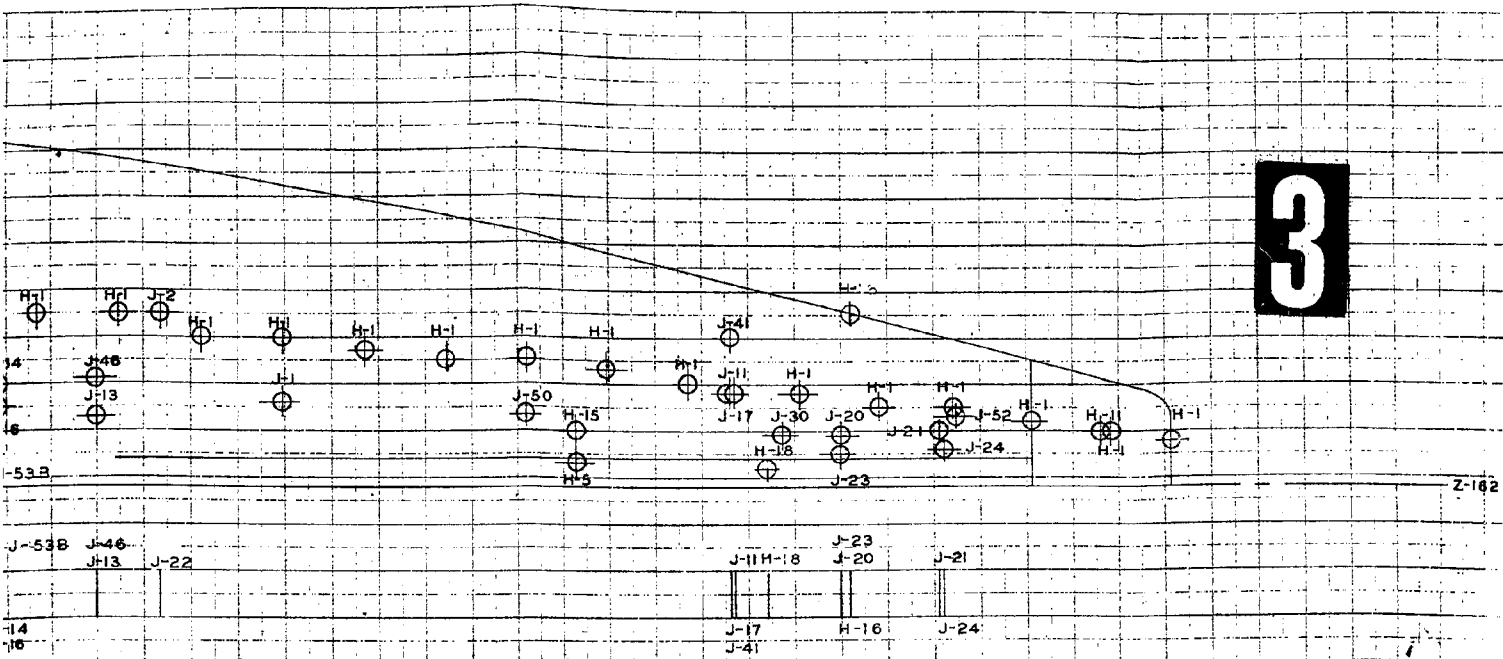
THICK LINE

500

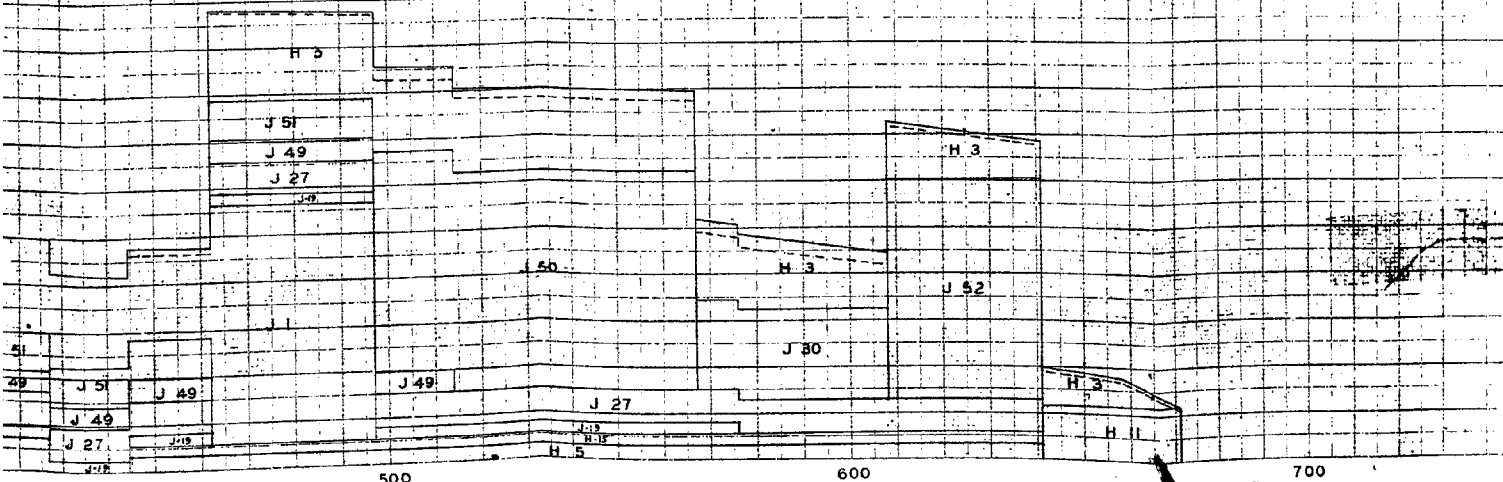
600

700

3



WEIGHT DISTRIBUTION CREW NACELLE XC-120



INCH STANDARD WITH
SECTION 10 X 10 TO THE HALF INCH
10 X 10 X 10
MADE IN U.S.A.

FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION						PAGES	PAGE 68	
REPORT NO. R107B-004	MODEL XC-120		PREPARED BY	CHECKED BY	APPROVED BY			
Subject: <u>MASS MOMENTS OF INERTIA CALCULATIONS - PART III</u>					DATE <u>21 July 1948</u> REVISED <u>14 Feb. 1949</u>			
<u>PRODUCT OF INERTIA</u>								
Condition No. 1 - Pack On, Full Fuel, Gear Up, G.W. = 64,000 Lbs.								
Centroids $\bar{X} = 355.3$ in.; $\bar{Z} = 169.07$ in.								
Item	Weight Lbs.	$\bar{X}$ In.	X-Moment In. Lbs.	$\bar{Z}$ In.	Z-Moment In. Lbs.	K 10^6	I_x 10^6	I_z 10^6
Weight Empty	40,465.0	340.36	13,772,690	176.26	7,132,510	2378.45	2566.47	7069.78
Pilot	200.0	128	25,600	126	25,200	3.23	3.18	3.28
Co-Pilot	200.0	128	25,600	126	25,200	3.23	3.18	3.28
Crew Chief	200.0	158	31,600	124	24,800	3.92	3.08	4.99
Navigator	200.0	268	53,600	124	24,800	6.65	3.08	14.36
Radio Operator	200.0	254	50,800	124	24,800	6.30	3.08	12.90
Trapped Fuel	100.0	372.5	37,250	153	15,300	5.70	2.34	13.88
Trapped Oil	250.0	290.0	72,500	165	41,250	11.96	6.81	21.03
Usable Fuel	16,020.0	372.5	5,967,450	150	2,403,000	895.18	1336.64	3204.82
Usable Oil	900.0	475	427,500	151	135,900	64.55	20.52	203.06
Misc. Equipment	27.0	275	7,425	105	2,835	0.78	0.30	2.04
Cargo	5,238.0	393.4	2,060,792	266.2	1,394,606	548.54	371.18	810.65
TOTAL - Wheels Down	64,000.0	352.08	22,532,807	175.78	11,250,201	3928.49	4319.86	11364.16
MOMENT CHANGE - Wheels Up			+ 206,393		- 333,601	-53.84	-151.14	+133.16
TOTAL - Wheels Up	64,000.0	355.30	22,739,200	170.57	10,916,600	3874.05	4168.72	11497.23
Product of Inertia about Centroid = $3874.65 \times 10^6 - 64,000 \times 355.3 \times 170.57$ = $3874.65 \times 10^6 - 3,878,63 \times 10^6 = -3.98 \times 10^6$ Lb. * In^2 I_x about Centroid = $4168.72 \times 10^6 - 64,000 (170.57)^2$ = $4168.72 \times 10^6 - 1862.02 \times 10^6 = 2306.70 \times 10^6$ Lb. In^2 I_z about Centroid = $11497.23 \times 10^6 - 64,000 (355.3)^2$ = $11497.23 \times 10^6 - 8079.24 \times 10^6 = 3417.99 \times 10^6$ Lb. In^2 + This value is negative due to choice of axes.								
FA-800-23								

FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION						PAGES PAGE 69		
REPORT NO. R107B-004		MODEL XC-120		PREPARED BY	CHECKED BY	APPROVED BY		
Subject: MASS MOMENTS OF INERTIA CALCULATIONS - PART III						DATE 21 July 1948		
PRODUCT OF INERTIA						REVISED 11 Feb. 1949		
Condition No. 2 - Pack On, 20% Fuel Gear Down G.W. = 52,000 Lbs.								
Centroids $\bar{X} = 341.86$; $\bar{Z} = 175.15$								
Item	Weight Lbs.	X In.	X-Moment In. Lbs.	Z In.	Z-Moment In. Lbs.	$\frac{K}{10^6}$	$\frac{I_x}{10^6}$	$\frac{I_z}{10^6}$
Weight Empty	40,465.0	340.36	13,772,690	176.26	7,132,510	2378.45	2566.47	7069.78
Pilot	200.0	128	25,600	126	25,200	3.23	3.18	3.28
Co-Pilot	200.0	128	25,600	126	25,200	3.23	3.18	3.28
Crew Chief	200.0	158	31,600	124	24,800	3.92	3.08	4.99
Navigator	200.0	268	53,600	124	24,800	6.65	3.08	14.36
Radio Operator	200.0	254	50,800	124	24,800	6.30	3.08	12.90
Trapped Fuel	100.0	372.5	37,250	153	15,300	5.70	2.34	13.88
Trapped Oil	250.0	290	72,500	165	41,250	11.96	6.81	21.03
Usable Fuel	3,204.0	372.5	1,193,490	150	480,600	179.04	267.32	640.96
Usable Oil	255.0	475	121,125	151	38,505	18.29	5.81	57.53
Misc. Equipment	27.0	275	7,425	105	2,835	0.78	0.30	2.04
Cargo	6,699.0	356.0	2,384,873	192.8	1,291,397	459.80	249.01	849.00
TOTAL - Wheels Down	52,000.0	341.86	17,776,553	175.52	9,127,197	3077.35	3113.66	8693.03

Product of Inertia about Centroid = $3077.35 \times 10^6 - 52,000 \times 341.86 \times 175.52$

= $3077.35 \times 10^6 - 3120.17 \times 10^6 = -42.82 \times 10^6 \frac{\text{Lb.} \cdot \text{In.}^2}{\text{In.}^2}$

I_x about Centroid
 = $3113.66 \times 10^6 - 52,000 (175.52)^2$
 = $3113.66 \times 10^6 - 1601.98 \times 10^6 = 1511.68 \times 10^6 \frac{\text{Lb.} \cdot \text{In.}^2}{\text{In.}^2}$

I_z about Centroid
 = $8693.03 \times 10^6 - 52,000 (341.86)^2$
 = $8693.03 \times 10^6 - 6077.15 \times 10^6 = 2615.88 \times 10^6 \frac{\text{Lb.} \cdot \text{In.}^2}{\text{In.}^2}$

* This value is negative due to choice of axes.

FA-800-23

FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION						PAGES	PAGE 70	
REPORT NO. R107B-004		MODEL XC-120		PREPARED BY	CHECKED BY	APPROVED BY		
Subject: <u>MASS MOMENTS OF INERTIA CALCULATIONS - PART III</u>						DATE <u>21 July 1948</u>		
						REVISED <u>14 Feb. 1949</u>		
<u>PRODUCT OF INERTIA</u>								
Condition No. 3 - Pack Off, Full Fuel, Gear Up, G.W. = 53,641 Lbs.								
Centroids $\bar{X}$ = 352.80 In.; $\bar{Z}$ = 153.29 In.								
Item	Weight Lbs.	X In.	X-Moment In. Lbs.	Z In.	Z-Moment In. Lbs.	K 10^6	I_x 10^6	I_z 10^6
Weight Empty	35,344.0	340.06	12,018,990	167.75	5,929,080	1964.26	2251.19	6328.51
Pilot	200.0	128	25,600	126	25,200	3.23	3.18	3.28
Co-Pilot	200.0	128	25,600	126	25,200	3.23	3.18	3.28
Crew Chief	200.0	158	31,600	124	24,800	3.92	3.08	4.99
Navigator	200.0	268	53,600	124	24,800	6.65	3.08	14.36
Radio Operator	200.0	254	50,800	124	24,800	6.30	3.08	12.90
Trapped Fuel	100.0	372.5	37,250	153	15,300	5.70	2.34	13.88
Trapped Oil	250.0	290	72,500	165	41,250	11.96	6.81	21.03
Usable Fuel	16,020.0	372.5	5,967,450	150	2,403,000	895.18	1336.64	3204.82
Usable Oil	900.0	475	427,500	151	135,900	64.55	20.52	203.06
Misc. Equipment	27.0	275	7,425	105	2,835	0.78	0.30	2.04
TOTAL - Wheels Down	53,641.0	348.96	18,718,315	161.30	8,652,165	2965.76	3633.40	9812.15
MOMENT CHANGE -- Wheels Up			+ 206,393		- 333,601	- 53.84	-151.14	+133.16
TOTAL WHEELS UP	53,641.0	352.80	18,924,708	153.08	8,318,564	2911.92	3482.26	9945.31
Product of Inertia about Centroid = $2911.92 \times 10^6 - 53,641.0 \times 352.8 \times 153.08$ $= 2911.92 \times 10^6 - 2934.82 \times 10^6 = -22.90 \times 10^6 \text{ Lb. In.}^2 *$								
$I_x \text{ about Centroid} = 3482.26 \times 10^6 - 53,641 (153.08)^2$ $= 3482.26 \times 10^6 - 1290.06 \times 10^6 = 2192.20 \text{ Lb. In.}^2$								
$I_z \text{ about Centroid} = 9945.31 \times 10^6 - 53641 (352.8)^2$ $= 9945.31 \times 10^6 - 6676.58 \times 10^6 = 3268.73 \text{ Lb. In.}^2$								
* This value is negative due to choice of axes.								

FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION						PAGES		PAGE 71	
REPORT NO. R107B-004		MODEL XC-120		PREPARED BY		CHECKED BY		APPROVED BY	
Subject: <u>MASS MOMENTS OF INERTIA CALCULATIONS - PART III</u>						DATE <u>21 July 1948</u> REVISED <u>14 Feb. 1949</u>			
<u>PRODUCT OF INERTIA</u>									
Condition No. 4 - Pack Off; 20% Fuel, Gear Down, G.W. = 40,180 Lbs.									
Centroids $\bar{X} = 339.42$ in.; $\bar{Z} = 164.59$ in.									
Item	Weight Lbs.	$\bar{X}$ In.	$\bar{X}$ -Moment In. Lbs.	$\bar{Z}$ In.	$\bar{Z}$ -Moment In. Lbs.	$\bar{K}$ 10^6	I_x 10^6	I_z 10^6	
Weight Empty	35,344	340.06	12,018,990	167.75	5,929,080	1964.26	2251.19	6328.51	
Pilot	200	128	25,600	126	25,200	3.23	3.18	3.28	
Co-Pilot	200	128	25,600	126	25,200	3.23	3.18	3.28	
Crew Chief	200	158	31,600	124	24,800	3.92	3.08	4.99	
Navigator	200	268	53,600	124	24,800	6.65	3.08	14.36	
Radio Operator	200	254	50,800	124	24,800	6.30	3.08	12.90	
Trapped Fuel	100	372.5	37,250	153	15,300	5.70	2.34	13.88	
Trapped Oil	250	290	72,500	165	41,250	11.96	6.81	21.03	
Usable Fuel	3,204	372.5	1,193,490	150	480,600	179.04	267.32	640.96	
Usable Oil	255	475	121,125	151	38,505	18.29	5.81	57.53	
Misc. Equipment	27	275	7,425	105	2,835	0.78	0.30	2.04	
TOTAL - WHEELS DOWN	40,180	339.42	13,637,980	165.07	6,632,370	2203.36	2549.37	7102.76	
Product of Inertia about Centroid = $2203.36 \times 10^6 - 40,180 \times 339.42 \times 165.07$ $= 2203.36 \times 10^6 - 2251.21 \times 10^6 = -47.8 \text{ Lb. In.}^2$ *									
$I_x \text{ about Centroid} = 2549.37 \times 10^6 - 40,180 (165.07)^2$ $= 2549.37 \times 10^6 - 1094.83 \times 10^6 = 1454.54 \text{ Lb. In.}^2$									
$I_z \text{ about Centroid} = 7102.76 \times 10^6 - 40,180 (339.42)^2$ $= 7102.76 \times 10^6 - 4628.97 \times 10^6 = 2473.79 \text{ Lb. In.}^2$									
* This value is negative due to choice of axes.									

MODEL KC120 M-107 PREPARED BY Hawley CHECKED BY Meyer

APPROVED BY

DATE July 9, 1948

REVISED Feb. 14, 1949

Subject: MASS MOMENTS OF INERTIA - Part II

Ship Empty About Ship Empty c.g.

Gear Up

Item	W	X	Y	Z	WX x 10 ⁻³	WY x 10 ⁻³	WZ x 10 ⁻³
1	2	3	4	5	6	7	8
Total Carrier Gear Down	35343.8	340.06	.04	167.75	12018.99	1.58	5929.08
Moment Changed due to Gear Up					206.4	0	-333.6
Carrier	35343.8	345.90	.04	167.75	12225.39	1.58	5595.48
Plus Pack	5121.2	342.44	0	235.0	1753.7	0	1203.43
Carrier with Pack	40465.0	345.46	.04	176.26	13979.09	1.58	6798.91

Item	WX ² x 10 ⁻⁶	WY ² x 10 ⁻⁶	WZ ² x 10 ⁻⁶	IXX x 10 ⁻⁶	IYY x 10 ⁻⁶	IZZ x 10 ⁻⁶
1	9	10	11	12	13	14
Total Carrier Gear Down	5133.33	1179.73	1050.90	20.56	15.39	15.45
Moment Change Due to Gear Up	133.16	0	-151.14	0	0	0
Carrier	5266.49	1179.73	899.76	20.56	15.39	15.45
Plus Pack	741.1	0	284.25	31.03	.17	.17
Carrier with Pack	6007.59	1179.73	1184.01	51.69	15.56	15.62
Ixx = Iox + Wy ² + Wz ² ; Iyy = Ioy + Wx ² + Wz ² ; Izz = Ioz + Wx ² + Wy ²						

Io About Ship Empty c.g.

Gear up Iox = Ixx - Wz² = 2,100,050,000 - 35,343.80(167.75)² = 1,105,47 x 10⁶ #in.²

Gear up Ioy = Iyy - (x² + z²)W = 6,181,640,000 - [(345.9)² + (167.75)²] 35,343.8 = 958.29 x 10⁶ #in.²

Gear up Ioz = Izz - Wx² = 6,461,670,000 - 35,343.8(340.06)² = 2,374.48 x 10⁶ #in.²

Gr. up and Pack Iox = Ixx - Wx² = 2,415,330,000 - 40,465.0(176.26)² = 1,158.18 x 10⁶ #in.²

Gr. up and Pack Ioy = Iyy - [x² + z²]W = 7,207,160,000 - [(345.46)² + (176.26)²] 40,465.0 = 1,120.81 x 10⁶ #in.²

Gr. up and Pack Ioz = Izz - Wx² = 7,202,940,000 - (345.46)² 40,465 = 2,373.74 x 10⁶ #in.²

REPORT NO. <u>R107B-004</u>		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE <u>49</u>
MODEL <u>XG120 M-107</u>		PREPARED BY <u>Hawley</u>	CHECKED BY <u>Mayer</u>	APPROVED BY	
Subject: <u>MASS MOMENTS OF INERTIA - Part II</u>				DATE <u>July 9, 1948</u> REVISED <u>Feb. 14, 1949</u>	

Basic Weight about Basic Weight c.g.

Gear Down

Item	W	X	Y	Z	WX x 10-3	WY x 10-3	WZ x 10-3
1	2	3	4	5	6	7	8
Weight Empty Carrier	35,343.8	340.06	.04	167.75	12,018.99	1.58	5,929.08
Trapped Fuel	100	372.5	-175	153.0	37.25	0	15.3
Trapped Oil	250	290.0	-175	165	72.50	0	41.25
Pilot	200	128	18	126.0	25.60	Small	25.2
Co-Pilot	200	128	18	126.0	25.60	Values	25.2
Navigator	200	268	34	124.0	53.60	Neglected	24.8
Radio Operator	200	254	26	124.0	50.8	in this	24.8
Crew Chief	200	158	0	124.0	31.6	Column	24.8
Misc.	27	275	0	105.0	7.43		2.84
Basic Weight of Carrier	36,720.8	335.60	.04	166.48	12,323.37	1.58	6,113.27
Plus Pack	5,121.2	342.44	0	235.0	1,753.70	0	1,203.43
Basic Weight of Carrier with Pack	41,842	336.43	.03	174.86	14,077.07	1.58	7,316.70

Basic Weight about Basic Weight c.g. (Cont.)
Gear Down (Cont.)

Item	Wx ² x 10 ⁻⁶	Wy ² x 10 ⁻⁶	Wz ² x 10 ⁻⁶	Iox x 10 ⁻⁶	Ioy x 10 ⁻⁶	Ioz x 10 ⁻⁶	Ixx x 10 ⁻⁶	Iyy x 10 ⁻⁶	Izz x 10 ⁻⁶
1	9	10	11	12	13	14	15	16	17
Weight Empty Carrier	5133.33	1179.73	1050.9	20.56	15.39	15.45	2251.19	6199.62	6328.51
Trapped Fuel	13.88	3.06	2.34				5.4	16.22	16.94
Trapped Oil	21.03	7.67	6.81				14.48	27.84	28.70
Pilot	3.28	.03	3.18				3.21	6.46	3.31
Co-Pilot	3.28	.03	3.18				3.21	6.46	3.31
Navigator	14.36	.23	3.08				3.31	17.44	14.59
Crew Chief	12.90	.14	3.08				3.22	15.98	13.04
Radio Operator	4.99	0	3.08				3.08	8.07	4.99
Misc.	2.04	0	.30				.30	2.34	2.04
Basic Weight of Carrier	5209.09	1190.89	1075.95	20.56	15.39	15.45	2287.4	6300.43	6415.43
Plus Pack	741.10	0	284.25	31.03	.17	.17	315.28	1025.52	741.27
Basic Weight of Carrier with Pack	5950.19	1190.89	1360.20	51.59	15.56	15.62	2602.68	7325.95	7156.70

$$I_{xx} = I_{ox} + W_y^2 + W_z^2; I_{yy} = I_{oy} + W_x^2 + W_z^2; I_{zz} = I_{oz} + W_x^2 + W_y^2$$

$$I_{ox} = I_{xx} - W_z^2 - \text{Carrier} = 2,287.4 \times 10^6 - 36,720.8(166.48)^2 = 1,269.66 \times 10^6 \text{ in.}^2$$

$$\text{Carrier with Pack} = 2,602.68 \times 10^6 - 41,842(174.86)^2 = 1,323.32 \times 10^6 \text{ in.}^2$$

$$I_{oy} = I_{yy} - (x^2 - z^2)W - \text{Carrier} = 6,300.43 \times 10^6 - [(335.6)^2 + (166.48)^2] 96,720.8 = 1146,92110 \text{ in.}^2$$

$$\text{Carrier with Pack} = 7,325.95 \times 10^6 - [(336.43)^2 + (174.86)^2] 41,842.0 = 1310.70 \times 10^6 \text{ in.}^2$$

$$I_{oz} = I_{zz} - W_x^2 - \text{Carrier} = 6415.43 \times 10^6 - 36,720.8(335.6)^2 = 2279.66 \times 10^6 \text{ in.}^2$$

$$\text{Carrier with Pack} = 7156.70 \times 10^6 - 41,842.0(336.43)^2 = 2420.81 \times 10^6 \text{ in.}^2$$

Basic Weight about Basic Weight c.g.

Gear Up

Item	W	X	Y	Z	Wx	Wy	Wz
1	2	3	4	5	6	7	8
Total Basic Weight of Carrier Gear Down	36720.8	335.60	.04	166.48	12323.37	1.58	6113.27
Moment Change Due to Gear Up					206.4		-333.60
Carrier Gear Up	36720.8	341.22	.043	157.39	12529.77	1.58	5779.67
Plus Pack	5121.2	342.44	0	235.0	1753.70	0	1203.43
Carrier with Pack	41842.0	341.37	.038	166.89	14283.47	1.58	6983.10

Item	Wx ² x 10 ⁻⁶	Wy ² x 10 ⁻⁶	Wz ² x 10 ⁻⁶	Iox x 10 ⁻⁶	Ioy x 10 ⁻⁶	Ioz x 10 ⁻⁶	Ixx x 10 ⁻⁶	Iyy x 10 ⁻⁶	Izz x 10 ⁻⁶
1	9	10	11	12	13	14	15	16	17
Total Basic Weight of Carrier Gear Down	5209.09	1190.89	1075.95	20.56	15.39	15.45	2287.40	6300.43	6415.43
Moment Changes Due to Gear Up	133.16	0	-151.14	0	0	0	-151.14	-17.98	133.16
Carrier Gear Up	5342.25	1190.89	924.81	20.56	15.39	15.45	2136.26	6282.45	6548.59
Plus Pack	741.10	0	284.25	31.03	.17	.17	315.28	1025.52	741.27
Carrier with Pack	6083.35	1190.89	1209.06	51.59	15.56	15.62	2451.54	7307.97	7289.86

Ixx, Iyy and Izz - ref. Page 48 for Formula

$$I_{ox} = I_{xx} + Wz^2 \text{ Carrier} = 2136.26 \times 10^6 - 36,720.8(157.39)^2 = 1,226.63 \times 10^6 \text{ in}^2$$

$$\text{Carrier with Pack} = 2,451.54 \times 10^6 - 41,842(166.89)^2 = 1,286.15 \times 10^6 \text{ in}^2$$

$$I_{oy} = I_{yy} - (x^2 + z^2)W, \text{ Carrier} = 6,282.45 \times 10^6 - [(341.22)^2 + (157.39)^2]36,720.8 = 1097.37 \times 10^6 \text{ in}^2$$

$$\text{Carrier with Pack} = 7307.97 \times 10^6 - [(341.37)^2 + (166.89)^2]41,842 = 1,266.58 \times 10^6 \text{ in}^2$$

$$I_{oz} = I_{zz} - Wx^2 \text{ Carrier} = 6,548.59 \times 10^6 - 36,720.8(341.22)^2 = 2,273.15 \times 10^6 \text{ in}^2$$

$$\text{Carrier with Pack} = 7289.86 \times 10^6 - 41,842(341.37)^2 = 2,413.87 \times 10^6 \text{ in}^2$$

MODEL XC120 M-107

PREPARED BY Hawley

CHECKED BY Meyer

APPROVED BY

Subject: MASS MOMENTS OF INERTIA - Part II

DATE July 9, 1948

REVISED Feb. 14, 1949

Landing Conditions

Airplane c. g. # 1L and #1AL - M.P.W. (Gear Down)

Item	W	X	Y	Z	$W_x \times 10^{-3}$	$W_y \times 10^{-3}$	$W_z \times 10^{-3}$
1	2	3	4	5	6	7	8
Basic Weight	36720.8	335.6	.04	166.48	12323.37	1.58	6113.27
Less							
Navigator	200	268.0	34.0	124.0	-53.6	Small	-24.8
Crew Chief	200	158.0	0	124.0	-31.6	values	-24.8
Radio Operator	200	254.0	26.0	124.0	-50.8	neglec-	-24.8
Misc.	27	275.0	0	105.0	-7.43	ted	-2.84
Plus							
Min. Fuel (5%)	801	372.5	175	144	298.37	0	115.34
Min. Oil (25%)	225	475.0	175	151	106.68	0	33.98
Carrier -c.g. 1L	37119.8	339.04	.0425	166.63	12585.19	1.58	6185.35
Plus Pack	5121.2	342.44	0	235	1753.7	0	1203.43
Carrier with Pack c.g. (1AL)	42241.0	339.45	.037	174.92	14338.89	1.58	7388.78

Wy column is neglected because it is equal distance off each side and adds out.

MODEL XC120 M-107

PREPARED BY Hawley

CHECKED BY Meyer

APPROVED BY

Subject: MASS MOMENTS OF INERTIA - Part II

DATE July 9, 1948

REVISED Feb. 14, 1949

Landing Conditions

Airplane c.g. #1L and 1AL - M.F.W. (Gear Down)(Cont.)

Item	Wx^2 $\times 10^{-6}$	Wy^2 $\times 10^{-6}$	Wz^2 $\times 10^{-6}$	I_{ox} $\times 10^{-6}$	I_{oy} $\times 10^{-6}$	I_{oz} $\times 10^{-6}$	I_{xx} $\times 10^{-6}$	I_{yy} $\times 10^{-6}$	I_{zz} $\times 10^{-6}$
1	9	11	11	12	13	14	15	16	17
Basic Weight	5209.09	1190.89	1075.95	20.56	15.39	15.45	2287.40	6300.43	6415.43
Less									
Navigator	-14.36	-23	-3.08				-3.31	-17.44	-14.59
Crew Chief	-4.99	0	-3.08				-3.08	-8.07	-4.99
Radio Operator	-12.90	-14	-3.08				-3.22	-15.98	-13.04
Misc.	-2.04	0	-3.30				-3.30	-2.34	-2.04
Plus									
Min. Fuel (5%)	111.14	24.53	16.61				41.14	127.75	135.67
Min. Oil (25%)	50.77	6.89	5.13				12.02	59.90	57.66
Carrier c.g. 1L	5336.71	1221.94	1088.15	20.56	15.39	15.45	2330.65	6444.25	6574.1
Plus Pack	741.1	0	284.25	31.03	.17	.17	315.25	1025.52	741.27
Carrier with Pack	6077.81	1221.94	1372.40	51.59	15.56	15.62	2645.93	7469.77	7315.37

Ixx, Iyy and Izz - Ref. page 48 for Formula

$$I_{ox} = I_{xx} - Wx^2 \quad \text{carrier} = 2330.65 \times 10^6 - 37119.8 (166.63)^2 = 1300.0 \times 10^6 \text{ #in.}^2$$

$$\text{Carrier with Pack} = 2645.93 \times 10^6 - 42241 (174.92)^2 = 1353.48 \times 10^6 \text{ #in.}^2$$

$$I_{oy} = I_{yy} - (x^2 + z^2)W - \text{Carrier} = 6444.25 \times 10^6 - [(339.04)^2 + (166.63)^2] 37119.8 = 1146.75 \times 10^6 \text{ #in.}^2$$

$$\text{Carrier with Pack} = 7469.77 \times 10^6 - [(339.45)^2 + (174.92)^2] 42241.0 = 1310.05 \times 10^6 \text{ #in.}^2$$

$$I_{oz} = I_{zz} - Wz^2 \quad \text{Carrier} = 6574.1 \times 10^6 - 37119.8 (339.04)^2 = 2307.25 \times 10^6 \text{ #in.}^2$$

$$\text{Carrier with Pack} = 7315.37 \times 10^6 - 42,241.0 (339.45)^2 = 2448.1 \times 10^6 \text{ #in.}^2$$

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LANDING CONDITION

Airplane c.g. #2L - 60,000 # Gross Weight, Max. Cargo (high)
Min. Fuel Gear Down.

Determination of Cargo c.g.

Item	W	x	x	Wx x10 ⁻³	Ws x10 ⁻³
Basic Weight	41,842	336.43	174.86	14077.07	7136.70
Min. Fuel	801	372.5	144.0	298.37	115.34
Min. Oil	225	475.0	151.0	106.88	33.98
**Cargo Dist	17,132	x	*204.2	17.132x	3498.35
	60,000	336.34	179.74	14482.32	10,784.37
				+ 17.132x	

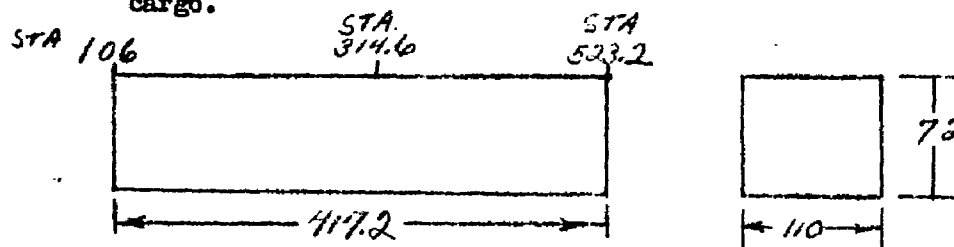
* Cargo c.g. assumed 60" above pack floor.

** 20% M.A.C.

$$\frac{14,482,320 + 17.132x}{60,000} = 336.34 = (\text{Station } 318.34)$$

$$x = \frac{60,000 (336.34) - 14,482,320}{17132} = 332.6 = \text{Station } 314.6$$

Assumed cargo distribution and moment of inertia for distributed cargo.



$$I_{ox} = \frac{17132}{12} (110^2 + 72^2) = 24.876 \times 10^6 \text{ #in.}^2$$

$$I_{oy} = \frac{17132}{12} (417.2^2 + 72^2) = 255.898 \times 10^6 \text{ #in.}^2$$

$$I_{oz} = \frac{17132}{12} (417.2^2 + 72^2) = 265.768 \times 10^6 \text{ #in.}^2$$

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LANDING CONDITIONS

Airplane c.g. #2L (Cont'd) Gear Down

Item	W	Ixx 10 ⁻⁶	Iyy x10 ⁻⁶	Izz x10 ⁻⁶
Basic Weight	41,842	2,602.82	7325.95	7156.7
Min. Fuel	801	41.14	127.75	135.67
Min. Oil	225	12.02	59.90	57.66
Cargo (dist.)	17,132	* 739.04	2865.45	* 2160.96
	60,000	3,395.02	10,379.05	9,510.99

*Cargo Moments of Inertia

$$I_{xx} = I_{ox} + Wz^2 = 24.676 \times 10^6 + 17132 (204.2)^2 = 739.04 \times 10^6 \text{ in.}^2$$

$$I_{yy} = I_{oy} + W(z^2 + x^2) = 255.898 \times 10^6 + 17132 (332.6^2 + 204.2^2) = 2,865.45 \times 10^6 \text{ in.}^2$$

$$I_{zz} = I_{oz} + Wx^2 = 265.76 \times 10^6 + 17132 (332.6)^2 = 2,160.957 \times 10^6$$

Airplane Moments of Inertia

$$I_{ox} = I_{xx} - Wz^2 = 3,395.02 \times 10^6 - 17132 (179.74)^2 = 2,841.55 \times 10^6 \text{ in.}^2$$

$$I_{oy} = I_{yy} - W(z^2 + x^2) = 10,379.05 \times 10^6 - 17132 \left(\frac{179.74^2}{2} + \frac{336.34^2}{2} \right) = 7887.53 \times 10^6 \text{ in.}^2$$

$$I_{oz} = I_{zz} - W(x^2) = 9,510.99 \times 10^6 - 60,000 (336.34)^2 = 2,723.51 \times 10^6 \text{ in.}^2$$

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LANDING CONDITIONS

Airplane c.g. #2AL-44,106 Gross Weight, Min. Fuel, 1238# Cargo High Gear Down

Determination of Cargo c.g.

Item	W	x	z	Wx x10 ⁻³	Wz x10 ⁻³
Basic Weight	41,842	336.43	174.86	14077.07	7316.70
Min. Fuel	801	372.5	144.0	298.37	115.34
Min. Oil	225	475.	151.0	106.88	33.98
Cargo (dist)	1,238	x	*204.2	1.238x	252.80
	44,106	**	175.01	14482.32 +1.238x	7718.82

* Cargo c.g. assumed 60" above pack floor

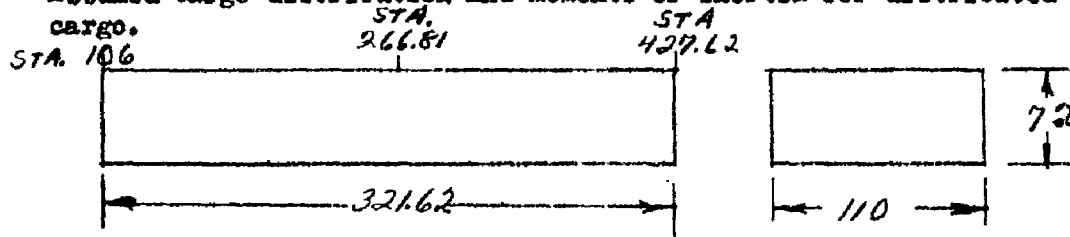
** 20% M.A.C.

$$336.34 = \frac{14,482.32 + 1.238x}{44,106}$$

$$x = \frac{44,106 (336.34) - 14,482,000}{1.238} = \frac{14,834.6 - 14,482.0}{1.238}$$

$$\frac{352.6}{1.238} = 284.81 \quad \text{Station} = 266.81$$

Assumed Cargo distribution and moments of inertia for distributed cargo.



$$I_{ox} = \frac{1,238}{12} (110^2 + 72^2) = 1.78 \times 10^6 \text{ in.}^2$$

$$I_{oy} = \frac{1,238}{12} (321.62^2 + 72^2) = 11.21 \times 10^6 \text{ in.}^2$$

$$I_{oz} = \frac{1,238}{12} (321.62^2 + 110^2) = 11.92 \times 10^6 \text{ in.}^2$$

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LANDING CONDITIONS

Airplane c.g. #2AL (cont'd) (Gear Down)

Item	W	Ixx x10 ⁻⁶	Iyy x10 ⁻⁶	Izz x10 ⁻⁶
Basic Weight	41,843	2,602.82	7325.95	7158.7
Min. Fuel	801	41.14	127.75	135.67
Min. Oil	225	12.02	59.90	57.66
Cargo dist.	1,238	* 53.4	*163.25	112.34
	44,106	2,709.38	7676.85	7462.37

* Cargo Moments of Inertia

$$I_{xx} = I_{ox} + Wz^2 = 1.78 + 1.238 (204.2)^2 = 53.4 \times 10^6 \text{ in.}^2$$

$$I_{yy} = I_{oy} + W(z^2 + x^2) = 11.21 \times 10^6 + 1,238 \left(\frac{2^2}{204.2} + \frac{2^2}{284.81} \right) = 163.25 \times 10^6 \text{ in.}^2$$

$$I_{zz} = I_{oz} + W(x^2) = 11.92 \times 10^6 + 1,238 (284.81)^2 = 112.34 \times 10^6 \text{ in.}^2$$

Airplane Moments of Inertia

$$I_{ox} = I_{xx} - Wz^2 = 2709.38 \times 10^6 - 1238 \left(\frac{2^2}{175.01} \right) = 2671.46 \times 10^6 \text{ in.}^2$$

$$I_{oy} = I_{yy} - W(z^2 + x^2) = 7676.85 \times 10^6 - 1238 \left(\frac{2^2}{175.01} + \frac{2^2}{336.34} \right) = 7498.88 \times 10^6 \text{ in.}^2$$

$$I_{oz} = I_{zz} - W(x^2) = 7,462.37 \times 10^6 - 44,106 (336.34^2) = 2472.9 \times 10^6 \text{ in.}^2$$

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LANDING CONDITONS

Airplane c.g. #3L - 60,000# gross weight, Full Fuel, 1,238# Cargo (High)
Gear (Down)

Determination of Cargo c.g.

Item	W	x	z	$Wx \times 10^{-3}$	$Wz \times 10^{-3}$
Basic Weight	41842	338.43	74.86	14077.07	7316.70
Full Fuel	16020	372.5	150.0	5967.5	2403.2
Full Oil	900	476	151.0	427.5	135.9
*Cargo Dist.	1238	284.81	204.26	352.59	252.8
	60,000	347.08	168.47	20824.66	10108.61

*Reference to page 56

Item	$I_{xx} \times 10^{-6}$	$I_{yy} \times 10^{-6}$	$I_{zz} \times 10^{-6}$
Basic Weight	2602.82	7325.95	7156.7
Full Fuel	1336.6	2590.8	3204.8
Full Oil	***20.52	***223.58	***203.06
Cargo (Dist.)	***31.82	***152.04	***100.42
	4011.56	10292.37	10664.98

Item	$Wx^2 \times 10^{-6}$	$Wy^2 \times 10^{-6}$	$Wz^2 \times 10^{-6}$
Full Oil	203.06	0	20.52
Cargo (dist)	100.42	0	51.62

$$\begin{aligned}
 &*** (I_{xx} = I_{ox} + Wy^2 + Wz^2) \\
 &(I_{yy} = I_{oy} + Wx^2 + Wz^2) \\
 &(I_{zz} = I_{oz} + Wx^2 + Wy^2)
 \end{aligned}$$

Airplane moments of Inertia

$$I_{ox} = I_{xx} - W(z^2) = 4011.56 \times 10^6 - 60,000(168.47)^2 = 2308.63 \times 10^6 \text{ in.}^2$$

$$I_{oy} = I_{yy} - W(x^2 + z^2) = 10292.37 \times 10^6 - 60,000 \left(\frac{168.47^2}{2} + \frac{347.08^2}{2} \right) = 1361.57 \times 10^6 \text{ in.}^2$$

$$I_{oz} = I_{zz} - W(x^2) = 10,664.98 \times 10^6 - 60,000 \left(\frac{347.08^2}{2} \right) = 3437.11 \times 10^6 \text{ in.}^2$$

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LANDING CONDITIONS

Airplane c.g. #5L - 60,000# gross weight, Max. Cargo (low)
Min. Fuel (Gear Down)

Determination of cargo c.g.

Item	W	x	z	Wx x10 ⁻³	Wz x10 ⁻³
Basic Weight	41842	336.43	174.86	14077.07	7316.7
Min. Fuel	801	372.5	144	298.37	115.34
Min. Oil	225	475.0	151	106.88	33.98
Cargo	17132	x	258.2	17.132x	4423.48
	60,000	336.34	198.16	14482.32 +17.132x	11889.5

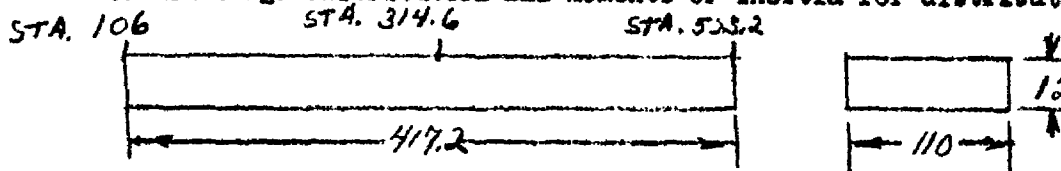
$$336.34 = \frac{14,482.32 + 17,132x}{60,000}$$

$$x = \frac{336.34 (60,000) - 14,482.32 \times 10^3}{17,132} = \frac{20,180.4 \times 10^3 - 14,482.32 \times 10^3}{17,132}$$

$$= \frac{5698.08 \times 10^3}{17132}$$

$$x = 332.6 \text{ station} = 314.6$$

Assumed cargo distribution and moments of inertia for distributed cargo.



$$I_{ox} = \frac{17132}{12} [(110)^2 + (12)^2] = 17.48 \times 10^6 \text{ in.}^2$$

$$I_{oy} = \frac{17132}{12} [(417.2)^2 + (12)^2] = 248.70 \times 10^6 \text{ in.}^2$$

$$I_{oz} = \frac{17132}{12} [(417.2)^2 + (110)^2] = 265.78 \times 10^6 \text{ in.}^2$$

$$I_{xx} = I_{ox} + Wz^2 = 17.48 \times 10^6 + 17132(258.2)^2 = 1159.62 \times 10^6 \text{ in.}^2$$

$$I_{yy} = I_{oy} + W(x^2 + z^2) = 248.7 \times 10^6 + 17132 \left(\frac{332.6^2}{2} + \frac{258.2^2}{2} \right) = 3,286.03 \times 10^6 \text{ in.}^2$$

$$I_{zz} = I_{oz} + W(x^2) = 265.78 \times 10^6 + 17132(332.6)^2 = 2,160.97 \times 10^6 \text{ in.}^2$$

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LANDING CONDITIONS

Airplane c.g. #5L (cont'd) - 60,000# G. W., Max. Cargo (low), Min. Fuel (Gear Down)

Item	W	I_{xx-6} $\times 10^6$	I_{yy-6} $\times 10^6$	I_{zz-6} $\times 10^6$
Basic Weight	41842	2602.68	7325.95	7156.70
Min. Fuel	801	41.14	127.75	135.67
Min. Oil	225	12.02	59.9	57.66
Cargo (Dist.)	17132	* 1159.62	* 3286.03	* 2160.97
Total	60000	3815.46	10799.63	9511.0

* Cargo Moments of Inertia

Airplane moments of inertia about c.g. #5L

$$I_{ox} = I_{xx} - Wz^2 = 3815.46 \times 10^6 - 60,000 (198.16)^2 = 1459.42 \times 10^6 \text{ #}^2$$

$$I_{oy} = I_{yy} - W(x^2 + z^2) = 10,799.13 \times 10^6 - 60,000 (336.34^2 + 198.16^2) = 1,656.11 \times 10^6 \text{ #}^2$$

$$I_{oz} = I_{zz} - Wx^2 = 9,511.0 \times 10^6 - 60,000 (336.34)^2 = 2,723.52 \times 10^6 \text{ #}^2$$

REPORT NO. <u>RL07B-004</u>		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE <u>62</u>
MODEL <u>XC-120</u>	PREPARED BY <u>Hawley</u>	CHECKED BY <u>Meyer</u>	APPROVED BY		
Subject: <u>MASS MOMENTS OF INERTIA - Part II</u>			DATE <u>July 9, 1948</u> REVISED <u>Feb. 14, 1949</u>		

LANDING CONDITIONS

Airplane c.g. #61 - 60,000# Gross Weight, Min. Fuel and Oil, Max. Cargo Aft (low)
(Gear Down)

Item	W	X	Z	$WX \times 10^{-3}$	$WZ \times 10^{-3}$
Basic Weight	41842	336.43	174.86	14077.07	7316.7
Min. Fuel	801	372.5	144	298.37	115.34
Min. Oil	225	475.0	151	106.88	33.98
Cargo (dist.)	17132	x	258.2	17.132x	4423.48
Total	60000	353.17	198.16	14482.32 +17.132 x	11889.5

30% M.A.C.

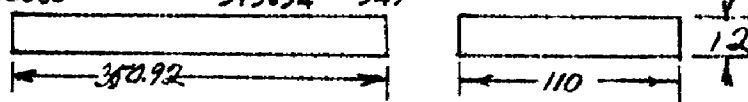
$$353.17 = \frac{17132 x + 14,482.32 \times 10^3}{60,000}$$

$$x = \frac{60,000 (353.17) - 14,482,320}{17132} = 391.54$$

= Sta. 373.54

Assumed cargo distribution and moments of inertia for distributed cargo

STA. 198.08 Sta. 373.54 Sta. 549



$$I_{ox} = \frac{17132}{12} [(110)^2 + (12)^2] = 17.48 \times 10^6 \text{ in}^2$$

$$I_{oy} = \frac{17132}{12} [(350.92)^2 + (12)^2] = 176.02 \times 10^6 \text{ in}^2$$

$$I_{oz} = \frac{17132}{12} (350.92^2 + 110^2) = 193.08 \times 10^6 \text{ in}^2$$

$$I_{xx} = I_{ox} + W_z^2 = 17.48 \times 10^6 + 17132 (258.2)^2 = 1159.62 \times 10^6 \text{ in}^2$$

$$I_{yy} = I_{oy} + W(x^2 + z^2) = 176.02 \times 10^6 + 17132 (258.2 + 391.54)^2 = 3,944.56 \times 10^6 \text{ in}^2$$

$$I_{zz} = I_{oz} + W_x^2 = 193.08 \times 10^6 + 17132 (391.54)^2 = 2,819.48 \times 10^6 \text{ in}^2$$

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				REVISED	Feb. 14, 1949

LANDING CONDITIONS

Airplane c.g. #6L (cont'd) 60,000# Gross Weight, Min. Fuel and Oil
Max. Cargo Aft (low) (Gear Down)

Item	W	I_{xx-6} $\times 10^{-6}$	I_{yy-6} $\times 10^{-6}$	I_{zz-6} $\times 10^{-6}$
Basic Weight	41842	2602.68	7325.95	7156.70
Min. Fuel	801	41.14	127.75	135.67
Min. Oil	225	12.02	59.9	57.66
Cargo	* 17132	* 1159.62	* 3944.56	* 2819.48
	60000	3815.46	11458.16	10169.51

* Cargo moments of inertia

Airplane moments of inertia about c.g. #6L

$$I_{Ox} = I_{xx} - Wz^2 = 3815.46 \times 10^6 - 60,000 (198.16)^2 = 1,459.42 \times 10^6 \text{ #}^2$$

$$I_{Oy} = I_{yy} - W(x^2 + z^2) = 11458.16 \times 10^6 - 60,000 (198.16^2 + 353.7^2) = 1618.37 \times 10^6 \text{ #}^2$$

$$I_{Oz} = I_{zz} - Wx^2 = 10,169.51 \times 10^6 - 60,000 (353.17)^2 = 2,685.77 \times 10^6 \text{ #}^2$$

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MODEL XC-120	M-107	PREPARED BY Hawley	CHECKED BY Meyer	APPROVED BY	
Subject: MASS MOMENTS OF INERTIA - Part II				DATE July 9, 1948 REVISED Feb. 14, 1949	

LANDING CONDITIONS

Airplane c.g. #7L - 60,000# Gross Weight, Full Fuel and Oil, Cargo (high) Aft
(Gear Down)

Item	W	X	Z	WX $\times 10^{-3}$	WZ $\times 10^{-3}$
Basic Weight	41842	336.43	174.86	14077.07	7316.7
Full Fuel	16020	372.5	144.0	5967.5	2403.2
Full Oil	900	475	151.0	427.5	135.9
Cargo (dist.)	1238	x	204.2	1.238 x	252.79
Total	60000	353.17	168.48	20472.07 + 1.238 x	10108.59

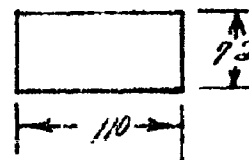
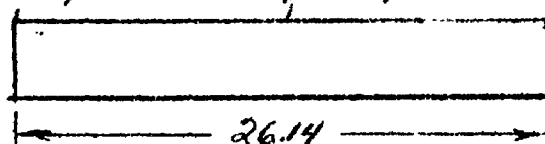
30% M.A.C.

$$353.17 = \frac{20,472,070 + 1,238 x}{60,000}$$

$$x = \frac{60,000 (353.17) - 20,472,070}{1,238} = 580.07 = \text{Sta. } 562.07$$

Assumed cargo distribution and moments of inertia for distributed cargo

STA. 519 STA. 562.07 STA. 585.14



$$I_{ox} = \frac{1238}{12} 110^2 + 72^2 = 1.78 \times 10^6 \text{ in}^2$$

$$I_{oy} = \frac{1238}{12} 26.14^2 + 72^2 = 0.61 \times 10^6 \text{ in}^2$$

$$I_{oz} = \frac{1238}{12} 26.14^2 + 110^2 = 1.32 \times 10^6 \text{ in}^2$$

$$I_{xx} = I_{ox} + W_z^2 = 1.78 \times 10^6 + 1238 (204.2)^2 = 53.40 \times 10^6 \text{ in}^2$$

$$I_{yy} = I_{oy} + W (z^2 + x^2) = .61 \times 10^6 + 1238 (204.2^2 + 580.07^2) = 468.8 \times 10^6 \text{ in}^2$$

$$I_{zz} = I_{oz} + W (x^2) = 1.32 \times 10^6 + 1238 (580.07)^2 = 417.88 \times 10^6 \text{ in}^2$$

MODEL

XC-120

PREPARED BY Hawley

CHECKED BY Meyer

APPROVED BY

Subject:—

MASS MOMENTS OF INERTIA - Part II

DATE July 9, 1949

REVISED Feb. 14, 1949

LANDING CONDITIONSAirplane c.g. #7L (cont'd) 60000# Gross Weight, Full Fuel, Cargo (high) Aft
(Gear Down).

Item	W	I_{xx} $\times 10^{-6}$	I_{yy} $\times 10^{-6}$	I_{zz} $\times 10^{-6}$
Basic Weight	41842	2,602.68	7325.95	7156.70
Full Weight	16020	1,336.6	2590.8	3204.8
Full Oil	900	20.52	223.8	203.06
Cargo	1238	*53.40	*468.8	*417.88
Total	60000	4,013.2	10609.35	10,982.44

*Cargo moments of inertia.

Airplane moments of inertia about c.g. #7L.

$$I_{O_x} = I_{xx} - W(z)^2 = 4013.2 \times 10^6 - 60,000 (168.48)^2 = 2310.07 \times 10^6 \text{ in}^2$$

$$I_{O_y} = I_{yy} - W(z^2 + x^2) = 10609.35 \times 10^6 - 60000 (168.48^2 + 353.17^2) = 1522.48 \times 10^6 \text{ in}^2$$

$$I_{O_z} = I_{zz} - W(x^2) = 10982.44 \times 10^6 - 60000 (353.17)^2 = 3498.7 \times 10^6 \text{ in}^2$$

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MODEL	XC-120	PREPARED BY	Hawley	CHECKED BY	Meyer
Subject: MASS MOMENTS OF INERTIA - Part II				APPROVED BY	
				DATE	July 9, 1948
				REVISED	Feb. 14, 1949

SUMMARY OF NORMAL GROSS WEIGHT LANDING CONDITIONS

(Gear Down)

C.g. Location	Ref. Page	Condition	I_{ox} Slug Ft. ²	I_{oy} Slug Ft. ²	I_{oz} Slug Ft. ²
1L	53	M.F.W. Pack Off	280,360	247,315	497,600
1AL	53	M.F.W. Pack On	291,900	282,500	527,970
2L	55	G.W. = 60,000# Min. Fuel, Max. Cargo (High)	612,820	1,701,000	587,400
2AL	57	G.W. = 44,106# Min. Fuel, 1238# Cargo (High)	576,100	1,617,200	533,300
3L	58	G.W. = 60,000# Max. Fuel 1238# Cargo (High)	497,900	293,600	741,300
4L	59	G.W. = 53640.8 Max. Fuel No Cargo - Pack Off	485,000	256,000	709,800
4AL	59	G.W. = 58762 Max. Fuel No Cargo - Pack On	497,500	292,200	740,200
5L	61	G.W. = 60,000# Min. Fuel Max. Cargo Aft (low)	314,700	357,160	587,400
6L	63	G.W. = 60,000# Min. Fuel Max. Cargo Aft (low)	336,300	349,000	579,200
7L	65	G.W. = 60,000# Max. Fuel 1238# Cargo (High)	498,000	328,300	754,600

REPORT NO. R107B-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 72
MODEL	XC-120	PREPARED BY	CHECKED BY	APPROVED BY	
Subject: MASS MOMENTS OF INERTIA CALCULATIONS - PART IV				DATE 14 Feb 1949	
				REVISED	
PART IV					
Ly FOR MANEUVERING HORIZONTAL TAIL LOADS					
FA-800 23					

MODEL XC-120

PREPARED BY

CHECKED BY

APPROVED BY

Subject: MASS MOMENTS OF INERTIA CALCULATIONS - PART IV

DATE 14 Feb 1949

REVISED

Iy For Maneuvering Horizontal Tail Loads

20% MAC - Low

Item	Weight Lbs.	X In.	X-Moment In. Lbs.	Z In.	Z-Moment In. Lbs.	Iyy
Weight Empty	40,465.0	340.3	13,772,690	176.3	7,132,510	7225.14
Pilot	200.0	128.	25,600	126.	25,200	6.45
Co-Pilot	200.0	128.	25,600	126.	25,200	6.45
Navigator	200.0	158.	31,600	124.	24,800	8.07
Radio Operator	200.0	268.	53,600	124.	24,800	17.44
Crew Chief	200.0	254.	50,800	124.	24,800	15.98
Trapped Fuel	100.0	372.5	37,250	153.	15,300	16.22
Trapped Oil	250.0	298.	72,500	165.	41,250	27.83
Usable Fuel	16,020.0	372.5	5,967,450	150.	2,403,000	2590.76
Usable Oil	900.0	475.	427,500	151.	135,900	223.58
Misc. Equipment	27.0	275.	7,425	105.	2,835	2.34
Cargo	5,238.0	168.2	881,272	258.2	1,352,452	511.86*
TOTAL - Wheels Down	64,000.0		21,353,287		11,208,047	10,652.12
Change - Wheels Up			+206,393		-333,601	-17.98
TOTAL - Wheels Up	64,000.0	336.87	21,559,680	169.91	10,874,446	10,634.14

$$I_y = 10,634.14 - 64,000 \left[(336.87)^2 + (169.91)^2 \right] = 1,523.69 \times 10^6 \text{ lb. in}^2$$

* Includes $14.47 \times 10^6 \text{ lb. in}^2$ for I_{y0} about its centroid assuming low distributed loading = $\frac{5238}{12} \left[(72.0)^2 + (167.2)^2 \right]$

REPORT NO. R107B-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 74
MODEL XC-120	PREPARED BY	CHECKED BY	APPROVED BY		
Subject: MASS MOMENTS OF INERTIA CALCULATIONS - PART IV			DATE 14 Feb 1949		
			REVISED		

Iy For Maneuvering Horizontal Tail Loads

35% MAC - High

Item	Weight Lbs.	X In.	X-Moment In. Lbs.	Z In.	Z-Moment In. Lbs.	Iyy
Weight Empty	40,465.0	340.3	13,772,690	176.3	7,132,510	7225.14
Pilot	200.0	128.	25,600	126.	25,200	6.45
Co-Pilot	200.0	128.	25,600	126.	25,200	6.45
Navigator	200.0	158.	31,600	124.	24,800	8.07
Radio Operator	200.0	268.	53,600	124.	24,800	17.44
Crew Chief	200.0	254.	50,800	124.	24,800	15.98
Trapped Fuel	100.0	372.5	37,250	153.	15,300	16.22
Trapped Oil	250.0	298.	72,500	165.	41,250	27.83
Usable Fuel	16,020.0	372.5	5,967,450	150.	2,403,000	2590.76
Usable Oil	900.0	475.	427,500	151.	135,900	223.58
Misc. Equipment	27.0	275.	7,438	105.	2,835	2.34
Cargo	5,238.0	476.6	2,496,619	204.2	1,069,600	1424.74 *
TOTAL - Wheels Down	64,000.0		22,968,647		10,925,195	11,565.00
Change - Wheels Up			+ 206,393		- 333,601	-17.98
TOTAL - Wheels Up	64,000.0	362.11	23,175,040	165.49	10,591,594	11,547.02

$$I_y = 11,547.02 - 64,000 \left[(362.11)^2 + 165.49^2 \right] = 1402.38 \times 10^6 \text{ lb. in}^2$$

* Includes $16.53 \times 10^6 \text{ lb. in}^2$ for I_{yo} about its centroid assuming distributed loading

$$= \frac{5238}{12} \left[(72.0)^2 + (180.8)^2 \right]$$

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MODEL XC-120	PREPARED BY	CHECKED BY	APPROVED BY		
Subject: MASS MOMENTS OF INERTIA CALCULATIONS - PART III				DATE 21 July 1948 REVISED 14 Feb. 1949	
P A R T III PRODUCT OF INERTIA - ASSUMED LOADINGS NOTE: Reference Data page 2.					
14-800 23					

REPORT NO. R107B-004				FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 75
MODEL XC-120	PREPARED BY		CHECKED BY		APPROVED BY		
Subject: <u>MASS MOMENTS OF INERTIA CALCULATIONS - PART IV</u>					DATE <u>14 Feb 1949</u>		
					REVISED		
<u>Iy For Maneuvering Horizontal Tail Loads</u> <u>Detachable Fuselage - Off</u>							
Forward Low							
Item	Weight Lbs.	X In.	X-Moment In. Lbs.	Z In.	Z-Moment In. Lbs.	Iyy	
Weight Empty	35,344.0	340.1	12,018,990	167.8	5,929,080	6199.62	
Pilot	200.0	128.	25,600	126.	25,200	6.45	
Co-Pilot	200.0	128.	25,600	126.	25,200	6.45	
Navigator	200.0	268.	53,600	124.	24,800	8.07	
Radio Operator	200.0	254.	50,800	124.	24,800	17.44	
Crew Chief	200.0	158.	31,600	124.	24,800	15.98	
Misc. Equipment	27.0	275.	7,425	105.	2,835	2.34	
Trapped Fuel	100.0	372.5	37,250	153.	15,300	16.22	
Trapped Oil	250.0	290.	72,500	165.	41,250	27.83	
TOTAL - Wheels Down	36,721.0	335.59	12,323,365	166.48	6,113,265	6300.40	
$I_y = 6,300.40 \times 10^6 - 36.721 [(335.59)^2 + (166.48)^2] = 1147.11 \times 10^6 \text{ lb. in}^2$							

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MODEL XC-120	PREPARED BY	CHECKED BY	APPROVED BY			
Subject: MASS MOMENTS OF INERTIA CALCULATIONS - PART IV			DATE 14 Feb 1949			
RESTRICTED			REVISED			
<u>Iy For Maneuvering Horizontal Tail Loads</u> <u>Detachable Fuselage - Off</u>						
Aft - High						
Item	Weight Lbs.	X In.	X-Moment In. Lbs.	Z In.	Z-Moment In. Lbs.	Iyy
Weight Empty	35,344.0	340.1	12,018,990	167.8	5,929,080	6199.62
Pilot	200.0	128.	25,600	126.	25,200	6.45
Co-Pilot	200.0	128.	25,600	126.	25,200	6.45
Navigator	200.0	268.	53,600	124.	24,800	8.07
Radio Operator	200.0	254.	50,800	124.	24,800	17.44
Crew Chief	200.0	158.	31,600	124.	24,800	15.98
Misc. Equipment	27.0	275.	7,425	105.	2,835	2.34
Trapped Fuel	100.0	372.5	37,250	153.	15,300	16.22
Trapped Oil	250.0	290.	72,500	165.	41,250	27.83
Usable Fuel	16,020.0	372.5	5,967,450	150.	2,403,000	2590.76
Usable Oil	900.0	475.	427,500	151.	135,900	223.58
TOTAL - Wheels Down	53,641.0		18,718,315		8,652,165	9114.74
MOMENT CHANGE - Wheels Up			+206,393		-333,601	-17.98
TOTAL - Wheels Up	53,641.0	352.80	18,924,708	155.08	8,318,564	9096.76
$I_y = 9096.76 \times 10^6 - 53,641 [(352.8)^2 + (155.08)^2] = 1130.13 \times 10^6 \text{ lb. in}^2$						

ENGINEERING REPORT NO.

R107B-004

REV

SUBJECT

MASS MOMENTS OF INERTIA CALCULATIONS

MODEL: XC-120



FAIRCHILD AIRCRAFT

Division of
FAIRCHILD ENGINE & AIRPLANE CORPORATION
HAGERSTOWN, MARYLAND

Date: 6 May 1948

Prepared By J. W. O. Baker
J. W. O. Baker

No. Pages: 45 (PART I)
 21 (PART II)
 5 (PART III)
 5 (PART IV)
 9 (PART V)

Checked By _____
Approved By C. F. Comstock
C. F. Comstock

REVISIONS

Date	Pages Affected	By	Remarks
2/14/49	All pages.	J.W.O.Baker	PART I completely revised.
2/14/49	All pages.	J. Myers	PART II completely revised.
2/14/49	All pages.	J.W.O.Baker	PART III completely revised.
2/14/49	Pages 72, 73, 74, 75, 76	J.W.O.Baker	PART IV Added.
3/14/49	Pgs. 55, 57, 66 of Part II revised.	Hawley	

MODEL XC-120

PREPARED BY

CHECKED BY

APPROVED BY

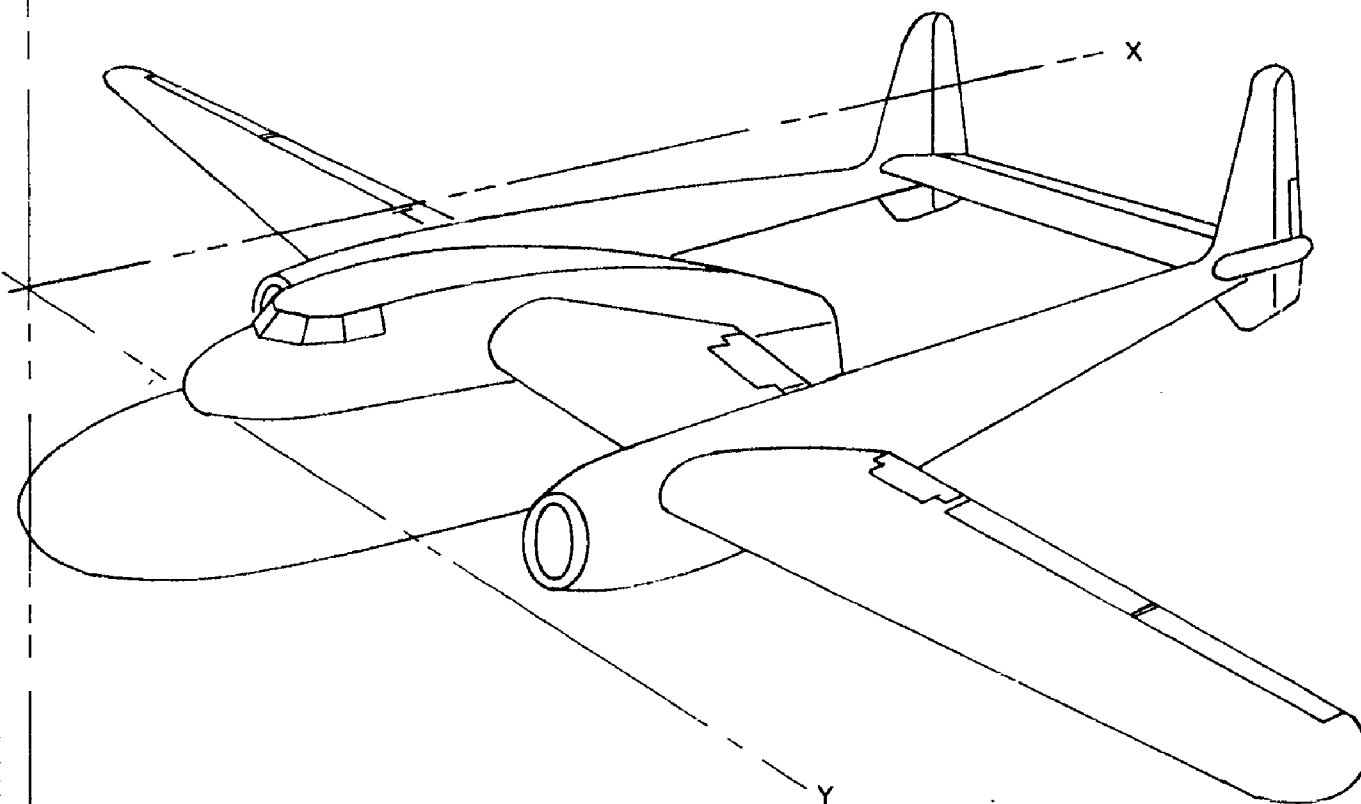
Subject: MASS MOMENTS OF INERTIA CALCULATIONS

DATE 6 May 1948

REVISED 5 May 1949

RESTRICTED

Z



REFERENCE DATA

X-Axis = Parallel to $\bar{C}$ Fuselage and 172.0" above thrust line.

Y-Axis = Parallel to 40% chord and 370 ahead.

Z-Axis = Perpendicular to $\bar{C}$ Fuselage 370 inches ahead of 40% chord.

Distance along Y-Axis noted as Y positive left.

Distance along X-Axis noted as X positive aft.

Distance along Z-Axis noted as Z positive down.

I Values given in lb. in².

MODEL *XC-120*

PREPARED BY *Miller*

CHECKED BY *J. J. J.*

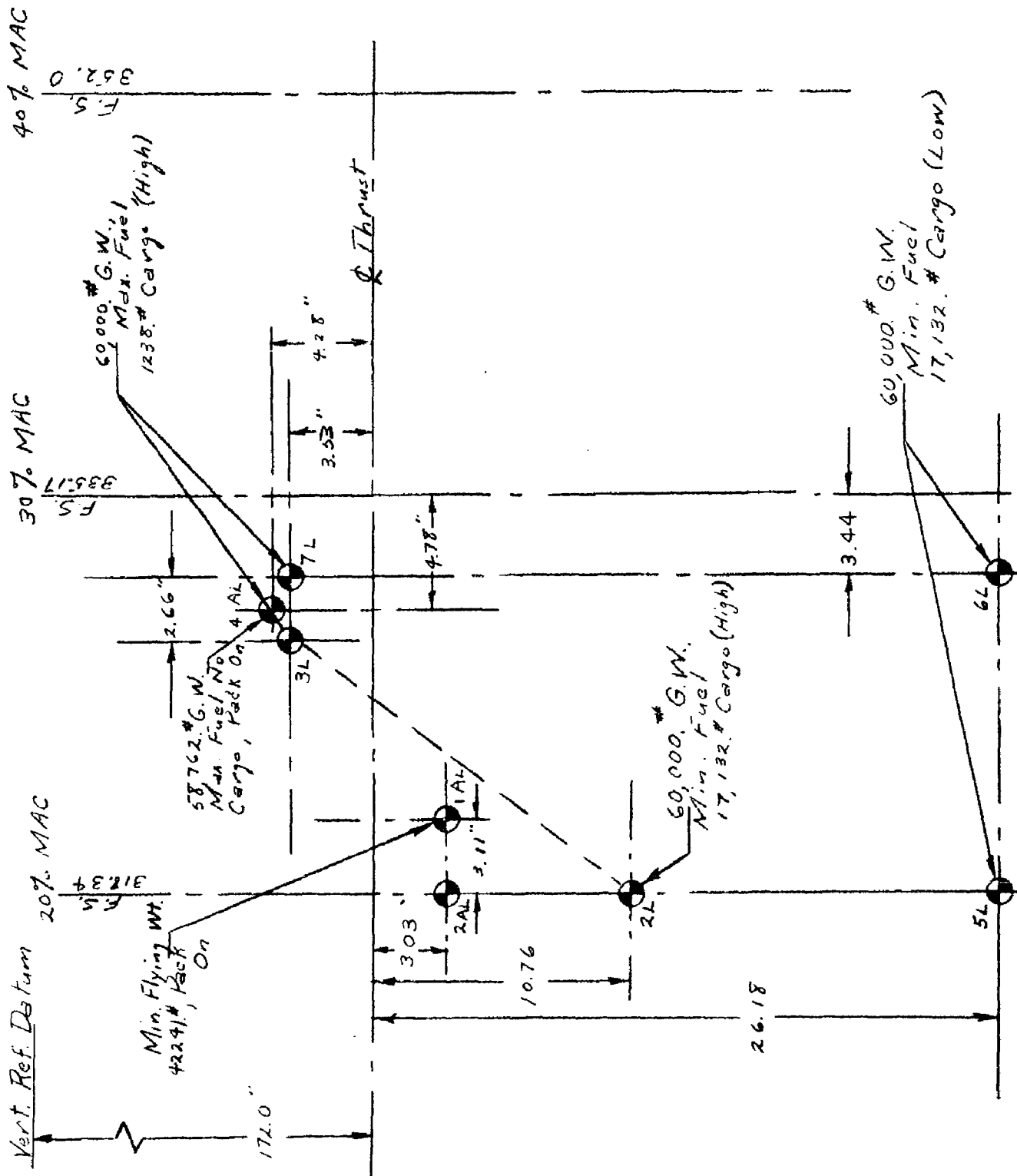
APPROVED BY

DATE *Jul 7 1949*

REVISED

Subject: *MASS MOMENTS OF INERTIA*

NORMAL LANDING CONDITIONS
Airplane Center of Gravity Envelope



MODEL *XC-120*

PREPARED BY *Miller*

CHECKED BY *Levin*

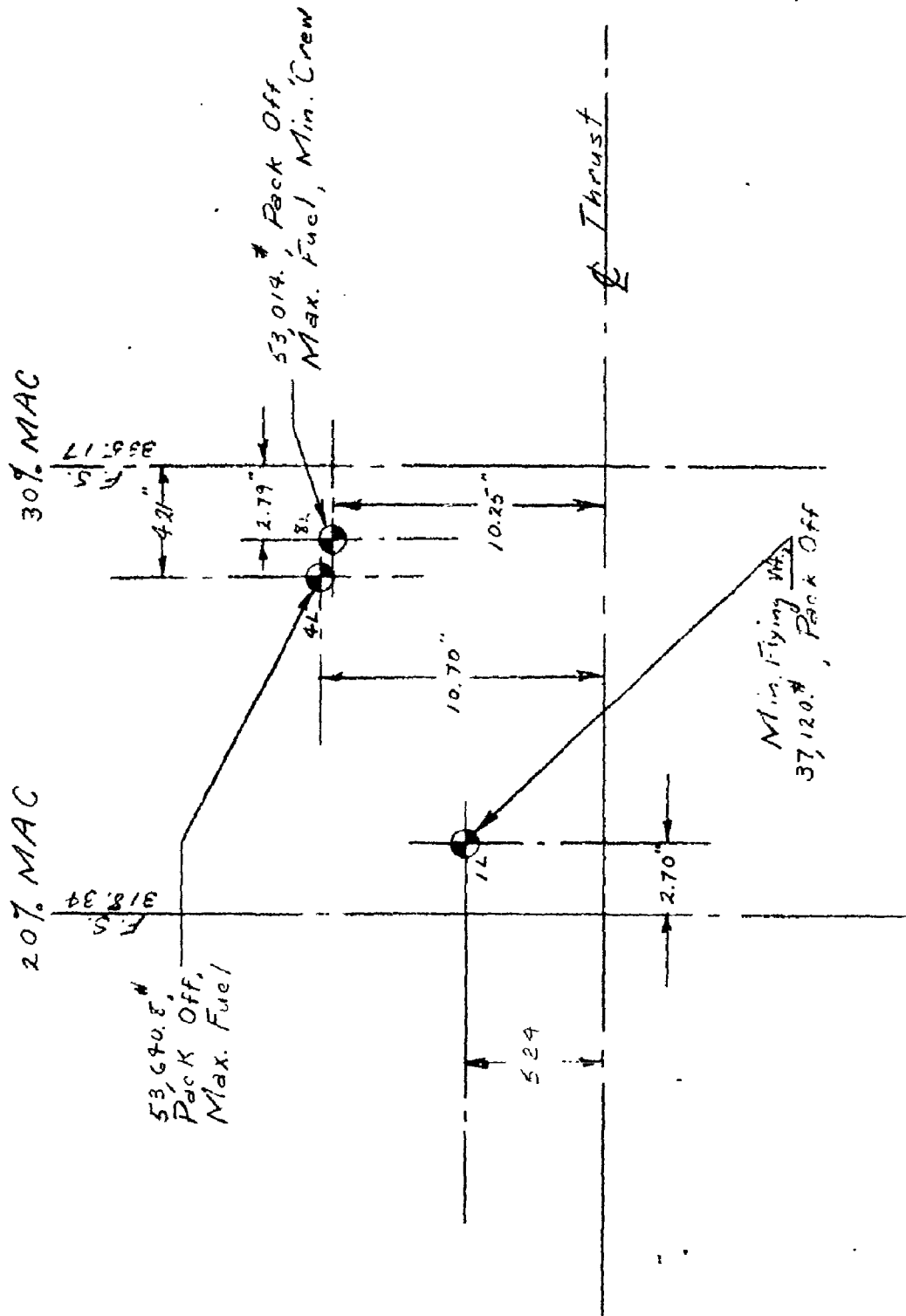
APPROVED BY

DATE *July 1 1949*

REVISED

Subject: *MASS MOMENTS OF INERTIA*

PACK - OFF LANDING CONDITIONS
Airplane Center of Gravity Envelope



MODEL XC120 M-107

PREPARED BY Miller

CHECKED BY Lewis

APPROVED BY

Subject: MASS MOMENTS OF INERTIA - Part II

DATE July 9, 1948

REVISED Feb. 14, 1949

July 7, 1949

Landing Conditions

Airplane c.g. #1L and #1AL - M.F.W. (Gear Down)

Item	W.	X	Y	Z	Wx x 10 ⁻³	Wy x 10 ⁻³	Wz x 10 ⁻³
1	2	3	4	5	6	7	8
Basic Weight	36720.8	335.6	.04	166.48	12323.37	1.58	6113.27
Less							
Navigator	200	268.0	34.0	124.0	-53.6	Small	-24.8
Crew Chief	200	158.0	0	124.0	-31.6	values	-24.8
Radio Operator	200	254.0	26.0	124.0	-50.8	neglec-	-24.8
Misc.	27	275.0	0	105.0	-7.43	ted	-2.84
Plus							
Min. Fuel (5%)	801	372.5	175	150.0	298.37	0	120.15
Min. Oil (25%)	225	475.0	175	151.0	106.88	0	33.98
Carrier - c.g. 1L	37119.8	339.04	.0425	166.76	12585.19	1.58	6190.16
Plus Pack	5121.2	342.44	0	235	1753.7	0	1203.43
Carrier with Pack c.g. (1AL)	42241.0	339.45	.037	175.03	14338.89	1.58	7393.59

Wy column is neglected because it is equal distance off each side and adds out.

MODEL XC-120 M-107

PREPARED BY Miller

CHECKED BY Lewis

APPROVED BY

Subject: MASS MOMENTS OF INERTIA - Part II

DATE July 27th, 1948

REVISED Feb. 14th, 1949

July 7, 1949

Landing Conditions

Airplane c.g. #1L and 1AL - M.F.W. (Gear Down) (Cont.)

Item	Wx ² x 10 ⁻⁶	Wy ² x 10 ⁻⁶	Wz ² x 10 ⁻⁶	Iox x 10 ⁻⁶	Ioy x 10 ⁻⁶	Ioz x 10 ⁻⁶	Ixx x 10 ⁻⁶	Iyy x 10 ⁻⁶	Izz x 10 ⁻⁶
1	9	10	11	12	13	14	15	16	17
Basic Weight	5209.09	1190.89	1075.95	20.56	15.39	15.45	2287.40	6300.43	6415.43
Less									
Navigator	-14.36	-23	-3.08				-3.31	-17.44	-14.59
Crew Chief	-4.99	0	-3.08				-3.08	-8.07	-4.99
Radio Operator	-12.90	-14	-3.08				-3.22	-15.98	-13.04
Misc.	-2.04	0	-3.0				-3.0	-2.34	-2.04
Plus									
Min. Fuel (5%)	111.14	24.53	18.02				41.14	127.75	135.67
Min. Oil (25%)	50.77	6.89	5.13				12.02	59.90	57.66
Carrier c.g. 1L	5336.71	1221.94	1089.56	20.56	15.39	15.45	2330.65	6444.25	6574.1
Plus Pack	741.1	0	284.25	31.03	.17	.17	315.25	1025.52	741.27
Carrier with Pack									
c.g. 1AL	6077.81	1221.94	1373.81	51.59	15.56	15.62	2645.93	7469.77	7315.37

Ixx, Iyy and Izz - Ref. page 48 for Formula

$I_{ox} = I_{xx} - Wz^2 \text{ carrier} = 2330.65 \times 10^6 - 37119.8 (166.76)^2 = 1298.39 \times 10^6 \text{ #in}^2$
 Carrier with Pack = $2645.93 \times 10^6 - 42241 (175.03)^2 = 1351.86 \times 10^6 \text{ #in}^2$
 $I_{oy} = I_{yy} - (x^2 + z^2)W = \text{Carrier} = 6444.25 \times 10^6 - [(339.04)^2 + (166.76)^2] 37119.8 = 1145.14 \times 10^6 \text{ #in}^2$
 Carrier with Pack = $7469.77 \times 10^6 - [(339.45)^2 + (175.03)^2] 42241.0 = 1308.42 \times 10^6 \text{ #in}^2$
 $I_{oz} = I_{zz} - Wx^2 \text{ Carrier} = 6574.1 \times 10^6 - 37119.8 (339.04)^2 = 2307.25 \times 10^6 \text{ #in}^2$
 Carrier with Pack = $7315.37 \times 10^6 - 42241.0 (339.45)^2 = 2448.1 \times 10^6 \text{ #in}^2$

REPORT NO. R101B-002		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 54
MODEL	XG-120	PREPARED BY	Miller	CHECKED BY	Lewis
Subject: MASS MOMENTS OF INERTIA CALCULATIONS				APPROVED BY	
				DATE 9 July 1948 REVISED 14 Feb. 1949 July 7, 1949	

LANDING CONDITION

Airplane c.g. #2L - 60,000 # Gross Weight, Max. Cargo (high)
Min. Fuel Gear Down

Determination of Cargo c.g.

Item	W	x	z	Wx x10 ⁻³	Wz x10 ⁻³
Basic Weight	41,842	336.43	174.86	14077.07	7316.70
Min. Fuel	801	372.5	150.0	298.37	120.15
Min. Oil	225	475.0	151.0	106.88	33.98
** Cargo Dist	17,132	x	*204.0	17.132x	3494.93
	60,000	336.34	182.76	14482.32	10965.76
				+ 17.132x	

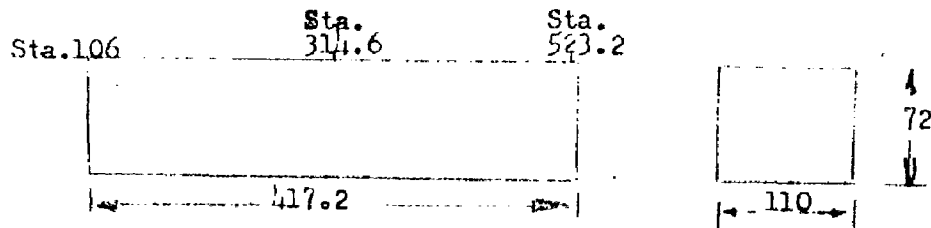
* Cargo c.g. assumed 60" above pack floor.

** 20% M.A.C.

$$\frac{14,482,320 + 17.132x}{60,000} = 336.34 = (\text{Station } 318.34)$$

$$x = \frac{(60,000 (336.34) - 14,482,320)}{17132} = 332.6 = \text{Station } 314.6$$

Assumed cargo distribution and moment of inertia for distributed cargo.



$$I_{ox} = \frac{17132}{12} (\overline{110}^2 + \overline{72}^2) = 24.676 \times 10^6 \text{ #in.}^2$$

$$I_{oy} = \frac{17132}{12} (\overline{417.2}^2 + \overline{72}^2) = 255.898 \times 10^6 \text{ #in.}^2$$

$$I_{oz} = \frac{17132}{12} (\overline{417.2}^2 + \overline{110}^2) = 265.768 \times 10^6 \text{ #in.}^2$$

REPORT NO. <u>11075-00</u>		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 55
MODEL	<u>XC-120</u>	PREPARED BY	<u>Miller</u>	CHECKED BY	<u>Lewis</u>
Subject: <u>MASS MOMENTS OF INERTIA CALCULATIONS - Part II</u>				APPROVED BY DATE <u>July 9, 1948</u> REVISED <u>Feb. 14, 1949</u> <u>C Mar. 14, 1949</u> <u>July 7, 1949</u>	

LANDING CONDITIONS

Airplane c.g. #2L (Cont'd) Gear Down

Item	W	Ixx 10 ⁻⁶	Iyy x10 ⁻⁶	Izz x10 ⁻⁶
Basic Weight	41,842	2602.68	7325.95	7156.7
Min. Fuel	801	41.14	127.75	135.67
Min. Oil	225	12.02	59.90	57.66
Cargo (dist.)	17,132	*737.64	2864.05	*2160.96
	60,000	3393.48	10,377.65	9510.99

* Cargo Moments of Inertia

$$I_{xx} = I_{ox} + Wz^2 = 24.676 \times 10^6 + 17132 (204.0)^2 = 737.64 \times 10^6 \text{ #in.}^2$$

$$I_{yy} = I_{oy} + W(z^2 + x^2) = 255.898 \times 10^6 + 17132 (332.6^2 + 204.0^2) = 2864.05 \times 10^6 \text{ #in.}^2$$

$$I_{zz} = I_{oz} + Wx^2 = 265.768 \times 10^6 + 17132 (332.6)^2 = 2,160.957 \times 10^6$$

Airplane Moments of Inertia

$$I_{ox} = I_{xx} - Wz^2 = 3393.48 \times 10^6 - 60000 (182.76)^2 = 1389.41 \times 10^6 \text{ #in.}^2$$

$$I_{oy} = I_{yy} - W(z^2 + x^2) = 10,377.65 \times 10^6 - 60,000 (182.76^2 + 336.34^2) = 1586.16 \times 10^6 \text{ #in.}^2$$

$$I_{oz} = I_{zz} - W(x^2) = 9,510.99 \times 10^6 - 60,000 (336.34)^2 = 2723.51 \times 10^6 \text{ #in.}^2$$

REPORT NO. R1072-001		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 56
MODEL	XC-120	PREPARED BY	Miller	CHECKED BY	Lewis
Subject: MASS MOMENTS OF INERTIA CALCULATIONS				APPROVED BY	
				DATE July 9, 1948	
				REVISED Feb. 14, 1949	
				July 7, 1949	

LANDING CONDITIONS

Airplane c.g. #2AL-44,106 Gross Weight, Min. Fuel, 1238# Cargo High Gear Down

Determination of Cargo c.g.

Item	W	x	z	Wx x10 ⁻³	Wz x10 ⁻³
Basic Weight	41,842	336.4	174.86	14075.65	7316.70
Min. Fuel	801	372.5	150.0	298.37	120.15
Min. Oil	225	475.	151.0	106.88	33.98
Cargo (dist)	1,238	x	*204.0	1.238x	252.55
	44,106	**	175.11	14480.90 +1.238x	7723.38

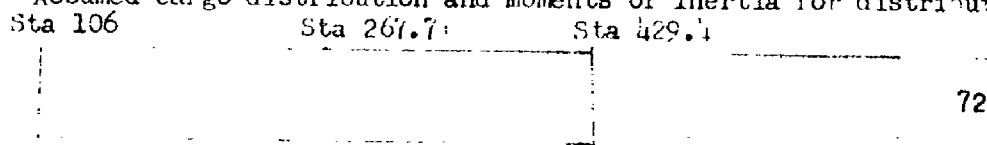
*Cargo c.g. assumed 60" above pack floor
**20% M.A.C.

$$336.34 = \frac{14,482.32 + 1.238x}{44.106}$$

$$x = \frac{44,106 (336.34) - 14,480,400}{1.238} = \frac{14,834.6 - 14,480.9}{1.238}$$

$$\frac{353.7}{1.238} = 285.7 \quad \text{Station} = 267.7$$

Assumed cargo distribution and moments of inertia for distributed cargo.



$$I_{ox} = \frac{1,238}{12} (323.4^2 + 72^2) = 1.78 \times 10^6 \text{ #in.}^2$$

$$I_{oy} = \frac{1,238}{12} (323.4^2 + 72^2) = 11.32 \times 10^6 \text{ #in.}^2$$

$$I_{oz} = \frac{1,238}{12} (323.4^2 + 110^2) = 12.04 \times 10^6 \text{ #in.}^2$$

REPORT NO. R107B-001		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 57
MODEL	XC-120	PREPARED BY	Miller	CHECKED BY	Lewis
Subject:-- MASS MOMENTS OF INERTIA CALCULATIONS - Part II				APPROVED BY	
				DATE July 9, 1948	
				REVISED Feb. 14, 1949	
				July 7, 1949	

LANDING CONDITIONS

Airplane c.g. #2AL (cont'd) (Gear Down)

Item	W	Ixx x10 ⁻⁶	Iyy x10 ⁻⁶	Izz x10 ⁻⁶
Basic Weight	41,842	2,602.68	7325.95	7156.7
Min. Fuel	801	41.14	127.75	135.67
Min. Oil	225	12.02	59.90	57.66
Cargo dist.	1,238	*53.3	*163.89	113.09
	44,106	2,709.14	7677.49	7463.12

*Cargo Moments of Inertia

$$I_{xx} = I_{ox} + Wz^2 = 1.78 \times 10^6 + 1,238 (204)^2 = 53.30 \times 10^6 \text{ #in.}^2$$

$$I_{yy} = I_{oy} + W(z^2 + x^2) = 11.32 \times 10^6 + 1,238 (204.0^2 + 285.7^2) = 163.89 \times 10^6 \text{ #in.}^2$$

$$I_{zz} = I_{oz} + W(x^2) = 12.04 \times 10^6 + 1,238 (285.7)^2 = 113.09 \times 10^6 \text{ #in.}^2$$

Airplane Moments of Inertia

$$I_{ox} = I_{xx} - Wz^2 = 2709.14 \times 10^6 - 44106 (175.11)^2 = 1356.70 \times 10^6 \text{ #in.}^2$$

$$I_{oy} = I_{yy} - W(z^2 + x^2) = 7677.49 \times 10^6 - 44106 [(175.11)^2 + (336.34)^2] = 1335.57 \times 10^6 \text{ #in.}^2$$

$$I_{oz} = I_{zz} - W(x^2) = 7463.12 \times 10^6 - 44,106 (336.34^2) = 2473.65 \times 10^6 \text{ #in.}^2$$

REPORT NO. <u>R107B-001</u>			FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 58
MODEL <u>XC-120</u>	PREPARED BY <u>Miller</u>	CHECKED BY <u>Lewis</u>	APPROVED BY			
Subject: <u>MASS MOMENTS OF INERTIA CALCULATIONS</u>			DATE <u>July 9, 1948</u> REVISED <u>Feb. 14, 1949</u> <u>July 7, 1949</u>			

LANDING CONDITIONS

Airplane c.g. #3L - 60,000# gross weight, Full Fuel, 1,238# Cargo (High)
Gear (Down)

Determination of Cargo c.g.

Item	W	x	z	Wx x10 ⁻³	Wz x10 ⁻³
Basic Weight	41842	336.4	174.86	14075.65	7316.70
Full Fuel	16020	372.5	150.0	5967.5	2403.0
Full Oil	900	475	151.0	427.5	135.9
*Cargo Dist.	1238	285.7	204.0	353.70	252.55
	60,000	347.07	168.47	20824.45	10108.15

* Reference to page 56 % MAC = 100 $\frac{(347.07 - 302.69)}{168.28}$ = 100 $\frac{(44.38)}{168.28}$ = 26.37

Item	Ixx x10 ⁻⁶	Iyy x10 ⁻⁶	Izz x10 ⁻⁶
Basic Weight	2602.68	7325.95	7156.7
Full Fuel	1336.64	2590.8	3204.8
Full Oil	*** 20.52	*** 223.58	*** 203.06
Cargo (Dist.)	*** 51.52	*** 152.57	*** 101.05
	4011.36	10292.90	10665.61

Item	Wx ² x 10 ⁻⁶	Wy ² x 10 ⁻⁶	Wz ² x 10 ⁻⁶
Full Oil	203.06	0	20.52
Cargo (dist)	101.05	0	51.52

$$\begin{aligned}
 &*** (I_{xx} = I_{ox} + W_y^2 + W_z^2) \\
 & \quad (I_{yy} = I_{oy} + W_x^2 + W_z^2) \\
 & \quad (I_{zz} = I_{oz} + W_x^2 + W_y^2)
 \end{aligned}$$

Airplane moments of Inertia

$$I_{ox} = I_{xx} - W(z^2) = 4011.36 \times 10^6 - 60,000 (168.47)^2 = 2308.43 \times 10^6 \text{ #in.}^2$$

$$I_{oy} = I_{yy} - W(x^2 + z^2) = 10292.90 \times 10^6 - 60,000 (168.47^2 + 347.07^2) = 1362.10 \times 10^6 \text{ #in.}^2$$

$$I_{oz} = I_{zz} - W(x^2) = 10,665.61 \times 10^6 - 60,000 (347.07^2) = 3,371.11 \times 10^6 \text{ #in.}^2$$

MODEL XC-120 L-107 PREPARED BY Miller CHECKED BY Lewis

APPROVED BY

Subject: MASS MOMENTS OF INERTIA - Part II

DATE July 9, 1948
REVISED Feb. 14, 1949
July 7, 1949

Landing Conditions

Airplane c.g. #4L and 4AL - Full Fuel, No Cargo (Gear Down)

REC

Item	W	X	Y	Z	$Wx \times 10^{-3}$	$Wy \times 10^{-3}$	$Wz \times 10^{-3}$
1	2	3	4	5	6	7	8
Basic Weight	36720.8	335.6	.03	164.48	12323.37	1.58	6113.28
Full Oil	900	475.0	0	151.0	427.5	0	135.9
Full Fuel	16020	372.5	0	150.0	5967.5	0	2403.0
Carrier-c.g. 4L	53640.8	348.96	.03	161.3	18718.37	1.58	8652.18
Plus Pack	5121.2	342.44	0	235.0	1753.7	0	1203.43
Carrier with Pack	58762	348.39	.03	167.72	20472.07	1.58	9855.61
c.g. 4AL							

Item	$Wx^2 \times 10^{-6}$	$Wy^2 \times 10^{-6}$	$Wz^2 \times 10^{-6}$	$I_{ox} \times 10^{-6}$	$I_{oy} \times 10^{-6}$	$I_{oz} \times 10^{-6}$	$I_{xy} \times 10^{-6}$	$I_{yz} \times 10^{-6}$	$I_{zx} \times 10^{-6}$
1	9	10	11	12	13	14	15	16	17
Basic Weight	5209.08	1190.89	1075.95	20.56	15.39	15.45	2287.4	(300.43)	6415.13
Full Oil	203.06	0	20.52	0	0	0	20.52	223.58	203.06
Full Fuel							1336.6	2590.8	3204.8
Carrier-c.g. 4L	5412.15	1190.89	1096.47	20.56	15.39	15.45	3644.52	9114.81	9823.29
Plus Pack	741.1	0	284.25	31.03	.17	.17	315.28	1025.52	741.27
Carrier with Pack									
c.g. 4AL	(153.25)	1190.89	1380.72	51.59	15.56	15.62	3959.80	10140.33	10564.56

* Full Fuel Ref. Page 58

Carrier 4L

$$I_{ox} = I_{xx} - Wz^2 = 3644.52 \times 10^6 - 53640.8(161.3)^2 = 2248.91 \times 10^6 \text{ #in.}^2$$

$$I_{oy} = I_{yy} - W(x^2 + z^2) = 9114.81 \times 10^6 - 53640.8(161.32 + 348.962) = 1187.19 \times 10^6 \text{ #in.}^2$$

$$I_{oz} = I_{zz} - W(x^2) = 9823.29 \times 10^6 - 53640.8(348.962) = 3291.28 \times 10^6 \text{ #in.}^2$$

Carrier with Pack 4AL

$$I_{ox} = I_{xx} - Wz^2 = 3959.80 \times 10^6 - 58762(167.72)^2 = 2306.83 \times 10^6 \text{ #in.}^2$$

$$I_{oy} = I_{yy} - W(x^2 + z^2) = 10140.33 \times 10^6 - 58762(167.722 + 348.392) = 1355.08 \times 10^6 \text{ #in.}^2$$

$$I_{oz} = I_{zz} - Wx^2 = 10564.56 \times 10^6 - 58762(348.39)^2 = 3432.29 \times 10^6 \text{ #in.}^2$$

$$\% \text{ MAC} = 100 \left(\frac{348.39 - 302.69}{168.25} \right) = 100 \left(\frac{45.70}{168.25} \right) = 27.75$$

REPORT NO. R107B-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 60
MODEL XC-120 M-107	PREPARED BY Miller	CHECKED BY Lewis	APPROVED BY		
Subject: MASS MOMENTS OF INERTIA CALCULATIONS			DATE July 9, 1948 REVISED Feb. 14, 1949 July 7, 1949		

LANDING CONDITIONS

Airplane c.g. #5L - 60,000# gross weight, Max. Cargo (low)
Min. Fuel (Gear Down)

Determination of cargo c.g.

Item	W	x	z	Wx x10 ⁻³	Wz x10 ⁻³
Basic Weight	41842	336.43	174.86	14077.07	7316.7
Min. Fuel	801	372.5	150.0	298.37	120.45
Min. Oil	225	475.0	151	106.88	33.98
Cargo	17132	x	258.0	17.132x	4420.06
	60,000	336.34	198.18	14482.32 +17.132x	11890.89

$$336.34 = \frac{14,482.32 + 17.132x}{60,000}$$

$$x = \frac{336.34 (60,000) - 14,482.32 \times 10^3}{17132} = \frac{20,180.4 \times 10^3 - 14,482.32 \times 10^3}{17132}$$

$$= \frac{5698.08 \times 10^3}{17132}$$

$$x = 332.6 \text{ station} = 314.6$$

Assumed cargo distribution and moments of inertia for distributed cargo.

$$I_{ox} = \frac{17132}{12} [(110)^2 + (12)^2] = 17.48 \times 10^6 \text{ #in.}^2$$

$$I_{oy} = \frac{17132}{12} [(417.2)^2 + (12)^2] = 248.70 \times 10^6 \text{ #in.}^2$$

$$I_{oz} = \frac{17132}{12} [(417.2)^2 + (110)^2] = 265.77 \times 10^6 \text{ #in.}^2$$

$$I_{xx} = I_{ox} + Wz^2 = 17.48 \times 10^6 + 17132 (258.0)^2 = 1157.85 \times 10^6 \text{ #in.}^2$$

$$I_{yy} = I_{oy} + W(x^2 + z^2) = 248.7 \times 10^6 + 17132 (332.6^2 + 258.0^2) = 3035.6 \times 10^6 \text{ #in.}^2$$

$$I_{zz} = I_{oz} + W(x^2) = 265.77 \times 10^6 + 17132 (332.6)^2 = 2,160.96 \times 10^6 \text{ #in.}^2$$

REPORT NO. <u>R107B-CC4</u>		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 61
MODEL <u>XC-120</u>	PREPARED BY <u>Miller</u>	CHECKED BY <u>Lewis</u>	APPROVED BY		
Subject: <u>MASS MOMENTS OF INERTIA - Part II</u>			DATE <u>July 9, 1948</u> REVISED <u>Feb. 14, 1949</u> <u>July 7, 1949</u>		

LANDING CONDITIONS

Airplane c.g. #5L (cont'd) - 60,000# G.W., Max. Cargo (low), Min. Fuel (Gear Down)

Item	W	I_{xx} $\times 10^{-6}$	I_{yy} $\times 10^{-6}$	I_{zz} $\times 10^{-6}$
Basic Weight	41842	2602.68	7325.95	7156.70
Min. Fuel	801	41.14	127.75	135.67
Min. Oil	225	12.02	59.9	57.66
Cargo (Dist.)	17132	*1157.85	*3035.56	*2160.96
Total	60000	3813.69	10549.16	9510.99

* Cargo Moments of Inertia

Airplane moments of inertia about c.g. #5L

$$I_{ox} = I_{xx} - Wz^2 = 3813.69 \times 10^6 - 60,000 (198.18^2) = 1457.17 \times 10^6 \text{ #in.}^2$$

$$I_{oy} = I_{yy} - W(x^2 + z^2) = 10,549.16 \times 10^6 - 60,000 (336.34^2 + 198.18^2) = 1405.17 \times 10^6 \text{ #in.}^2$$

$$I_{oz} = I_{zz} - Wx^2 = 9510.99 \times 10^6 - 60,000 (336.34)^2 = 2723.51 \times 10^6 \text{ #in.}^2$$

REPORT NO. <u>3107B-001</u>		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE <u>62</u>
MODEL <u>XC-120</u>	PREPARED BY <u>Miller</u>	CHECKED BY <u>Lewis</u>	APPROVED BY		
Subject: <u>MASS MOMENTS OF INERTIA - Part II</u>			DATE <u>July 9, 1948</u> REVISED <u>Feb. 14, 1949</u> <u>July 7, 1949</u>		

LANDING CONDITIONS

REF

Airplane c.g. #6L - 60,000# Gross Weight, Min. Fuel and Oil, Max. Cargo Aft (Low)
(Gear Down)

Item	W	X	Z	WX x10-3	WZ x10-3
Basic Weight	41842	336.43	174.86	14077.07	7316.7
Min. Fuel	801	372.5	150.0	298.37	120.15
Min. Oil	225	475.0	151	106.88	33.98
Cargo (dist.)	17132	x	258.0	17.132x	4420.06
Total	60000	349.73	198.18	14482.32 +17.132x	11890.89

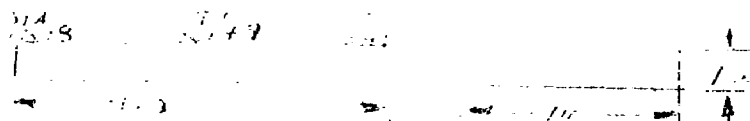
$$\% \text{ MAC} = 100 \left(\frac{349.73 - 302.69}{168.28} \right) = 100 \left(\frac{47.04}{168.28} \right) = 27.95 \quad (\text{Ref R107B-006A Pg. 2})$$

$$349.73 = \frac{17132 \times x + 14482.32 \times 10^3}{60,000}$$

$$x = \frac{60,000 (349.73) - 14482320}{17132} = 379.49$$

= Sta. 361.49

Assumed cargo distribution and moments of inertia for distributed cargo.



$$I_{Ox} = \frac{17132}{12} (110)^2 + (12)^2 = 17.48 \times 10^6 \text{ #in.}^2$$

$$I_{Oy} = \frac{17132}{12} (375.02^2 + 12)^2 = 200.99 \times 10^6 \text{ #in.}^2$$

$$I_{Oz} = \frac{17132}{12} (375.02^2 + 110^2) = 218.06 \times 10^6 \text{ #in.}^2$$

$$I_{xx} = I_{Ox} + W_z^2 = 17.48 \times 10^6 + 17132 (258.0)^2 = 1157.85^2 \times 10^6 \text{ #in.}^2$$

$$I_{yy} = I_{Oy} + W(x^2 + z^2) = 200.99 \times 10^6 + 17132 (258.0^2 + 379.49^2) = 3809.76 \times 10^6 \text{ #in.}^2$$

$$I_{zz} = I_{Oz} + W_x^2 = 218.06 \times 10^6 + 17132 (379.58)^2 = 2686.46 \times 10^6 \text{ #in.}^2$$

REPORT NO. <u>RLC7B-001</u>		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 63
MODEL	<u>TC-120</u>	PREPARED BY	<u>Miller</u>	CHECKED BY	<u>Lewis</u>
Subject: <u>MASS MOMENTS OF INERTIA - Part II</u>				APPROVED BY	
				DATE	<u>July 9, 1948</u>
				REVISED	<u>Feb. 14, 1949</u> <u>July 7, 1949</u>

LANDING CONDITIONS

Airplane c.g. #6L (cont'd) 60,000# Gross Weight, Min. Fuel and Oil

Max. Cargo Aft (low) (Gear Down)

<u>Item</u>	<u>W</u>	<u>I_{xx} x 10⁻⁶</u>	<u>I_{yy} x 10⁻⁶</u>	<u>I_{zz} x 10⁻⁶</u>
Basic Weight	41842	2602.68	7325.95	7156.70
Min. Fuel	801	41.14	127.75	135.67
Min. Oil	225	12.02	59.9	57.66
Cargo	17132	1157.85	3809.76	2686.46
	60,000	3813.69	11323.36	10036.49

Cargo Moments of Inertia

Airplane Moments of inertia about c.g. #6L

$$I_{Ox} = I_{xx} - Wz^2 = 3813.69 \times 10^6 - 60,000 (198.18)^2 = 1457.17 \times 10^6 \text{ #in.}^2$$

$$I_{Oy} = I_{yy} - W(x^2 + z^2) = 11323.36 \times 10^6 - 60,000 (198.18^2 + 349.73^2) = 1628.18 \times 10^6 \text{ #in.}^2$$

$$I_{Oz} = I_{zz} - Wx^2 = 10036.49 \times 10^6 - 60,000 (349.73)^2 = 2697.83 \times 10^6 \text{ #in.}^2$$

REPORT NO R107B-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 64
MODEL XC-120 M-107	PREPARED BY Miller	CHECKED BY Lewis	APPROVED BY		
Subject: MASS MOMENTS OF INERTIA - Part II			DATE July 9, 1948 REVISED Feb. 14, 1949 July 7, 1949		

LANDING CONDITIONS

Airplane c.g. #7L - 60,000# Gross Weight, Full Fuel and Oil, Cargo (high) Aft
(Gear Down)

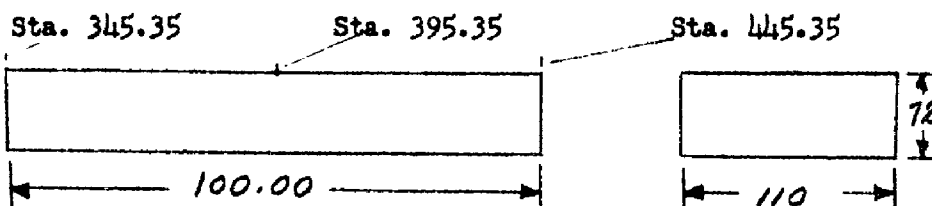
Item	W	X	Z	WX $\times 10^{-3}$	WZ $\times 10^{-3}$
Basic Weight	41842	336.43	174.86	14077.07	7316.7
Full Fuel	16020	372.5	150.0	5967.5	2403.0
Full Oil	900.0	475	151.0	427.5	135.9
Cargo (dist.)	1238	x	204.0	1.238 x	252.55
Total	60000	349.73	168.47	20472.07 +1.238 x	10108.15

$$\% \text{ MAC} = 100 \cdot \left(\frac{349.73 - 302.69}{168.28} \right) = 27.95 \text{ (Ref. Pg. 62)}$$

$$349.73 = \frac{20,472,070 + 1,238 x}{60,000}$$

$$x = \frac{60,000 (349.73) - 20,472,070}{1,238} = 413.35 = \text{Sta. } 395.35$$

Assumed cargo distribution and moments of inertia for distributed cargo



$$I_{ox} = \frac{1238}{12} \left(\frac{100^2}{12} + \frac{72^2}{12} \right) = 1.78 \times 10^6 \text{ in}^2$$

$$I_{oy} = \frac{1238}{12} \left(\frac{100^2}{12} + \frac{72^2}{12} \right) = 1.57 \times 10^6 \text{ in}^2$$

$$I_{oz} = \frac{1238}{12} \left(\frac{100^2}{12} + \frac{72^2}{12} \right) = 2.28 \times 10^6 \text{ in}^2$$

$$I_{xx} = I_{ox} + W_z^2 = 1.78 \times 10^6 + 1238 (204.0)^2 = 53.30 \times 10^6 \text{ in}^2$$

$$I_{yy} = I_{oy} + W (z^2 + x^2) = 1.57 \times 10^6 + 1238 (204.0^2 + 413.35^2) = 264.61 \times 10^6 \text{ in}^2$$

$$I_{zz} = I_{oz} + W (x^2) = 2.28 \times 10^6 + 1238 (413.35)^2 = 213.80 \times 10^6 \text{ in}^2$$

MODEL XC-120

PREPARED BY Miller

CHECKED BY Lewis

APPROVED BY

Subject: MASS MOMENTS OF INERTIA - Part II

DATE July 9, 1949

REVISED Feb. 14, 1949

July 7, 1949

LANDING CONDITIONS

REST

Airplane c.g. #7L (cont'd) 60000# Gross Weight, Full Fuel, Cargo (high) Aft(Gear Down)

Item	W	I_{xx} $\times 10^{-6}$	I_{yy} $\times 10^{-6}$	I_{zz} $\times 10^{-6}$
Basic Weight	41842	2,602.68	7325.95	7156.70
Full Fuel	16020	1,336.6	2590.8	3204.8
Full Oil	900	20.52	223.58	203.06
Cargo	1238	53.30	264.61	213.80
Total	60000	4,013.10	10,404.94	10,778.36

Cargo moments of inertia.

Airplane moments of inertia about c.g. #7L.

$$I_{ox} = I_{xx} - W(z)^2 = 4013.10 \times 10^6 - 60,000 (168.47)^2 = 2310.17 \times 10^6 \text{ #}^2$$

$$I_{oy} = I_{yy} - W(z^2 + x^2) = 10404.94 \times 10^6 - 60000 (168.47^2 + 349.73^2) = 1363.35 \times 10^6 \text{ #}^2$$

$$I_{oz} = I_{zz} - W(x^2) = 10778.36 \times 10^6 - 60000 (349.73)^2 = 3439.7 \times 10^6 \text{ #}^2$$

REPORT NO. <u>FLC/7B-001</u>		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 66
MODEL <u>XC-120</u>	PREPARED BY <u>Miller</u>	CHECKED BY <u>Lewis</u>	APPROVED BY		
Subject: <u>MASS MOMENTS OF INERTIA - Part II</u>			DATE <u>July 9, 1948</u> REVISED <u>Feb. 14, 1949</u> <u>C March 14, 1949</u> <u>July 7, 1949</u>		

SUMMARY OF NORMAL GROSS WEIGHT LANDING CONDITIONS

RES

c.g. Location	Ref. Page	Condition	I _{ox} Slug Ft. ²	I _{oy} Slug Ft. ²	I _{oz} Slug Ft. ²
1L	53	M.F.W. Pack Off	280,019	246,968	497,595
1AL	53	M.F.W. Pack On	291,550	282,182	527,972
2L	55	G.W. = 60,000 # Min. Fuel, Max. Cargo (High)	299,648	342,068	587,368
2AL	57	G.W. = 44,106 # Min. Fuel, 1238# Cargo (High)	292,594	266,037	533,482
3L	58	G.W. = 60,000 # Max. Fuel 1238# Cargo (High)	497,850	293,759	741,268
4L	59	G.W. = 53640.8 Max. Fuel No Cargo - Pack Off	485,013	256,036	709,817
4AL	59	G.W. = 58762 Max. Fuel No Cargo - Pack On	497,500	292,200	740,200
5L	61	G.W. = 60,000 # Min. Fuel Max. Cargo Aft (low)	314,262	303,047	587,368
6L	63	G.W. = 60,000 # Min. Fuel Max. Cargo Aft (low)	314,262	351,143	581,830
7L	65	G.W. = 60,000 # Max. Fuel 1238# Cargo (High)	498,225	294,028	741,826

REPORT NO. R107B-011			FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 77
MODEL	XC-120	PREPARED BY	Levin	CHECKED BY	Lewis	APPROVED BY
Subject:—					DATE July 7, 1949	
					REVIS	
RESTRICTED						
PART V						
Mass Moments of Inertia - Flight Conditions						
FA-800-23						

REPORT NO. R107B-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 18
MODEL	XC-120	PREPARED BY	Levin	CHECKED BY	Lewis
Subject: MASS MOMENTS OF INERTIA Part V				APPROVED BY	
				DATE July 7, 1949 REVISED	

RES

Flight Conditions

Vertical limits of cargo at 6.0" and 60.0" above pack floor

Airplane C.G.'s - G.W. = 64,000#, Full Outer - Panel Fuel,
 Gear Up, Cargo C.G. 60.0" above floor

C.G.# 1A: $\bar{x}_{\text{airplane}} = 20\% \text{ MAC } (= \text{F.S. } 318.34)$

Item	W (#)	x (from F.S.-18)	z (from vert. ref.)	W x (x 10 ⁻³)	W z (x 10 ⁻³)
Basic Weight	11,842	340.5	168.42	1,947.20	7,047.03
Fuel	9,744	372.5	154.10	3,629.64	1,501.55
Oil	547	475.0	151.00	259.83	82.60
Cargo	11,867	x	204.00	11.87x	2,420.87
2	64,000	336.34	172.69	18,136.67 + 11.87x	11,052.05

$z \text{ cargo} = 204.00 (= 60" \text{ above floor})$

$x \text{ cargo} = \frac{64.0 (336.34) - 18,136.67}{11.87} = 285.53 (= \text{F.S. } 267.53)$

$z \text{ airplane} = \frac{11,052.05}{64.0} = 172.69 (= 0.69" \text{ below } \bar{x} \text{ thrust})$

C.G.# 2A:

$\bar{x} \text{ airplane} = 30\% \text{ MAC } (\text{F.S. } 335.17)$

$\bar{z} \text{ airplane} = 172.69 (= 0.69" \text{ below } \bar{x} \text{ thrust}) \text{ as above}$

$z \text{ cargo} = 204.00 (= 60" \text{ above floor}) \text{ as above}$

$x \text{ cargo} = \frac{64.0 (353.17) - 18,136.67}{11.87} = 376.27 (= \text{F.S. } 358.27)$

REPORT NO. R107B-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 79
MODEL	XC-120	PREPARED BY	Levin	CHECKED BY	Lewis
Subject: MASS MOMENTS OF INERTIA - Part V				APPROVED BY	
				DATE	July 7, 1949
				REVISED	

RESTRICTED

CG 3A at 20% M.A.C. , G.W. = 64,000#
Full Outer Panel Fuel Tanks, Gear Up
Cargo C.G. 6.0" above floor

Item	W (#)	x (from F.S. - 18)	z (from vert. ref)	W-x (x10 ⁻³)	W-z (x 10 ⁻³)
Basic Weight	41,842	340.5	168.42	14,247.20	7,047.03
Fuel	9,744	372.5	154.10	3,629.64	1,501.55
Oil	547	475.0	151.00	259.83	82.60
Cargo	11,867	x	258.00	11.87x	3,061.69
Σ	64,000	336.34	182.70	18,136.67 + 11.87x	11,692.87

Cargo C.G. -

$$\frac{11.87x + 18,136.67}{64.0} = 336.34$$

$$11.87 x_{\text{cargo}} = 21,525.76 - 18,136.67 = 3389.09$$

$$x_{\text{cargo}} = 285.53 (= \text{F.S. } 267.53)$$

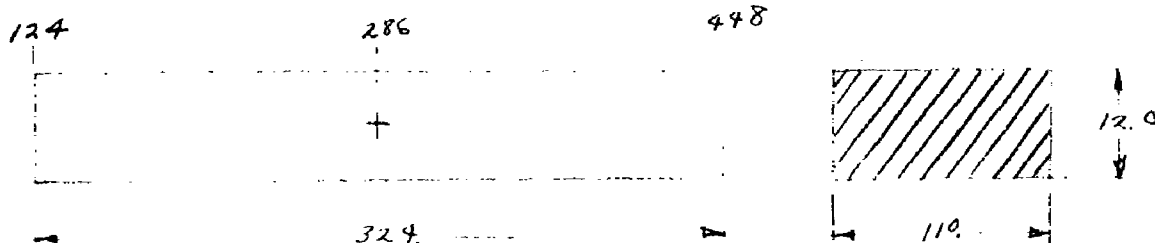
$$z_{\text{cargo}} = 258.00 (= 6.0" \text{ above floor})$$

Airplane C.G. -

$$x_{\text{airplane}} = 336.34 (= \text{F.S. } 318.34)$$

$$z_{\text{airplane}} = 182.70 (= 10.70" \text{ below } \bar{c} \text{ thrust})$$

Assumed cargo distribution and moments of inertia:-



$$I_{Ox} = \frac{11,867}{12} (110^2 + 12^2) = 12.11 \times 10^6 \text{ lb in}^2$$

$$I_{Oy} = \frac{11,867}{12} (324^2 + 12^2) = 103.95 \times 10^6 \text{ lb in}^2$$

$$I_{Oz} = \frac{11,867}{12} (324^2 + 110^2) = 115.78 \times 10^6 \text{ lb in}^2$$

MODEL 107 PREPARED BY Levin CHECKED BY Lewis

APPROVED BY

(MC-120)

DATE July 7, 1949

Subject: MASS MOMENTS OF INERTIA

REVISED

CG 3A at 20% M.A.C., G.W. = 64,000#
Full Outer Panel Fuel Tanks; Gear Up

RESTRICTED

Item	W (#)	* I_{xx} (x 10 ⁻⁶)	** I_{yy} (x 10 ⁻⁶)	*** I_{zz} (x 10 ⁻⁶)
Basic Weight	41,842	2486.01	7,332.28	7,302.07
Fuel	9,744	1117.14	1,583.43	2,237.79
Oil	547	29.22	135.89	140.17
Cargo	11,867	*802.02	*1,861.35	*1,083.27
Σ	64,000	4434.39	10,912.95	10,763.30

$$* I_{xx} = 12.11 \times 10^6 + 11,867 (258.00)^2$$

$$= 802.02 \times 10^6 \text{ lb in}^2$$

$$* I_{yy} = 103.95 \times 10^6 + 11,867 (258.00^2 + 285.53^2)$$

$$= 1861.35 \times 10^6 \text{ lb in}^2$$

$$* I_{zz} = 115.78 \times 10^6 + 11,867 (285.53)^2$$

$$= 1,083.27 \times 10^6 \text{ lb in}^2$$

Airplane Moments of Inertia

$$I_{ox} = I_{xx} - W z^2 = 4434.39 \times 10^6 - 64,000 (182.70)^2$$

$$= 4434.39 \times 10^6 - 64,000 (33,379.29) = 2298.12 \times 10^6 \text{ lb in}^2$$

$$I_{oy} = I_{yy} - W (\bar{x}^2 + \bar{z}^2) = 10,912.95 \times 10^6 - 64,000 (336.34^2 + 182.70^2)$$

$$= 10,912.95 \times 10^6 - 64,000 (146,504) = 1,536.69 \times 10^6 \text{ lb in}^2$$

$$I_{oz} = I_{zz} - W \bar{x}^2 = 10,763.30 \times 10^6 - 64,000 (113,125)$$

$$= 10,763.30 \times 10^6 - 7,240 \times 10^6 = 3,523.30 \times 10^6 \text{ lb in}^2$$

REPORT NO. R107B-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 81
MODEL	XC-120	PREPARED BY	Levin	CHECKED BY	Lewis
Subject: MASS MOMENTS OF INERTIA - Part V				APPROVED BY	
				DATE	July 7, 1949
				REVISED	
CG 4A at 30% M.A.C. G.W. = 64,000# Full Outer-Panel Fuel Tanks, Gear Up					

Item	W (#)	x (from F.S. - 18)	z (from 172" above T)	W-x (in-lb x 10 ⁻³)	W-z (in-lb x 10 ⁻³)
Basic Wt.	41,842	340.5	168.42	14,247.20	7,047.03
Fuel	9,744	372.5	154.10	3,629.64	1,501.55
Oil	547	475.0	151.00	259.83	82.60
Cargo	11,867	x	258.00	11.87x	3,061.69
Σ	64,000	353.17	z	18,136.67 + 11.87x	11,692.87

Cargo C.G. -

$$\frac{11.87x + 18,136.67}{64.0} = 353.17$$

$$11.87x_{\text{cargo}} = 22,602.88 - 18,136.67 = 4,466.21$$

$$x_{\text{cargo}} = 376.26 \quad (= \text{F.S. } 358.26)$$

$$z_{\text{cargo}} = 258.00 \quad (= 6.0" \text{ above floor})$$

Airplane C.G.

$$\bar{x}_{\text{airplane}} = \frac{11,692.87}{64,000} = 182.70 \quad (= 10.70" \text{ below } \bar{c} \text{ thrust})$$

$$\bar{x}_{\text{airplane}} = 353.17 \quad (= \text{F.S. } 335.17)$$

Assumed cargo distribution and moments of inertia:-

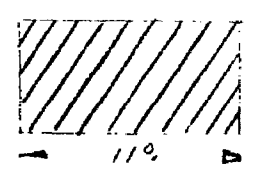
185

376

+

382

567



110

Δ

12.

Δ

$$I_{Ox} = \frac{11867}{12} \quad (110^2 + 12^2) = 12,108,295 \text{ lb-in}^2$$

$$= 12.11 \times 10^6 \text{ lb-in}^2$$

$$I_{Oy} = \frac{11867}{12} \quad (382^2 + 12^2) = 144,449,070 \text{ lb-in}^2$$

$$= 144.45 \times 10^6 \text{ lb-in}^2$$

$$I_{Oz} = \frac{11867}{12} \quad (382^2 + 110^2) = 156.27 \times 10^6 \text{ lb-in}^2$$

REPORT NO. R107B-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 82
MODEL XC-120	PREPARED BY Levin	CHECKED BY Lewis	APPROVED BY		
Subject: MASS MOMENTS OF INERTIA - Part V			DATE July 7, 1949		
			REVISED		

CG 4A at 30% M.A.C. G.W. = 64,000#
Full Outer-Panel Fuel Tanks, Gear Up

RIES

Item	W	* I _{xx} (x 10 ⁻⁶)	* I _{yy} (x 10 ⁻⁶)	* I _{zz} (x 10 ⁻⁶)
Basic Wt.	41,842	2486.01	7332.28	7302.07
Fuel	9,744	1117.14	1583.43	2237.79
Oil	547	29.22	135.89	140.17
Cargo	11,867	* 802.02	* 2614.48	* 1836.39
Σ	64,000	4434.39	11666.08	11516.42

$$\begin{aligned}
 * I_{xx} &= 12.11 \times 10^6 + 11,867 (258.00)^2 \\
 &= 12.11 \times 10^6 + 789.91 \times 10^6 \\
 &= 802.02 \times 10^6 \text{ lb in}^2
 \end{aligned}$$

$$\begin{aligned}
 * I_{yy} &= 144.45 \times 10^6 + 11,867 (258.00^2 + 376.27^2) \\
 &= 144.45 \times 10^6 + 2470.03 \times 10^6 \\
 &= 2614.48 \times 10^6 \text{ lb in}^2
 \end{aligned}$$

$$\begin{aligned}
 * I_{zz} &= 156.27 \times 10^6 + 11,867 (376.27^2) \\
 &= 156.27 \times 10^6 + 1680.12 \times 10^6 \\
 &= 1836.30 \times 10^6 \text{ lb in}^2
 \end{aligned}$$

Airplane Moments of Inertia

$$\begin{aligned}
 I_{Ox} &= I_{xx} - W \bar{z}^2 = 4434.39 \times 10^6 - 64,000 (182.70)^2 \\
 &= 4434.39 \times 10^6 - 64,000 (33,379.29) = 2298.12 \times 10^6 \text{ lb in}^2
 \end{aligned}$$

$$\begin{aligned}
 I_{Oy} &= I_{yy} - W (\bar{x}^2 + \bar{z}^2) = 11,666.08 \times 10^6 - 64,000 (353.17^2 + 182.70^2) \\
 &= 11,666.08 \times 10^6 - 64,000 (124,729 + 33,379) = 1,547.17 \times 10^6 \text{ lb in}^2
 \end{aligned}$$

$$\begin{aligned}
 I_{Oz} &= I_{zz} - W (\bar{x}^2) = 11,516.42 \times 10^6 - 64,000 (353.17^2) \\
 &= 11,516.42 \times 10^6 - 64,000 (124,729) = 3,533.76 \times 10^6 \text{ lb in}^2
 \end{aligned}$$

REPORT NO. <u>R107B-001</u>		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE <u>83</u>
MODEL <u>XC-120</u>	PREPARED BY <u>Levin</u>	CHECKED BY <u>Lewis</u>	APPROVED BY		
Subject: <u>MASS MOMENTS OF INERTIA - Part V</u>			DATE <u>July 7, 1949</u> REVISED		
<u>RES</u>					
CG #1A, G.W. = 74,000#, Gear Up					
For a vertical location of the cargo at 60.0" above the floor, find the airplane c.g. with the same wt. distribution as for the cargo at 6.0" above the floor.					
Item	W (#)	x (from F.S.-18)	z (from Vert.Ref.)	W-x (in-lbx10 ⁻³)	W-z (in-lbx10 ⁻³)
Basic Wt.	41,842	340.50	168.42	14247.20	7047.03
Fuel	11,511	372.50	150.00	4287.85	1726.65
Oil	647	475.00	151.00	307.33	97.70
Cargo	20,000	x	204.00	20.00(x)	4080.00
Σ	74,000	336.34	$\bar{z}$	18842.38 + 20. x	12951.38
$\bar{x}_{\text{cargo}} = \frac{336.34 - 254.63}{.27027} = 302.34$ (=F.S. 284.34) $\bar{z}_{\text{airplane}} = \frac{12,951.38}{74} = 175.02$ (=3.02" below $\bar{z}$ thrust) For C.G. #2A same wt. distribution $\bar{x}_{\text{cargo}} = \frac{353.17 - 254.63}{.27027} = 364.61$ $\bar{z}_{\text{airplane}} = 175.02$ (= 3.02" below $\bar{z}$ thrust)					

MODEL XC-120

PREPARED BY Levin

CHECKED BY Lewis

APPROVED BY

Subject: MASS MOMENTS OF INERTIA - PART V.

DATE July 7, 1949

REVISED

Flight Conditions

C.G. #3A, 20% M.A.C. - G.W. = 74,000#, Gear Up
Cargo C.G. at 6.0" above floor

Item	W (#)	x (from F.S.-18)	z (from 172" above T)	W-x (x10 ⁻³)	W-z (x 10 ⁻³)
Basic Wt.	41,842	340.50	168.42	14247.20	7047.03
Fuel	11,511	372.50	150.00	4287.85	1726.65
Oil	647	475.00	151.00	307.38	97.70
Cargo	20,000	x	254.00	20.00x	5080.00
Σ	74,000	336.34	Z	18842.38 + 20. x	13951.38

$$20.0 x + 18,842.38 = 74.00 (336.34) = 24,889.16$$

$$20.0 x = 6046.78$$

$$\bar{x}_{\text{cargo}} = 302.34 \quad (= \text{F.S. } 284.34)$$

$$\bar{z}_{\text{airplane}} = \frac{13,951.38}{74.0} = 188.53$$

$$(\quad = 16.53" \text{ below } \bar{z} \text{ thrust})$$

C.G. # 4A, 30% MAC - GW = 74,000#
Gear Up, Cargo at 6.0" above floor

$$20.0 x + 18,842.38 = 74.0 (353.17) = 26,134.58$$

$$20.0x = 7292.20$$

$$\bar{x}_{\text{cargo}} = 364.61 \quad (= \text{FS } 346.61)$$

$$\bar{z}_{\text{airplane}} = 188.53 \quad (\quad = 16.53" \text{ below } \bar{z} \text{ thrust})$$

REPORT NO. R107B-011			FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 85
MODEL	XC-120	PREPARED BY	Levin	CHECKED BY	Lewis	APPROVED BY
Subject: MASS MOMENTS OF INERTIA - Part V					DATE	July 7, 1949
					REVISED	

Flight Conditions

Summary of Normal Gross Wt. Flight Conditions,

Airplane Moments of Inertia (lb-in²)

Condition	Airplane C.G.		I _{ox} (x 10 ⁻⁶)	I _{oy} (x 10 ⁻⁶)	I _{oz} (x 10 ⁻⁶)
	X	Z			
C.G. 3A, G.W. = 64,000# Gear Up, Full Fuel, Outer Panel Cargo C.G. at 6.0" above floor	336.34	182.70	2298.12	1536.69	3523.30
C.G. 4A, G.W. = 64,000# Gear Up, Full Fuel, Outer Panel, Cargo C.G. at 6.0" above floor	353.17	182.70	2298.12	1547.17	3533.76

* Referenced to F.S. "-18"

* Referenced to vert. ref. datum, 172.0" above $\bar{x}$ thrust

ENGINEERING REPORT NO.

R1073-004

SUBJECT

MASS MOMENTS OF INERTIA CALCULATIONS

MODEL: XC-120



FAIRCHILD AIRCRAFT

Division of
FAIRCHILD ENGINE & AIRPLANE CORPORATION
HAGERSTOWN, MARYLAND

Date: 6 May 1948

Prepared By J. W. O. Baker
J. W. O. Baker

No. Pages: 45 (PART I)
21 (PART II)
5 (PART III)
5 (PART IV)

Checked By _____

Approved By C. F. Comstock
C. F. Comstock

REVISIONS

Date	Pages Affected	By	Remarks
2/14/49	All pages.	J.W.O.Baker	PART I completely revised.
2/14/49	All pages.	J. Myers	PART II completely revised.
2/14/49	All pages.	J.W.O.Baker	PART III completely revised.
2/14/49	Pages 72, 73, 74, 75, 76	J.W.O.Baker	PART IV Added.
3/14/49	Pgs. 55, 57, 66 of Part II revised.	Hawley	

REPORT NO. R107B-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 55
MODEL	XC-120	PREPARED BY	Hawley	CHECKED BY	Meyer
Subject: MASS MOMENTS OF INERTIA CALCULATIONS - Part II				APPROVED BY	
				DATE 9 July 1948	
				REVISED 14 Feb. 1949	
				C Mar. 14, 1949	

LANDING CONDITIONS

Airplane c.g. #2L (Cont'd) Gear Down

Item	W	Ixx 10 ⁻⁶	Iyy x10 ⁻⁶	Izz x10 ⁻⁶
Basic Weight	41,842	2,602.82	7325.95	7156.7
Min. Fuel	801	41.14	127.75	135.67
Min. Oil	225	12.02	69.90	57.66
Cargo (dist.)	17,132	* 739.04	2865.45	* 2160.96
	60,000	3,395.02	10,379.05	9,510.99

*Cargo Moments of Inertia

$$I_{xx} = I_{ox} + Wz^2 = 24.676 \times 10^6 + 17132 (204.2)^2 = 739.04 \times 10^6 \text{ in.}^2$$

$$I_{yy} = I_{oy} + W(z^2 + x^2) = 255.898 \times 10^6 + 17132 (332.6^2 + 204.2^2) = 2,865.45 \times 10^6 \text{ in.}^2$$

$$I_{zz} = I_{oz} + Wx^2 = 265.76 \times 10^6 + 17132 (332.6)^2 = 2,160.957 \times 10^6$$

Airplane Moments of Inertia

$$I_{ox} = I_{xx} - Wz^2 = 3,395.02 \times 10^6 - 60000 (179.74)^2 = 1,456.63 \times 10^6 \text{ in.}^2 \quad C$$

$$I_{oy} = I_{yy} - W(z^2 + x^2) = 10,379.05 \times 10^6 - 60000 \left(\frac{179.74^2}{2} + \frac{336.34^2}{2} \right) = 1653.19 \times 10^6 \text{ in.}^2 \quad C$$

$$I_{oz} = I_{zz} - W(x^2) = 9,510.99 \times 10^6 - 60,000 (336.34)^2 = 2,723.51 \times 10^6 \text{ in.}^2 \quad C$$

REPORT NO. R107B-004 FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION			PAGES	PAGE 57
MODEL	XC-120	PREPARED BY	Hawley	CHECKED BY
			Meyer	APPROVED BY
Subject:--			DATE 9 July 1948	
			REVISED 14 Feb. 1949	
			C Mar. 14, 1949	

LANDING CONDITIONS

Airplane c.g. #2AL (cont'd) (Gear Down)

Item	W	Ixx x10 ⁻⁶	Iyy x10 ⁻⁶	Izz x10 ⁻⁶
Basic Weight	41,842	2,602.82	7325.95	7156.7
Min. Fuel	801	41.14	127.75	135.67
Min. Oil	225	12.02	59.90	57.66
Cargo dist.	1,238	* 53.4	*163.25	112.34
	44,106	2,709.38	7676.85	7462.37

* Cargo Moments of Inertia

$$I_{xx} = I_{ox} + Wz^2 = 1.78 + 1,238 (204.2)^2 = 53.4 \times 10^6 \text{ in.}^2$$

$$I_{yy} = I_{oy} + W(z^2 + x^2) = 11.21 \times 10^6 + 1,238 \left(\frac{2}{204.2} + \frac{2}{284.81} \right) = 163.25 \times 10^6 \text{ in.}^2$$

$$I_{zz} = I_{oz} + W(x^2) = 11.92 \times 10^6 + 1,238 (284.81)^2 = 112.34 \times 10^6 \text{ in.}^2$$

Airplane Moments of Inertia

$$I_{ox} = I_{xx} - Wz^2 = 2709.38 \times 10^6 - 44,106 \left(\frac{2}{175.01} \right) = 1358.48 \times 10^6 \text{ in.}^2$$

$$I_{oy} = I_{yy} - W(z^2 + x^2) = 7676.85 \times 10^6 - 44,106 \left(\frac{2}{175.01} + \frac{2}{336.34} \right) = 1336.48 \times 10^6 \text{ in.}^2$$

$$I_{oz} = I_{zz} - W(x^2) = 7,462.37 \times 10^6 - 44,106 (336.34^2) = 2472.9 \times 10^6 \text{ in.}^2$$

REPORT NO. <u>ELJ7P-004</u>		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 66
MODEL	<u>XC-120</u>	PREPARED BY	<u>Hawley</u>	CHECKED BY	<u>Meyer</u>
Subject: <u>MATH MOMENTS OF INERTIA - Part II</u>				APPROVED BY	
				DATE <u>July 9, 1949</u>	
				REVISED <u>Feb. 14, 1949</u> <u>C Mar. 14, 1949</u>	

SUMMARY OF NORMAL GROSS WEIGHT LANDING CONDITIONS

(Gear Down)

C.G. Location	Ref. Page	Condition	I_{ox} Slug Ft. ²	I_{oy} Slug Ft. ²	I_{oz} Slug Ft. ²
1L	53	M.F.W. Pack Off	287,360	247,315	497,600
1AL	53	M.F.W. Pack On	291,900	282,500	527,970
2L	55	G.W. = 60,000# Min. Fuel, Max. Cargo (High)	314,146	356,536	587,400
2AL	57	G.W. = 44,106# Min. Fuel, 1238# Cargo (High)	292,980	283,233	533,300
3L	52	G.W. = 60,000# Max. Fuel 1238# Cargo (High)	497,900	293,600	741,300
4L	59	G.W. = 53640.8 Max. Fuel No Cargo - Pack Off	485,000	256,000	709,800
4AL	59	G.W. = 58762 Max. Fuel No Cargo - Pack On	497,500	292,200	740,200
5L	61	G.W. = 60,000# Min. Fuel Max. Cargo Aft (low)	314,700	357,160	587,400
6L	63	G.W. = 60,000# Min. Fuel Max. Cargo Aft (low)	336,300	349,000	579,200
7L	65	G.W. = 60,000# Max. Fuel 1238# Cargo (High)	498,000	328,300	754,600

MODEL XC-120

PREPARED BY FEHSTER

CHECKED BY

APPROVED BY

DATE March 20, 1950

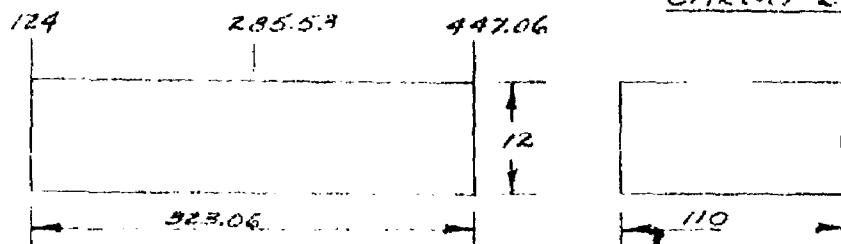
REVISED

Subject: MASS MOMENTS OF INERTIA

FLIGHT CONDITIONS

C.G. 1A, 207° 19' A.C. - G.W. = 64000#. GEAR UP

CRK 60 AT 60.0" ABOVE FLOOR CONT'D FROM PAGE 78

CARGO DISTRIBUTION

$$I_{xx} = \frac{11867}{12} [(110)^2 + (12)^2] = 12.108 \times 10^{-6} \text{ #} \cdot \text{ft}^2$$

$$I_{yy} = \frac{11867}{12} [(323.06)^2 + (12)^2] = 103.352 \times 10^{-6} \text{ #} \cdot \text{ft}^2$$

$$I_{zz} = \frac{11867}{12} [(323.06)^2 + (110)^2] = 115.177 \times 10^{-6} \text{ #} \cdot \text{ft}^2$$

ITEM	W (#)	I_{xx} ($\times 10^{-6}$)	I_{yy} ($\times 10^{-6}$)	I_{zz} ($\times 10^{-6}$)
ENGINE WEIGHT	41842	2486.01	7832.28	7302.07
FUEL	3744	1117.14	1583.43	2282.10
OIL	541	29.22	123.89	140.11
CARGO	11867	* 505.97	* 1564.39	* 1082.68
Σ	64000	4138.34	10616.29	10762.69

$$* I_{xx} = 12.108 \times 10^{-6} + 11867 (204.00)^2 = 505.965 \times 10^{-6} \text{ #} \cdot \text{ft}^2$$

$$* I_{yy} = 103.352 \times 10^{-6} + 11867 [(204)^2 + (285.53)^2] = 1564.690 \times 10^{-6} \text{ #} \cdot \text{ft}^2$$

$$* I_{zz} = 115.177 \times 10^{-6} + 11867 (285.53)^2 = 1082.608 \times 10^{-6} \text{ #} \cdot \text{ft}^2$$

AIRPLANE MOMENTS OF INERTIA

$$I_{xx} = I_{xx} - W \bar{y}^2 = 4138.34 \times 10^{-6} - 64,000 (172.69)^2$$

$$= 4138.34 \times 10^{-6} - 64,000 (29,821) = 2229 \times 10^{-6} \text{ #} \cdot \text{ft}^2$$

$$I_{yy} = I_{yy} - W (\bar{x}^2 + \bar{z}^2) = 10616.29 \times 10^{-6} - 64,000 [336.34^2 + 172.69^2]$$

$$= 10616.29 \times 10^{-6} - 64,000 (142,346)$$

$$= 1467.75 \times 10^{-6} \text{ #} \cdot \text{ft}^2$$

$$I_{zz} = I_{zz} - W \bar{x}^2 = 10762.69 \times 10^{-6} - 64,000 (336.34)^2$$

$$= 10762.69 \times 10^{-6} - 7,240 \times 10^{-6}$$

$$= 3522.69 \times 10^{-6} \text{ #} \cdot \text{ft}^2$$

RESTRICTED

REPORT NO. R107B-004 FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES PAGE 84a
MODEL <u>XC-110</u>	PREPARED BY <u>FENSTER</u>	CHECKED BY _____ APPROVED BY _____
Subject: <u>MASS MOMENTS OF INERTIA</u> <u>C.G. #3A, 207° M.A.C. - G.W. = 74000#, GEAR UP, CARGO 6.0" ABOVE</u> <u>CONT'D FROM PAGE 84</u> <u>CARGO DISTRIBUTION</u>		DATE <u>Mar. 20, 1950</u> REVISED _____

$$I_{ox} = \frac{20,000}{12} [(110)^2 + (12)^2] = 20.407 \times 10^{-6} \text{ #}^2$$

$$I_{oy} = \frac{20,000}{12} [(409.78)^2 + (12)^2] = 212.275 \times 10^{-6} \text{ #}^2$$

$$I_{oz} = \frac{20,000}{12} [(356.68)^2 + (110)^2] = 232.201 \times 10^{-6} \text{ #}^2$$

ITEM	W (#)	I_{xx} ($\times 10^{-6}$)	I_{yy} $\times 10^{-6}$	I_{zz} $\times 10^{-6}$
BASIC WEIGHT	41842	2486.01	7332.28	7302.07
FUEL	11511	1117.14	1583.44	1231.10
OIL	647	29.22	135.89	140.11
CARGO	20000	* 1310.73	* 3330.76	* 2060.39
E	74000	4943.10	12382.36	11740.42

$$* I_{xx} = 20.407 \times 10^{-6} + 20,000 (254.00)^2 = 1,310.73 \times 10^{-6} \text{ #}^2$$

$$* I_{yy} = 212.275 \times 10^{-6} + 20,000 [(302.34)^2 + (254)^2] = 3,330.76 \times 10^{-6} \text{ #}^2$$

$$* I_{zz} = 232.201 \times 10^{-6} + 20,000 (302.34)^2 = 2,060.39 \times 10^{-6} \text{ #}^2$$

AIRPLANE MOMENTS OF INERTIA

$$I_{ox} = I_{xx} - W \bar{z}^2 = 4,943.10 \times 10^{-6} - 74,000 (188.53)^2 = 2,312.88 \times 10^{-6} \text{ #}^2$$

$$I_{oy} = I_{yy} - W (\bar{x}^2 + \bar{z}^2) = 12,382.36 \times 10^{-6} - 74,000 [336.34^2 + 188.53^2] = 1,380.92 \times 10^{-6} \text{ #}^2$$

$$I_{oz} = I_{zz} - W \bar{x}^2 = 11,740.42 \times 10^{-6} - 74,000 (336.34)^2 = 9,369.20 \times 10^{-6} \text{ #}^2$$

MODEL XC-120

PREPARED BY FEASPER

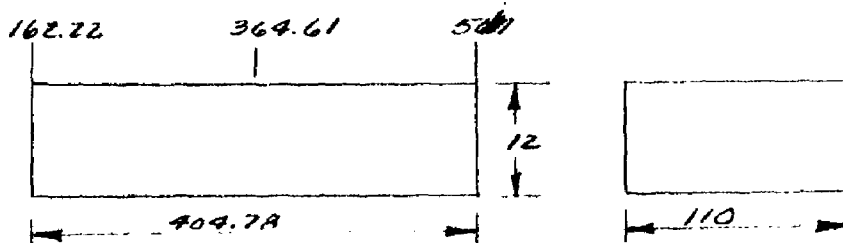
CHECKED BY

APPROVED BY

Subject: MASS MOMENTS OF INERTIA

DATE

REVISED

C.G. #4A, 307" MAC, - G.W. = 74000#, GEAR UP
CARGO AT 6.0" ABOVE FLOOR CONT'D FROM PAGE 84
CARGO DISTRIBUTION


$$I_{0x} = \frac{20,000}{12} [(110)^2 + (12)^2] = 20.407 \times 10^{-6} \text{ #ft}^2$$

$$I_{0y} = \frac{20,000}{12} [(404.78)^2 + (12)^2] = 273.318 \times 10^{-6} \text{ #ft}^2$$

$$I_{0z} = \frac{20,000}{12} [(404.78)^2 + (110)^2] = 293.244 \times 10^{-6} \text{ #ft}^2$$

ITEM	W (#)	I_{xx} ($\times 10^{-6}$)	I_{yy} $\times 10^{-6}$	I_{zz} $\times 10^{-6}$
BASIC WEIGHT	41842	2486.01	7332.28	7302.07
FUEL	11511	1117.14	1583.43	2237.79
OIL	647	29.22	135.89	140.17
CARGO	20000	* 1310.73	* 4232.44	* 2952.04
E	74000	4943.10	13284.04	12632.02

$$* I_{xx} = 20.407 \times 10^{-6} + 20,000 (254.00)^2 = 1,310.73 \times 10^{-6} \text{ #ft}^2$$

$$* I_{yy} = 273.318 \times 10^{-6} + 20,000 [(364.61)^2 + (254)^2] = 4,232.44 \times 10^{-6} \text{ #ft}^2$$

$$* I_{zz} = 293.244 \times 10^{-6} + 20,000 (364.61)^2 = 2,952.04 \times 10^{-6} \text{ #ft}^2$$

AIRPLANE MOMENTS OF INERTIA

$$I_{xx} = I_{xx} - W\bar{z}^2 = 4,943.10 \times 10^{-6} - 74,000 (188.33)^2$$

$$= 2,312.88 \times 10^{-6} \text{ #ft}^2$$

$$I_{0y} = I_{yy} - W(\bar{x}^2 + \bar{z}^2) = 13,284.04 \times 10^{-6} - 74,000 [353.17^2 + 188.33^2]$$

$$= 1,423.8 \times 10^{-6} \text{ #ft}^2$$

$$I_{0z} = I_{zz} - W\bar{x}^2 = 12,632.02 \times 10^{-6} - 74,000 (353.17)^2$$

$$= 3,402.07 \times 10^{-6} \text{ #ft}^2$$

RESTRICTED

MODEL XC-120

PREPARED BY FEHSTER

CHECKED BY

APPROVED BY

DATE Mar. 20, 1950

REVISED

Subject: MASS MOMENTS OF INERTIA
GROUND HANDLING CONDITION
AIRPLANE JACKING CONDITION

G.W. = 64000#

GEAR DOWN - FULL FUEL AND OIL

CARGO C.G. 60" ABOVE FLOOR FWD

ITEM	W (#)	X	Z	WX x10 ⁻³	WZ x10 ⁻³
BASIC WEIGHT	41842	336.4	174.86	14075.65	7316.49
FULL FUEL	16020	372.5	150.00	5967.5	2403.0
FULL OIL	900	475.0	151.00	427.5	135.9
CARGO	5238	168.2	258.20	881.0	1352.5
<u>E</u>	<u>64000</u>	<u>333.64</u>	<u>175.12</u>	<u>21351.65</u>	<u>11207.99</u>
NO CARGO	58762	348.36	164.91		

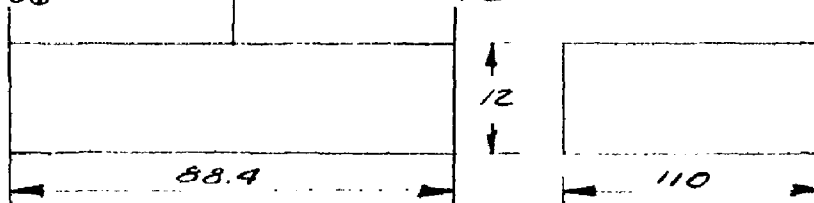
CARGO

$$I_{ox} = \frac{5,238}{12} [(110)^2 + (12)^2] = 5.345 \times 10^{-6} \text{ #ft}^2$$

$$I_{oy} = \frac{5,238}{12} [(88.4)^2 + (12)^2] = 34.739 \times 10^{-6} \text{ #ft}^2$$

$$I_{oz} = \frac{5,238}{12} [(88.4)^2 + (110)^2] = 86.927 \times 10^{-6} \text{ #ft}^2$$

STA. 106 STA. 150.2 STA. 194.2


CARGO DISTRIBUTION

ITEM	W (#)	I_{xx} x10 ⁻⁶	I_{yy} x10 ⁻⁶	I_{zz} x10 ⁻⁶
BASIC WEIGHT	41842	2486.01	7332.28	7302.07
FULL FUEL	16020	1336.64	2590.80	3204.80
FULL OIL	900	20.52	223.58	203.06
CARGO	5238	* 354.55	* 532.13	* 235.12
<u>E</u>	<u>64000</u>	<u>4197.72</u>	<u>10678.79</u>	<u>10945.05</u>

$$* I_{xx} = 5.345 \times 10^{-6} + 5238(258.2)^2 = 354.548 \times 10^{-6} \text{ #ft}^2$$

$$* I_{yy} = 34.739 \times 10^{-6} + 5238[258.2^2 + 168.2^2] = 532.132 \times 10^{-6} \text{ #ft}^2$$

$$* I_{zz} = 86.927 \times 10^{-6} + 5238(168.2)^2 = 235.117 \times 10^{-6} \text{ #ft}^2$$

REPORT NO. R1078-004		FAIRCHILD AIRCRAFT DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION		PAGES	PAGE 87
MODEL XC-120	PREPARED BY FENSTER	CHECKED BY	APPROVED BY		
Subject: <u>MASS MOMENTS OF INERTIA</u>			DATE Mar. 20, 1950		
<u>GROUND HANDLING CONDITION</u>			REVISED		
<u>AIRPLANE JACKING CONDITION</u>					
<u>AIRPLANE MOMENTS OF INERTIA</u>					
$I_{0x} = I_{xx} - W\bar{z}^2 = 4,197.72 \times 10^{-6} - 64,000 (175.12)^2$ $= 2,235.03 \times 10^{-6} \text{ #} \cdot \text{ft}^2$					
$I_{0y} = I_{yy} - W(\bar{x}^2 + \bar{z}^2) = 10,678.79 \times 10^{-6} - 64,000 [333.64^2 + 175.12^2]$ $= 1,592.75 \times 10^{-6} \text{ #} \cdot \text{ft}^2$					
$I_{0z} = I_{zz} - W\bar{x}^2 = 10,945.05 \times 10^{-6} - 64,000 (333.64)^2$ $= 3,821.7 \times 10^{-6} \text{ #} \cdot \text{ft}^2$					
1					
FA-800-23					

MODEL XC-120

PREPARED BY FEHSTEL

CHECKED BY

APPROVED BY

DATE March 20, 1950

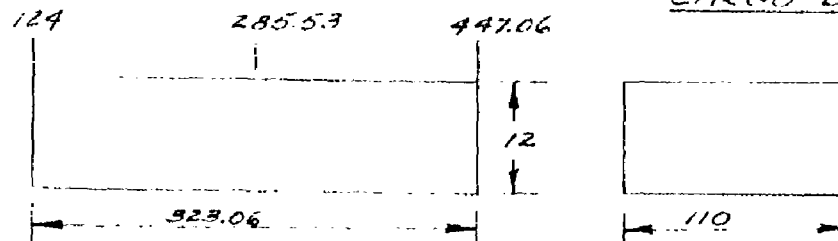
REVISED

Subject: MASS MOMENTS OF INERTIA

FLIGHT CONDITIONS

C.G. 1A, 20° M.A.C. - G.W. = 64000#, GEAR UP
CHRGD AT 60.0' ABOVE FLOOR CONT'D FROM PAGE 78

CARGO DISTRIBUTION



$$I_{xx} = \frac{11867}{12} [(110)^2 + (12)^2] = 12.108 \times 10^{-6} \text{ #ft}^2$$

$$I_{yy} = \frac{11867}{12} [(323.06)^2 + (12)^2] = 103.352 \times 10^{-6} \text{ #ft}^2$$

$$I_{zz} = \frac{11867}{12} [(323.06)^2 + (110)^2] = 115.177 \times 10^{-6} \text{ #ft}^2$$

ITEM	W (#)	I_{xx} ($\times 10^{-6}$)	I_{yy} ($\times 10^{-6}$)	I_{zz} ($\times 10^{-6}$)
BASIC WEIGHT	41842	2486.01	7332.28	7302.07
FUEL	9744	1117.14	1583.43	2251.23
OIL	547	29.22	135.89	140.17
CARGO	11867	* 505.97	* 1564.09	* 1082.66
Σ	64000	4138.34	10616.29	10762.63

$$* I_{xx} = 12.108 \times 10^{-6} + 11867 (204.00)^2 = 505.965 \times 10^{-6} \text{ #ft}^2$$

$$* I_{yy} = 103.352 \times 10^{-6} + 11867 [(204)^2 + (285.53)^2] = 1564.690 \times 10^{-6} \text{ #ft}^2$$

$$* I_{zz} = 115.177 \times 10^{-6} + 11867 (285.53)^2 = 1082.658 \times 10^{-6} \text{ #ft}^2$$

AIRPLANE MOMENTS OF INERTIA

$$I_{xx} = I_{xx} - W \bar{x}^2 = 4138.34 \times 10^{-6} - 64,000 (172.63)^2$$

$$= 4138.34 \times 10^{-6} - 64,000 (29,821) = 2229 \times 10^{-6} \text{ #ft}^2$$

$$I_{yy} = I_{yy} - W (\bar{x}^2 + \bar{z}^2) = 10616.29 \times 10^{-6} - 64,000 [336.34^2 + 172.63^2]$$

$$= 10616.29 \times 10^{-6} - 64,000 (142,246)$$

$$= 1467.75 \times 10^{-6} \text{ #ft}^2$$

$$I_{zz} = I_{zz} - W \bar{y}^2 = 10762.63 \times 10^{-6} - 64,000 (1326.34)^2$$

$$= 10762.63 \times 10^{-6} - 7,240 \times 10^{-6}$$

$$= 3522.63 \times 10^{-6} \text{ #ft}^2$$

MODEL XC-120

PREPARED BY FENSTER

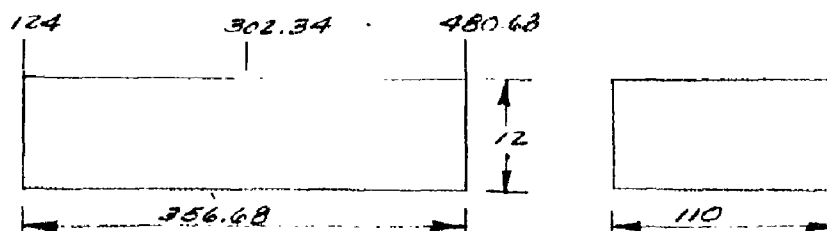
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APPROVED BY

DATE Mar. 20, 1950

Subject: MASS MOMENTS OF INERTIA

C.G. #3A, 20% M.A.C. - G.W. = 74000#, GEAR UP, CARGO 6.0" ABOVE
CONT'D FROM PAGE 84 FLOOR
CARGO DISTRIBUTION



$$I_{ox} = \frac{20,000}{12} [(110)^2 + (12)^2] = 20.407 \times 10^{-6} \text{ #}^2$$

$$I_{oy} = \frac{20,000}{12} [(404.78)^2 + (12)^2] = 212.275 \times 10^{-6} \text{ #}^2$$

$$I_{oz} = \frac{20,000}{12} [(356.68)^2 + (110)^2] = 232.201 \times 10^{-6} \text{ #}^2$$

ITEM	W (#)	I_{xx} ($\times 10^{-6}$)	I_{yy} $\times 10^{-6}$	I_{zz} $\times 10^{-6}$
BASIC WEIGHT	41842	2486.01	7332.28	7302.07
FUEL	11511	1117.14	1583.43	2237.73
OIL	647	29.22	135.89	140.17
CARGO	20000	* 1310.73	* 3330.76	* 2060.39
Σ	74000	4943.10	12382.36	11740.42

$$* I_{xx} = 20.407 \times 10^{-6} + 20,000 (254.00)^2 = 1,310.73 \times 10^{-6} \text{ #}^2$$

$$* I_{yy} = 212.275 \times 10^{-6} + 20,000 [(1302.34)^2 + (254)^2] = 3,330.76 \times 10^{-6} \text{ #}^2$$

$$* I_{zz} = 232.201 \times 10^{-6} + 20,000 (302.34)^2 = 2,060.39 \times 10^{-6} \text{ #}^2$$

AIRPLANE MOMENTS OF INERTIA

$$I_{ax} = I_{xx} - W \bar{z}^2 = 4,943.10 \times 10^{-6} - 74,000 (188.53)^2 = 2,312.88 \times 10^{-6} \text{ #}^2$$

$$I_{ay} = I_{yy} - W (\bar{x}^2 + \bar{z}^2) = 12,382.36 \times 10^{-6} - 74,000 [336.34^2 + 188.53^2] = 1,380.92 \times 10^{-6} \text{ #}^2$$

$$I_{az} = I_{zz} - W \bar{x}^2 = 11,740.42 \times 10^{-6} - 74,000 (336.34)^2 = 9,369.20 \times 10^{-6} \text{ #}^2$$

MODEL XC-120

PREPARED BY FENSING

CHECKED BY

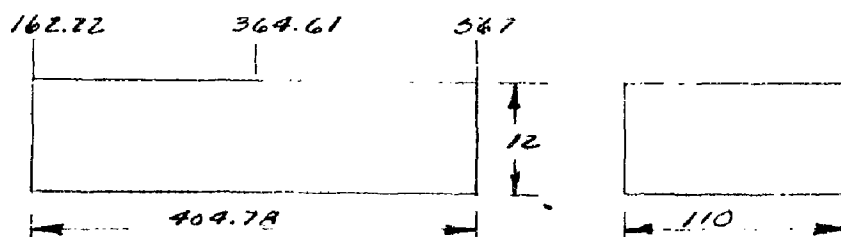
APPROVED BY

DATE

REVISED

Subject: MASS MOMENTS OF INERTIA

C.G. #4A, 307 MAC. - G.W. = 74000 #, GEAR UP
CARGO AT 6.0" ABOVE FLOOR, CONT'D FROM PAGE 84
CARGO DISTRIBUTION



$$I_{xx} = \frac{20,000}{12} [(110)^2 + (12)^2] = 20.407 \times 10^{-6} \text{ #in}^2$$

$$I_{yy} = \frac{20,000}{12} [(404.78)^2 + (12)^2] = 273.318 \times 10^{-6} \text{ #in}^2$$

$$I_{zz} = \frac{20,000}{12} [(404.78)^2 + (110)^2] = 293.244 \times 10^{-6} \text{ #in}^2$$

ITEM	W (#)	I_{xx} ($\times 10^{-6}$)	I_{yy} $\times 10^{-6}$	I_{zz} $\times 10^{-6}$
BASIC WEIGHT	41842	2486.01	7332.28	1302.07
FUEL	11511	1117.14	1583.43	2237.79
OIL	647	29.22	135.80	140.17
CARGO	20000	* 1310.73	* 4232.44	* 2952.04
E	74000	4943.10	13284.04	12632.02

$$* I_{xx} = 20.407 \times 10^{-6} + 20,000 (254.00)^2 = 1,310.73 \times 10^{-6} \text{ #in}^2$$

$$* I_{yy} = 273.318 \times 10^{-6} + 20,000 [(364.61)^2 + (254)^2] = 4,232.44 \times 10^{-6} \text{ #in}^2$$

$$* I_{zz} = 293.244 \times 10^{-6} + 20,000 (364.61)^2 = 2,952.04 \times 10^{-6} \text{ #in}^2$$

AIRPLANE MOMENTS OF INERTIA

$$I_{xx} = I_{xx} - W\bar{z}^2 = 4,943.10 \times 10^{-6} - 74,000 (188.53)^2 = 2,312.88 \times 10^{-6} \text{ #in}^2$$

$$I_{yy} = I_{yy} - W(\bar{x}^2 + \bar{z}^2) = 13,284.04 \times 10^{-6} - 74,000 [353.17^2 + 188.53^2] = 1,423.8 \times 10^{-6} \text{ #in}^2$$

$$I_{zz} = I_{zz} - W\bar{x}^2 = 12,632.02 \times 10^{-6} - 74,000 (353.17)^2 = 3,402.07 \times 10^{-6} \text{ #in}^2$$

RESTRICTED

MODEL XC-120

PREPARED BY FANSTRE

CHECKED BY

APPROVED BY

DATE Mar. 20, 1950

Subject: MASS MOMENTS OF INERTIA

REVISED

GROUND HANDLING CONDITION
AIRPLANE JACKING CONDITION

G.W. = 64000#

GEAR DOWN - FULL FUEL AND OIL

CARGO C.G. 60" ABOVE FLOOR FWD

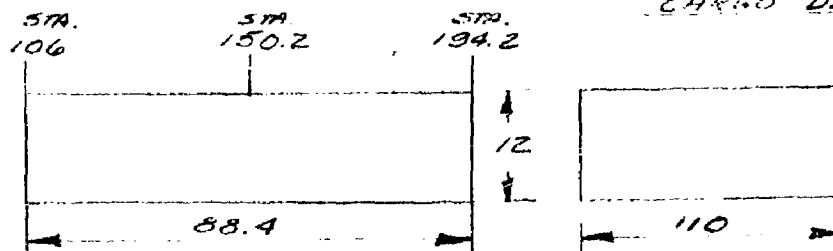
ITEM	W (#)	X	Z	WX x10 ⁻³	WZ x10 ⁻³
BASIC WEIGHT	41842	336.4	174.86	14075.65	7316.49
FULL FUEL	16020	372.5	150.00	5967.5	2403.0
FULL OIL	900	475.0	151.00	427.5	135.9
CARGO	5238	168.2	258.20	881.0	1352.5
<u>E</u>	64000	333.64	175.16	21351.65	11207.89
NO CARGO	58762	348.86	164.01		

CARGO

$$I_{ox} = \frac{5,238}{12} [(110)^2 + (12)^2] = 5.345 \times 10^{-6} \text{ #ft}^2$$

$$I_{oy} = \frac{5,238}{12} [(88.4)^2 + (12)^2] = 34.739 \times 10^{-6} \text{ #ft}^2$$

$$I_{oz} = \frac{5,238}{12} [(88.4)^2 + (110)^2] = 86.927 \times 10^{-6} \text{ #ft}^2$$

CARGO DISTRIBUTION


ITEM	W (#)	I_{xx} x10 ⁻⁶	I_{yy} x10 ⁻⁶	I_{zz} x10 ⁻⁶
BASIC WEIGHT	41842	2486.01	7332.28	7302.07
FULL FUEL	16020	1336.64	2590.80	3204.80
FULL OIL	900	20.52	223.58	405.06
CARGO	5238	* 354.58	* 532.13	* 235.12
<u>E</u>	64000	4197.72	10678.79	10945.05

$$* I_{xx} = 5.345 \times 10^{-6} + 5238 (258.2)^2 = 354.549 \times 10^{-6} \text{ #ft}^2$$

$$* I_{yy} = 34.739 \times 10^{-6} + 5238 [258.2^2 + 168.2^2] = 532.132 \times 10^{-6} \text{ #ft}^2$$

$$* I_{zz} = 86.927 \times 10^{-6} + 5238 (168.2)^2 = 235.117 \times 10^{-6} \text{ #ft}^2$$

MODEL XC-120

PREPARED BY FEASTER

CHECKED BY

APPROVED BY

DATE Mar. 20, 1950

REVISED

Subject: MASS MOMENTS OF INERTIA

GROUND HANDLING CONDITION

AIRPLANE JACKING CONDITION

AIRPLANE MOMENTS OF INERTIA

$$I_{xx} = I_{xx} - WZ^2 = 4,197.72 \times 10^{-6} - 64,000(175.12)^2 \\ = 2,235.08 \times 10^{-6} \text{ #ft}^2$$

$$I_{yy} = I_{yy} - W(X^2 + Z^2) = 10,618.79 \times 10^{-6} - 64,000[333.64^2 + 175.12^2] \\ = 6,592.75 \times 10^{-6} \text{ #ft}^2$$

$$I_{zz} = I_{zz} - WY^2 = 10,945.05 \times 10^{-6} - 64,000(333.64)^2 \\ = 3,821.7 \times 10^{-6} \text{ #ft}^2$$

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FAIRCHILD ENGINE AND AIRPLANE CORP., FAIRCHILD AIRCRAFT
DIV., HAGERSTOWN, MD. (ENGINEERING REPORT NO. R107B-004)

MASS MOMENTS OF INERTIA CALCULATIONS - MODEL XC-120

J.W. O. BAKER; J. MYERS; HAWLEY AND OTHERS 6 MAY '48
(REVISIONS 20 MARCH '50) 90PP. DIAGRS

STRUCTURES (7)

DESIGN AND DETAILS (3)

AIRPLANES - MOMENTS OF INERTIA

AIRPLANES, CARGO

C-120 AIRCRAFT

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EO 10501 dd 5 NOV 53
AD-B801 415 5 NOV 1953



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Code P/DB2507

SECTION I
REQUESTING ORGANIZATION

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WRIGHT AIR DEVELOPMENT CENTER
WRIGHT-PATTERSON AFB OH 45433
ATTN: [REDACTED]
[REDACTED]

2. DTIC USER CODE NO

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3. DATE OF REQUEST

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[REDACTED]
[REDACTED]
[REDACTED]

9. CONTRACT MONITOR AND TELEPHONE NUMBER (Contractors Only)

SECTION II
BIBLIOGRAPHIC INFORMATION

11. AD NUMBER (If Known)

AD-B801415

12. (TITLE, REPORT NUMBER, AUTHOR(S), ETC)

Mass Moments of Inertia Calculations - Model XC-120. Revision, 90 pages

SECTION III
REQUESTER JUSTIFICATION

13. REQUESTER JUSTIFICATION (Explain need in detail)

A paper copy of this unclassified document, currently releasable to DOD only, is being requested for administrative use in a preliminary project study. NASA-DFRC engineers are looking at several possible concepts for future Unmanned Aerial Vehicle applications. This historical document may help determine a future NASA REVCON (Revolutionary Concept) proposal to be engineered at this Center.

SECTION IV
RELEASING AGENCY

1. RELEASING AGENCY ADDRESS (If Known)

WRIGHT AIR DEVELOPMENT CTR
WRIGHT-PATTERSON AFB OH

2. RELEASING AGENCY DECISION (If the report was developed under the SDIR Program refer to instruction B 2 on the reverse of this form)

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