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Serial No. 2

File No. _____

Report No. NA-56-450

NORTH AMERICAN AVIATION, INC.

INTERNATIONAL AIRPORT
LOS ANGELES 45, CALIFORNIA

ENGINEERING DEPARTMENT

ESTIMATED WEIGHT AND BALANCE REPORTFORRECONNAISSANCE WEAPONSYSTEM 118P PHASE III(N.A.A. DESIGNATION S.O. 2432)CONTRACT NO. AF33(600)-31243(E.O. NO. 55-8-118L)FC
BAG

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18 U.S.C., SECTIONS 793 AND 794. ITS TRANSMISSION
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PREPARED BY

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APPROVED BY

G. V. Johnson

G. V. Johnson

Group Leader - Weight Control

*H. L. Schleicher*H. L. Schleicher
Chief Structures EngineerNumber Pages 51
Appendix I - 47 Pages

REVISIONS

Date 1 June 1956

DATE	REV BY	PAGES AFFECTED	REMARKS
MAY 21 1958			
58 A A		6066	
<i>Sub 31</i>	SECRET		66RDZ-6551-2 X-cy

PREPARED BY: J W C	NORTH AMERICAN AVIATION, INC.	PAGE NO 1 OF 51
CHECKED BY: W H L		REPORT NO. NA-56-450
DATE: 1 June 1956		MODEL NO Sys. 118P

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56RDZ-6551

PREPARED BY: J W C	NORTH AMERICAN AVIATION, INC. SECRET	PAGE NO. 2 OF 51
CHECKED BY: W H L		REPORT NO. NA-56-450
DATE: 1 June 1956	INTRODUCTION	MODEL NO. Sys. 118P

The estimated weight data presented in this report represents a Phase III Reconnaissance Airplane, Weapons System 118P.

The airplane is designed with capabilities for the following missions: Detail Photographic Mission, Search Photographic Mission, Radar Mapping with Coherent Doppler Side-looking Radar, Radar Mapping with Azimuth Radar and a Ferret Mission.

The Detail Photographic Mission was chosen as the design mission as this mission resulted in the heaviest of the five gross weights.

Appendix A contains the supporting data for the structural estimating techniques used in arriving at the Structural Group weights, with the exception of the Surface Controls Group.

The detail weight statement, AN-9102D, is included in the basic report to give a detail breakdown of the weight allocations in the Propulsion, Equipment, and Surface Controls Groups.

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56RDZ-6551

PREPARED BY: J W C		NORTH AMERICAN AVIATION, INC.		PAGE NO. 3 of 51	
CHECKED BY: W H L				REPORT NO. NA-56-450	
DATE: 1 June 1956		SUMMARY		MODEL NO. Sys. 118P	

CONDITION	WEIGHT (LBS.)	HORIZONTAL C.G.		VERTICAL C.G.		
		AFT OF DATUM (INS.)	$\bar{x}$ M.A.C.	ABOVE DATUM (INS.)	BELOW F.R.L. (INS.)	
WEIGHT EMPTY	142842	1572.89	55.3	172.65	27.3	
USEFUL LOAD	63958	-	-	-	-	
TAKE-OFF GROSS WEIGHT - Gear Down	206800	1485.78	48.8	184.39	15.6	
DETAIL PHOTO MISSION Gear Up		1481.42	48.5	188.86	11.1	
<u>ALTERNATE TAKE-OFF GROSS WEIGHTS</u>						
RADAR MAPPING MISSION - COHERENT DOPPLER RADAR	206794	Gear Down	1486.17	48.8	184.23	15.8
		Gear Up	1481.81	48.5	188.70	11.3
RADAR MAPPING MISSION - AZIMUTH RADAR	206588	Gear Down	1487.06	48.9	184.27	15.7
		Gear Up	1482.70	48.5	188.74	11.3
SEARCH PHOTO MISSION	206480	Gear Down	1487.43	48.9	184.27	15.7
		Gear Up	1483.06	48.6	188.75	11.2
FERRET MISSION	206696	Gear Down	1486.34	48.8	184.30	15.7
		Gear Up	1481.97	48.5	188.77	11.2
MOST FORWARD C.G. CONDITION	206800	1481.42	48.5	188.86	11.1	
MOST AFT C.G. CONDITION	145087	1558.20	54.2	172.98	27.0	

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AN-9103-D
SUPERSEDING
AN-9103-C

NAME J W C
DATE 1 June 1956

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MODEL Sys. 118P
REPORT NA-56-450

SECRET

GROUP WEIGHT STATEMENT

ESTIMATED - ~~CONFIDENTIAL~~

(Cross out those not applicable)

CONTRACT NO. AF33(600)-31243
AIRPLANE, GOVERNMENT NO. _____
AIRPLANE, CONTRACTOR NO. _____
MANUFACTURED BY North American Aviation Inc.

		MAIN	AUXILIARY
ENGINE	MANUFACTURED BY	Aerojet General	
	MODEL	HATR-2040 Scaled 103.1%	
	NO.	4	
PROPELLER	MANUFACTURED BY		
	DESIGN NO.		
	NO.		

SECRET

NAME J W C
DATE 1 June 1956

GROUP WEIGHT STATEMENT
WEIGHT EMPTY

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1	WING GROUP					24343
2	CENTER SECTION - BASIC STRUCTURE					
3	INTERMEDIATE PANEL - BASIC STRUCTURE					
4	OUTER PANEL - BASIC STRUCTURE ~~XXXXXXXXXX~~ ~~XXXX~~				21733	
5						
6	SECONDARY STRUCTURE (INCL. WINGFOLD MECHANISM LBS.)					
7	AILERONS (INCL. BALANCE WEIGHT LBS.)					
8	FLAPS - TRAILING EDGE					
9	LEADING EDGE					
10	SLATS					
11	SPOILERS				1710	
12	SPEED BRAKES					
13	TIP-FOLDING WING				650	
14	TAB-TRIM (L.H. WING ONLY)				250	
15	TAIL GROUP					3040
16	STABILIZER - BASIC STRUCTURE (CANARD)				1400	
17	FINS - BASIC STRUCTURE (INCL. DORSAL LBS.) (2)				1640	
18	SECONDARY STRUCTURE (STAB. & FINS)					
19	ELEVATOR (INCL. BALANCE WEIGHT LBS.)					
20	RUDDERS (INCL. BALANCE WEIGHT LBS.)					
21						
22						
23	BODY GROUP					29876
24	FUSELAGE OR HULL - BASIC STRUCTURE					
25	BOOMS - BASIC STRUCTURE					
26	SECONDARY STRUCTURE - FUSELAGE OR HULL					
27	BOOMS					
28	SPEEDBRAKES					
29	DOORS, PANELS & MISC.					
30						
31	ALIGHTING GEAR GROUP - LAND (TYPE: ~~TRICYCLE~~)					11806
32	LOCATION	WHEELS, BRAKES	STRUCTURE	CONTROLS		
33		TIRES, TUBES, AIR				
34	Main - Wing	2147	8044	825	11016	
35	Nose - Fuselage	90	400	300	790	
36						
37						
38						
39						
40	ALIGHTING GEAR GROUP - WATER					
41	LOCATION	FLOATS	STRUTS	CONTROLS		
42						
43						
44						
45						
46	SURFACE CONTROLS GROUP					4996
47	COCKPIT CONTROLS				22	
48	AUTOMATIC PILOT					
49	SYSTEM CONTROLS (INCL. POWER & FEEL CONTROLS 1373 LBS.)				4974	
50						
51	ENGINE SECTION ~~XXXXXXXXXXXXXXXXXXXX~~					306
52	INBOARD					
53	CENTER				306	
54	OUTBOARD					
55	DOORS, PANELS & MISC.					
56						
57	TOTAL (TO BE BROUGHT FORWARD)					74367

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AN-9103-D

NAME

J W C

DATE 1 June 1956

GROUP WEIGHT STATEMENT
WEIGHT EMPTY

SECRET

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MODEL Sys. 118P

REPORT NA-56-453

1	PROPULSION GROUP				56025
2		AUXILIARY		MAIN	
3	ENGINE INSTALLATION			15660	
4	AFTERBURNERS (IF PURN. SEPARATELY)				
5	ACCESSORY GEAR BOXES & DRIVES			1010	
6	SUPERCHARGERS (FOR TURBO TYPES)				
7	AIR INDUCTION SYSTEM			25680	
8	EXHAUST SYSTEM - SROUD			340	
9	COOLING SYSTEM & DRAIN PROV.			280	
10	LUBRICATING SYSTEM (INTEGRAL IN ENGINE)			-	
11	TANKS				
12	COOLING INSTALLATION				
13	DUCTS, PLUMBING, ETC.				
14	FUEL SYSTEM			12755	
15	TANKS - PROTECTED				
16	- UNPROTECTED			6860	
17	PLUMBING, ETC.			5895	
18	WATER INJECTION SYSTEM				
19	ENGINE CONTROLS			300	
20	STARTING SYSTEM (INTEGRAL IN ENGINE)			-	
21	PROPELLER INSTALLATION				
22					
23					
24	AUXILIARY POWER PLANT GROUP				
25	INSTRUMENTS & ~~EXTERNAL~~ ~~EQUIPMENT~~ GROUP				564
26	HYDRAULIC ~~EXTERNAL~~ ~~EQUIPMENT~~ GROUP				5090
27					
28					
29	ELECTRICAL GROUP				815
30					
31					
32	ELECTRONICS GROUP				1438
33	EQUIPMENT			823	
34	INSTALLATION			615	
35					
36	ARMAMENT GROUP (INCL. GUNFIRE PROTECTION	LBS.)			
37	FURNISHINGS & EQUIPMENT GROUP				1241
38	ACCOMMODATIONS FOR PERSONNEL			324	
39	MISCELLANEOUS EQUIPMENT			52	
40	FURNISHINGS			400	
41	EMERGENCY EQUIPMENT			465	
42					
43	AIR CONDITIONING & ANTI-ICING EQUIPMENT GROUP				3092
44	AIR CONDITIONING			2880	
45	ANTI-ICING			212	
46					
47	PHOTOGRAPHIC GROUP				
48	AUXILIARY GEAR GROUP				210
49	HANDLING GEAR			210	
50	ARRESTING GEAR				
51	CATAPULTING GEAR				
52	ATO GEAR				
53					
54					
55	MANUFACTURING VARIATION				
56	TOTAL FROM PG. 2				74367
57	WEIGHT EMPTY				142842

SECRET

ANC-9103-D

NAME J W C

DATE 1 June 1956

GROUP WEIGHT STATEMENT
USEFUL LOAD & GROSS WEIGHT
SECRET

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MODEL Sys-118P

REPORT NA-56-450

1	LOAD CONDITION	TAKE-OFF GROSS WEIGHT			DETAIL			
2					PHOTO			
3	CREW (NO. 1)				MISSION			
4	PASSENGERS (NO.)				270			
5	FUEL	Type	Gals.					
6	UNUSABLE	LIQUID H ₂	320		187			
7	INTERNAL	LIQUID H ₂	101330		59278			
8								
9								
10	EXTERNAL							
11								
12	BOMB BAY							
13								
14	OIL							
15	TRAPPED		8 Gals.		60			
16	ENGINE		12 Gals.		90			
17								
18	FUEL TANKS (LOCATION)							
19	WATER INJECTION FLUID (GALS)							
20								
21	BAGGAGE							
22	CARGO							
23								
24	ARMAMENT							
25	GUNS (Location)	Fix. or Flex.	Qty.	Cal.				
26								
27								
28								
29								
30								
31								
32	AMMUNITION							
33								
34								
35								
36								
37								
38								
39	INSTALLATIONS (BOMB, TORPEDO, ROCKET, ETC.)							
40	BOMB OR TORPEDO RACKS							
41								
42								
43								
44								
45								
46	EQUIPMENT							
47	PYROTECHNICS							
48	PHOTOGRAPHIC							
49	RECONN. PACKAGE, DETAIL PHOTO MISSION				1958			
50	OXYGEN							
51								
52	MISCELLANEOUS							
53	DROP-TT COWL				2115			
54								
55	USEFUL LOAD				63958			
56	WEIGHT EMPTY				142842			
57	GROSS WEIGHT				206800			

*If not specified as weight empty.

SECRET

AN-9103-D J W C
NAME
DATE 1 June 1956

GROUP WEIGHT STATEMENT
USEFUL LOAD & GROSS WEIGHT

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MODEL Sys. 118P
REPORT RA-56-450

SECRET				RADAR MAPPING MISSION			
1	LOAD CONDITION	ALTERNATE		DOPPLER	AZIMUTH	SEARCH	FERRET
2				RADAR	RADAR	PHOTO	MISSION
3	CREW (NO. 1)			270	270	270	270
4	PASSENGERS (NO.)						
5	FUEL	Type	Gals.				
6	UNUSABLE	LIQUID H ₂	320	187	187	187	187
7	INTERNAL	LIQUID H ₂	101330	59278	59278	59278	59278
8							
9							
10	EXTERNAL						
11							
12	BOMB BAY						
13							
14	OIL						
15	TRAPPED	8 Gals.		60	60	60	60
16	ENGINE	12 Gals.		90	90	90	90
17							
18	FUEL TANKS (LOCATION)						
19	WATER INJECTION FLUID (GALS)						
20							
21	BAGGAGE						
22	CARGO						
23							
24	ARMAMENT						
25	GUNS (Location)	Fix. or Flex.	Qty.	Cal.			
26							
27							
28							
29							
30							
31							
32	AMMUNITION						
33							
34							
35							
36							
37							
38							
39	INSTALLATIONS (BOMB, TORPEDO, ROCKET, ETC.)						
40	BOMB OR TORPEDO RACKS						
41							
42	RECONNAISSANCE PACKAGE			1952	1746	1638	1854
43							
44							
45							
46	EQUIPMENT						
47	PYROTECHNICS						
48	PHOTOGRAPHIC						
49							
50	OXYGEN						
51							
52	MISCELLANEOUS						
53	DROP-OFF COWL			2115	2115	2115	2115
54							
55	USEFUL LOAD			63952	63746	63638	63854
56	WEIGHT EMPTY			142842	142842	142842	142842
57	GROSS WEIGHT			206794	206588	206480	206696

* If not specified as weight empty.

ME J W C
TE 1 June 1956GROUP WEIGHT STATEMENT
DIMENSIONAL & STRUCTURAL DATA
SECRETPAGE 9 of 51
MODEL Sys. 118P
REPORT NA 56-450

LENGTH - OVERALL (FT.)		180.9		HEIGHT - OVERALL - STATIC (FT.)		33.3	
		Main Floats	Aux. Floats	Beams	Fuse or Hull	Inboard	Outboard
LENGTH - MAX. (FT.)					175.00		
DEPTH - MAX. (FT.)					9.04		
WIDTH - MAX. (FT.)					24.00		
WETTED AREA (SQ. FT.) (Including Canopy)					7132		
FLOAT OR HULL DISPL. - MAX (LBS.)							
FUSELAGE VOLUME (CU. FT.)		PRESSURIZED			TOTAL		
					Wing	H. Tail	V. Tail (Ea)
GROSS AREA (SQ. FT.)					3410	594	250
WEIGHT/GROSS AREA (LBS./SQ. FT.)					7.14	2.36	3.28
SPAN (FT.)					79.90	30.24	14.81
FOLDED SPAN (FT.)							
SWEEPBACK - AT 25% CHORD LINE (DEGREES)					71.0	52.41	52.41
- AT % CHORD LINE (DEGREES)							
THEORETICAL ROOT CHORD - LENGTH (INCHES)					1430.63	392.84	343.34
- MAX. THICKNESS (INCHES)							
CHORD AT PLANFORM BREAK - LENGTH (INCHES)					343.25		
- MAX. THICKNESS (INCHES)							
THEORETICAL TIP CHORD - LENGTH (INCHES)					0	78.57	35.49
- MAX. THICKNESS (INCHES)							
DORSAL AREA, INCLUDED IN (FUSE.) (HULL) (V. TAIL) AREA (SQ. FT.)							
TAB LENGTH - 25% MAC WING TO 25% MAC H. TAIL (FT.)							83.66
AREAS (SQ. FT.)		Flaps	L.E.	T.E.			
		Lateral Controls	Slats	Spallors	65.29		DEFLECTORS 52.23
		Speed Brakes	Wing	Fuse. & Hull		TAB	
AL LIGHTING GEAR (LOCATION)							
LENGTH - OLEO EXTENDED - ϕ AXLE TO ϕ TRUNNION (INCHES)							
OLEO TRAVEL - FULL EXTENDED TO FULL COLLAPSED (INCHES)							
FLOAT OR SKI STRUT LENGTH (INCHES)							
ARRESTING HOOK LENGTH - ϕ HOOK TRUNNION TO ϕ HOOK POINT (INCHES)							
HYDRAULIC SYSTEM CAPACITY (GALS.)							277
FUEL & LUBE SYSTEMS		Location	No. Tanks	****Gals. Protected	No. Tanks	****Gals. Unprotected	
Fuel - Internal		Wing					
		Fuse. or Hull			7	101330	
- External							
- Bomb Bay							
Oil		Integral - Engine			4	12	
STRUCTURAL DATA - CONDITION		Fuel in Wings (Lbs.)			Stress Gross Weight		Ult. L.F.
FLIGHT					201100		2.0
LANDING					160227		2.0
MAX. GROSS WEIGHT WITH ZERO WING FUEL							
CATAPULTING							
MIN. FLYING WEIGHT					148371		
LIMIT AIRPLANE LANDING SINKING SPEED (FT./SEC.)		5.5					
WING LIFT ASSUMED FOR LANDING DESIGN CONDITION (%W)							100
STALL SPEED - LANDING CONFIGURATION - POWER OFF (KNOTS)							
PRESSURIZED CABIN - ULT. DESIGN PRESSURE DIFFERENTIAL - FLIGHT (P.S.I.)							7.5
AIRFRAME WEIGHT (AS DEFINED IN AN-W-11) (LBS.)							

*Lbs. of sea water @ 64 lbs./cu. ft.
*Parallel to ϕ at ϕ airplane. ϕ Wing Data on Exposed Area**SECRET*****Parallel to ϕ airplane.
****Total usable capacity.

AN-9102-D
SUPERSEDING
AN-9102-C

NAME D D M
DATE 1 June 1956

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MODEL Sys. 118F
REPORT NA-56-450

SECRET

DETAIL WEIGHT STATEMENT

ESTIMATED - ~~XXXXXXXXXXXXXXX~~

(Cross out those not applicable)

CONTRACT NO. AF33(600)-31243
AIRPLANE, GOVERNMENT NO. _____
AIRPLANE, CONTRACTOR NO. _____
MANUFACTURED BY North American Aviation Inc.

		MAIN	AUXILIARY
ENGINE	MANUFACTURED BY	Aerojet General	
	MODEL	HATR-2040 Scaled 103.1%	
	NO.	4	
PROPELLER	MANUFACTURED BY		
	DESIGN NO.		
	NO.		

SECRET

NAME T A M

DATE 1 June 1956

WING GROUP
BASIC STRUCTURE
SECRET

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MODEL Sys. 118

REPORT NA-56-450

	Center Section	Interm. Panel	Outer Panel	Folding Tip
1				
2				
3	CODE NO.			
4	UPPER - SPAR CAP - FRONT			
5	- INTERMEDIATE			
6	- REAR			
7	- AUXILIARY			
8	- INTERSPAR COVERING			
9	SPANWISE STIFFENERS			
10	- JOINTS, SPLICES & FASTENERS			
11				
12				
13				
14	LOWER - SPAR CAP - FRONT			
15	- INTERMEDIATE			
16	- REAR			
17	- AUXILIARY			
18	- INTERSPAR COVERING			
19	SPANWISE STIFFENERS			
20	- JOINTS, SPLICES & FASTENERS			
21				
22				
23				
24	SPAR WEB & STIFFENERS - FRONT			
25	- INTERMEDIATE			
26	- REAR			
27	- AUXILIARY			
28	- JOINTS, SPLICES & FASTENERS			
29				
30				
31				
32	INTERSPAR - RIBS			
33	- BULKHEADS			
34	- CHORDWISE STIFFENERS			
35				
36	LEADING EDGE - COVERING			
37	- STIFFENERS			
38	- RIBS			
39	- AUXILIARY SPARS			
40	- JOINTS, SPLICES & FASTENERS			
41				
42				
43	TRAILING EDGE - COVERING			
44	- STIFFENERS			
45	- RIBS			
46	- AUXILIARY SPARS			
47	- JOINTS, SPLICES & FASTENERS			
48				
49				
50	TIPS			
51				
52	FIREWALL (STRUCTURAL)			
53				
54				
55				
56	TOTALS - BASIC STRUCTURE		21733	650
57	TOTAL (TO BE BROUGHT FORWARD)			22383

SECRET

AN-9102-D
NAME T A M
DATE 1 June 1956

WING GROUP
CONTROL SURFACES
SECRET

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1									
2									
3									
4									
5	SPARS								
6									
7									
8									
9	RIBS								
10									
11									
12	COVERING & STIFFENERS								
13									
14									
15	T.E. STRIPS								
16									
17	FABRIC & DOPE								
18									
19									
20									
21	TABS								
22									
23									
24									
25	TORQUE TUBES								
26									
27									
28									
29	BALANCE WEIGHTS & SUPPORTS								
30									
31	AERO. SEAL								
32									
33									
34	CONTROL HORNS								
35									
36									
37	ACCESS DOORS (NON STRUCT.)								
38									
39	HINGES & PINS								
40	EXTERIOR FINISH								
41	TOTALS - SURFACE	(	)	(	)	(	)	(	)
42									
43	CONTROL SURFACE SUPPORTS								
44	HINGES								
45	BRACKETS								
46	TRACKS								
47	CARRIAGES								
48									
49									
50									
51									
52	TOTALS - SUPPORTS	(	)	(	)	(	)	(	)
53	TOTALS (LINES 41 & 52)								
54	TOTALS - CONTROL SURFACES							1710	250
55	TOTAL								1960
56	TOTALS FROM PGS. 2 & 3								22383
57	TOTAL - WING GROUP								24343

SECRET

AN-910 2-D

NAME **T A M**DATE **1 June 1956****SECRET**TAIL GROUP
BASIC STRUCTUREPAGE **13 of 51**MODEL **Sys. 118F**REPORT **NA-56-450**

		~~Center~~		~~Tip~~		~~Vertical~~	
		C.S.	O.P.	Center	Outer	Dorsal	
1							
2							
3	CODE NO.						
4	UPPER - SPAR CAP - FRONT						
5	- INTERMEDIATE						
6	- REAR						
7	- AUXILIARY						
8	- INTERSPAR COVERING						
9	SPANWISE STIFFENERS						
10	- JOINTS, SPLICES & FASTENERS						
11							
12							
13							
14	LOWER - SPAR CAP - FRONT						
15	- INTERMEDIATE						
16	- REAR						
17	- AUXILIARY						
18	- INTERSPAR COVERING						
19	SPANWISE STIFFENERS						
20	- JOINTS SPLICES & FASTENERS						
21							
22							
23							
24	SPAR WEB & STIFFENERS - FRONT						
25	- INTERMEDIATE						
26	- REAR						
27	- AUXILIARY						
28	- JOINTS, SPLICES & FASTENERS						
29							
30							
31							
32	INTERSPAR - RIBS						
33	- BULKHEADS						
34	- CHORDWISE STIFFENERS						
35							
36	LEADING EDGE - COVERING						
37	- STIFFENERS						
38	- RIBS						
39	- AUXILIARY SPARS						
40	- JOINTS, SPLICES & FASTENERS						
41							
42							
43	TRAILING EDGE - COVERING						
44	- STIFFENERS						
45	- RIBS						
46	- AUXILIARY SPARS						
47	- JOINTS, SPLICES & FASTENERS						
48							
49							
50	TIPS						
51							
52							
53							
54							
55	TOTALS						
56	TOTALS - BASIC STRUCTURE	1400		1640			
57	TOTAL (XXXXXXXXXXXXXXXXXXXX)						3040

SECRET

ANZ 910 2-D

NAME T A MDATE 1 June 1956

**BODY GROUP
BASIC STRUCTURE
SECRET**

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1 2 3	CODE NO. SECTION	Fuselage	Beams
4 BULKHEADS & FRAMES	Stations		
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24 MINOR FRAMES			
25 JOINTS, SPLICES & FASTENERS			
26 OVERTURN STRUCTURE			
27			
28 COVERING - UPPER BETWEEN LONGERONS			
29 - SIDE BETWEEN LONGERONS			
30 - LOWER BETWEEN LONGERONS			
31			
32 COVERING LONGITUDINAL STIFFENERS - UPPER BETW. LONG.			
33 - SIDE BETW. LONG.			
34 - LOWER BETW. LONG.			
35			
36			
37 LONGERONS - UPPER			
38 - LOWER			
39			
40			
41 LONGITUDINAL PARTITIONS - (STRUCTURAL)			
42			
43 FLOORING & SUPPORTS - (BASIC STRUCTURE)			
44			
45			
46			
47 FIREWALL - (STRUCTURAL)			
48			
49 KEELSONS			
50 KEEL			
51			
52 CHINE & SPRAY STRIPS			
53 STEP ASSEMBLY			
54 STAIRWAY - (STRUCTURAL)			
55 TOTALS			
56 TOTALS - BASIC STRUCTURE		26776	
57 TOTAL (TO BE BROUGHT FORWARD)			26776

*List all main & watertight bulkheads & frames individually. Minor frames may be combined.

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DATE 1 June 1956

BODY GROUP
SECONDARY STRUCTURE
SECRET

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		Fuselage or Hull				Beams	Speed Brakes
		CODE NO.					
		SECTION					
1							
2							
3							
4							
5	ENCLOSURES (EXCLUDING TURRET ENCLOSURES)	750					
6	CANOPY						
7	CANOPY-OPERATING MECHANISM						
8	-RAILS						
9	-CYLINDERS, PLUMBING, FLUID						
10							
11	GUNNER - TAIL						
12							
13	BOMBARDIER						
14	SIGHTING BLISTERS						
15							
16	WINDSHIELD (EXCLUDING BULLET PROTECTION)	200					
17							
18	WINDOWS & PORTS INCL. FRAMES						
19							
20							
21							
22							
23							
24							
25							
26							
27							
28	FLOORING & SUPPORTS (SECONDARY STRUCTURE)						
29							
30							
31	STAIRWAYS & LADDERS (FIXED)						
32							
33							
34	STERNPOST & FITTINGS						
35	NOSE BUMPER (HULL)						
36	RUBBING STRIPS						
37							
38							
39							
40	TAIL CONE						
41							
42							
43	SPEED BRAKES - STRUCTURE						
44	- SUPPORTS						
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55	TOTALS	950					
56	TOTALS - SECONDARY STRUCTURE		950				
57	TOTAL (TO BE BROUGHT FORWARD)						950

* From main distribution point to actuating unit.

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BODY GROUP
SECONDARY STRUCTURE
(DOORS, PANELS & MISCELLANEOUS)

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SECRET

	Location	Type	Area Sq. Ft.	Structure	Mechanism & Controls	Operating Mechanism			
						Power Trans.	Actuator	Lock Mech.	Emerg.
1									
2									
3									
4									
5	DOORS & FRAMES								
6	- LANDING								
7	- NOSE			1250					
8				90					
9									
10	- BOMB								
11									
12									
13	- GUN								
14									
15	- AMMUNITION								
16									
17	- ROCKET								
18									
19	- LIFE RAFT								
20									
21	- ESCAPE								
22									
23									
24	- WATER TIGHT								
25									
26	- COMPARTMENT								
27									
28	- ENTRANCE								
29									
30									
31	- ACCESS			100					
32									
33									
34									
35	- ENGINE			450					
36									
37	- CAMERA								
38									
39	PANELS - (NON STRUCTURAL)								
40									
41									
42									
43									
44									
45									
46									
47									
48									
49	WALKWAYS, STEPS, GRIPS								
50	MISCELLANEOUS			260					
51	FAIRING & FILLETS								
52	EXTERIOR FINISH								
53									
54	TOTALS			2150					
55	TOTAL - SECONDARY STRUCTURE (DOORS, PANELS, MISC.)					2150			
56	TOTALS FROM PGS. 8 & 9								27726
57	TOTAL - BODY GROUP								29876

*Indicate location for major doors by B - Booms, F or H for Fuselage or Hull.

SECRET

**H - Hydraulic, E - Electrical, P - Pneumatic; power transmission from main distribution point to actuating unit.

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NAME T A M
DATE JUL 1956

ALIGHTING GEAR GROUP
SECRET

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1 TYPE: TRICYCLE				*LOCATION					
3				CODE NO.					
4 *LOCATION									
5	No.	Size	No.	Size	No.	Size			
6 WHEELS	4	46 x 14		24 x 5.5					
7 TIRES	4	46 x 14		24 x 5.5					
8 TUBES									
9 AIR									
10 BRAKES									
11	NO. & TYPE	4	Mech						
12	ENERGY CAP. **								
13 ANTI-SKID DEVICE									
14									
15 FLOATS - BULKHEADS									
16	- FRAMES								
17	- COVERING								
18	- COVERING STIFFENERS (LONGITUDINAL)								
19	- KEELSONS								
20	- KEEL								
21	- LONGITUDINAL PARTITIONS								
22	- CHINE & SPRAY STRIP								
23	- STEP ASSEMBLY								
24	- POST ASSEMBLY								
25	- NOSE BUMPER								
26 INSPECTION DOORS									
27 WALKWAYS									
28 EXTERIOR FINISH									
29 SKIDS OR BUMPERS									
30 SKIS									
31									
32	TOTALS - RUNNING GEAR				(	2147	(	90	(
33									
34	STRUTS - DRAG								
35	- SIDE								
36	- FLOAT								
37 PYLON									
38	SHOCK STRUT - STRUT (INCL. LBS. OIL)								
39	- FORK								
40	- AXLE								
41	- TORQUE ARMS								
42	- TRUNNIONS								
43 SHIMMY DAMPER OR SHUBBER									
44									
45	FITTINGS - MAIN ATTACH. - WING								
46	- TAIL								
47	- BODY								
48	- NACELLE								
49									
50 FAIRING									
51									
52									
53									
54									
55	PINS, BOLTS, NUTS, ETC.								
56	TOTALS - STRUCTURE				(	8044	(	400	(
57	TOTALS (LINES 32 & 56) (TO BE BROUGHT FORWARD)				(	10191	(	490	(

*Descriptive location - Nose, Tail, Main, Outrigger, Bumper, etc.

**Ft. lbs./brake

SECRET

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NAME T A M

DATE 1 June 1956

ALIGHTING GEAR GROUP CONTROLS SECRET

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MODEL Sys. 118F
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57	**LOCATION	MAIN			NOSE							
		Retract	Brake Oper.	Emerg. Ext.	Steering	Retract	Brake Oper.	Emerg. Ext.	Retract	Emerg. Ext.	Retract	Emerg. Ext.
	CODE NO.											
	MECHANICAL OPER. MECH.											
	CONTROLS											
	ACTUATORS											
	ELECTRICAL OPER. MECH.											
	CONTROLS											
	WIRING, CONDUIT, ETC.											
	OPERATING MOTORS											
	MECHANISM											
	HYDRAULIC OPER. MECH.											
	CONTROLS											
	PLUMBING & FLUID											
	PUMPS											
	RESERVOIRS											
	ACCUMULATORS											
	ACTUATORS											
	MECHANISM											
	PNEUMATIC OPER. MECH.											
	CONTROLS											
	PLUMBING											
	PUMPS											
	BOTTLES (AIR)											
	ACTUATORS											
	MECHANISM											
	LOCKING MECHANISM											
	BRACES											
	LINKS											
	PARKING BRAKE CONTROL											
	POSITION INDICATING MECH.											
	SUPP'TS, GUIDES, ETC. - WING											
	- TAIL											
	- BODY											
	- NACELLE											
	TOTALS											
	TOTALS - CONTROLS		825			300						
	TOTALS FROM PG. 11		10191			49						
	TOTALS		11016			790						
	TOTAL - ALIGHTING GEAR GROUP											11806

*From main distribution point to actuating unit.

SECRET

**Descriptive location - Nose, Tail, Main, Outrigger, Bumper, etc.

NAME J W C
DATE 1 June 1956SURFACE CONTROLS GROUP
COCKPIT & AUTOPILOTPAGE 19 of 51
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SECRET		Cockpit Controls	Autopilot
	CODE NO.		
1			
2			
3			
4	CONTROL COLUMNS		
5	CONTROL STICK ~~XXXXXXXX~~ (PILOT)	11	
6	CONTROL STICK OR COLUMN (ASSIST. PILOT)		
7	CONNECTING MEMBERS FOR ABOVE		
8	SUPPORTS		
9			
10			
11			
12			
13	RUDDER PEDALS		
14	RUDDER PEDALS, INCLUDING BRAKE TREADLE (PILOT)	11	
15	RUDDER PEDALS, INCLUDING BRAKE TREADLE (ASSIST. PILOT)		
16	CONNECTING MEMBERS FOR ABOVE		
17	SUPPORTS		
18			
19			
20			
21			
22			
23	INTEGRAL PARKING LOCK		
24	CONTROL STICK		
25	RUDDER PEDALS		
26	SURFACES		
27			
28			
29			
30			
31			
32			
33	AUTOPILOT OR AUTO. FLIGHT CONTROL (TYPE: INCLUDED IN ELECTRONIC SECTION)		
34	CONTROLLER		
35	TRANSMITTER		
36	SERVO AMPLIFIER		
37	SERVO MOTORS		
38	GYROS		
39			
40			
41			
42			
43			
44			
45			
46	SUPPORTS & BRACKETS		
47			
48	PLUMBING & FLUID		
49	ELECTRIC PANELS, BOXES, SWITCHES, RELAYS, WIRING		
50	PULLEYS, SPROCKETS, CHAINS, CABLES		
51			
52			
53			
54			
55			
56	TOTALS - COCKPIT CONTROLS & AUTOPILOT	22	
57	TOTAL (TO BE BROUGHT FORWARD)		22

*From main distribution point to actuating units.

SECRET

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NAME J W C

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SURFACE CONTROLS GROUP
SYSTEM CONTROLS

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1		Canard		Wing	Wing	L.E. Flaps	T.E.		Speed	Stab.	Wing
2		~~XXXX~~	Rud.	Sweep	Incid.	or Slots	~~XXXX~~	Spollers	Brakes	Adj.	Tip
3											Fold
4	CODE NO.										
5	MECHANICAL OPER. MECH.	56	60					110			
6	CONTROLS										
7	TENSION REGULATORS										
8	ACTUATORS										
9	TRIM CONTROLS										
10											
11	ELECTRICAL OPER. MECH.						10				15
**12	TYPE										
13	CONTROLS										
*14	WIRINGS, SWITCHES, ETC.										
15	OPERATING MOTORS										
16	MECHANISM										
17	TRIM CONTROLS										
18											
19	HYDRAULIC OPER. MECH.	(1630)	(181)				(71)	(1093)			(375)
**20	TYPE P										
21	CONTROLS										55
*22	PLUMBING ~~XXXX~~	1090	46				23	56			82
23	~~XXXX~~ MOTORS										108
24	RESERVOIRS										
25	ACCUMULATORS										
26	ACTUATORS & SUPTS	120	100				34	540			60
27	MECHANISM	25	25				10	480			50
28	TRIM CONTROLS										
29	FLUID	395	10				4	17			20
30	PNEUMATIC OPER. MECH.										
**31	TYPE										
32	CONTROLS										
*33	PLUMBING										
34	PUMPS										
35	BOTTLES (AIR)										
36	ACTUATORS										
37	MECHANISM										
38	TRIM CONTROLS										
39											
40	ARTIFICIAL FEEL	30	30					15			
41	BUNGEE										
42	BOB WEIGHT										
43											
44											
45											
46											
47											
48	SUPPORTS, GUIDES, ETC.										
49	WING										
50	TAIL										
51	BODY										
52	NACELLE										
53											
54	TOTALS	1716	271				81	1218			390
55	TOTALS - SYSTEM CONTROLS										3676
56	TOTAL (FROM PG. 13)										22
57	TOTAL - SURFACE CONTROLS GROUP (TO BE BROUGHT FORWARD)										3698

* From main distribution point to actuating units.

SECRET**Type - add (P) for "Powered Controls"
- or (B) for "Boost Controls"

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NAME J. M. C.

DATE 1 June 1956

SURFACE CONTROL GROUP
~~XXXXXXXXXXXXXXXXXXXXXXXXXXXX~~
***POWER CONTROLS**

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SECRET

	CODE NO.	Model	Hydraulic		Pneumatic	
			Utility	Emergency	Utility	Emergency
PUMPS & COMPRESSORS (4)			244			
REMOTE PUMP DRIVES						
RESERVOIRS	No. 2	Model	Capacity 7 Gals. 30			
AIR BOTTLES						
ACCUMULATORS	4		100 in. 3 95			
FILTERS						
PRESSURE REGULATORS						
VALVES - FILTERS			180			
CONTROLS						
PLUMBING & SUPPORTS			530			
FLUID IN SYSTEM (TYPE OB-45) (29.5 GALS.)			219			
SUPPORTS - WING						
- TAIL						
- BODY						
TOTAL ~~XXXXXXXXXX~~			1298			
TOTALS FROM PAGE 13 & 14						3698
TOTAL ~~XXXXXXXXXXXXXXXXXXXXXXXXXXXX~~ SURFACE CONTROL GROUP						4996
FURNISHES POWER FOR - (ITEMS)			Canard			
			Spoilers			
			Trim Tab			
			Wing Tip Fold			
			AFCS			
			Rudder			
SYSTEM PRESSURE (PSI)						

*Includes system from sources of power to main distribution points

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SECRET

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NAME T A MDATE 1 June 1956**ENGINE SECTION**~~CONFIDENTIAL~~PAGE 22 of 51MODEL Sys. 118FREPORT NA-56-450**SECRET**

	Inboard	Center	Outboard
1			
2			
3			
4 ENGINE MOUNT			
5			
6 SUPPORT BAY			
7 VIBRATION ABSORPTION DEVICES			
8			
9			
10 NACELLE STRUCTURE			
11 BULKHEADS AND FRAMES			
12 COVERING & STIFFENERS			
13 FITTINGS			
14 LONGERONS			
15 ATTACHING ANGLES, ETC.			
16			
17			
18			
19 PYLONS & STRUTS			
20			
21			
22			
*23 FIREWALL			
24			
25 SHROUDS FOR FIRE PROTECTION			
26			
27 COWLING			
28 ENGINE COWL			
29			
30			
31			
32			
33			
34			
35 BAFFLES			
36 ACCESSORY COWL OR SKIRT			
37 COWL FLAPS			
38 COWL FLAP CONTROLS & OPERATING MECH.			
39			
40			
41			
42			
43			
44			
45 FAIRING - NACELLE TO WING OR PYLON			
46 STEPS & GRIPS			
47 WORKING PLATFORM (BUILT IN)			
48 INTERNAL WALKWAYS			
49			
50			
51 INSTALLATION HARDWARE			
52			
53			
54			
55			
56 TOTALS - SECTIONS OR NACELLES			
57 TOTAL ~~BOOKED PRODUCTION~~ ENGINE SECTION			

306

*If in nacelle, or non-structural in wing or body.

SECRET

DDM
1 June 1956

PROPULSION GROUP

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	CODE NO.	Auxiliary	Main
1			
2			
3	ENGINE INSTALLATION (4) HATR 2040 (SCALED 103.1%)		15660
4	ENGINE (AS INSTALLED)		
5	ENGINE & AFTERBURNER (AS INSTALLED)		
6	REDUCTION GEAR BOX		
7	EXTENSION DRIVE SHAFT		
8			
9			
10	AFTERBURNERS (IF FURNISHED SEPARATELY)		
11	ACCESSORY GEAR BOXES & DRIVES		1010
12	COMPLETE GEAR BOXES (4)		340
13	LUBRICATING SYSTEM		390
14	SUPPORTS		36
15	DRIVE SHAFTS & COUPLINGS		164
16	PIPING		-
17	CONSTANT SPEED DRIVES (2)		90
18			
19	AIR INDUCTION SYSTEM		25680
20	INTERCOOLERS AND SUPPORTS		
21	AIR DUCTING ~~AND SUPPORTS~~		11500
22	INTAKE DOORS ~~AND SUPPORTS~~ CONTROLS, RAMPS		7945
23	~~INTAKE DOORS~~ RAMP MECH & CONTROLS		4105
24	SCREENS & CONTROLS		
25	BY-PASS PROVISIONS		1210
26	RAMP BLEED PROVISIONS		630
27	FAIRING - ENGINE INLET		290
28			
29			
30			
31	EXHAUST SYSTEM - SHROUD		340
32	EXHAUST STACKS		
33	EXHAUST COLLECTORS		
34	COLLECTOR OR ENGINE SHROUD		
35	TAIL PIPE		
36	TAIL PIPE SHROUD AND INSULATION		
37	TAIL CONE		
38	SILENCING DEVICES		
39	SUPPORTS, BRACKETS, ETC.		
40	AFTERBURNER		340
41			
42			
43			
44	COOLING SYSTEM		230
45	RADIATOR AND SUPPORTS		
46	SHUTTERS, SCOOP & DUCTS		
47	EXPANSION TANK & SUPPORTS		
48	LIQUID IN SYSTEM (GALS.)		
49	PIPING, VENTS, CLAMPS ETC.		
50	COOLING DUCTS ETC.		240
51	DRAIN PROVISIONS		40
52	FANS		
53	CONTROL VANES		
54	FAN DRIVES		
55	CONTROLS & OPERATING MECH.		
56			
57	TOTALS (TO BE BROUGHT FORWARD)		42970

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PROPULSION GROUP LUBRICATING & FUEL SYSTEMS

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MODEL Sys. 118P

REPORT NA-56-450

					Auxiliary		Main	
					Lubricating	Fuel	Lubricating	Fuel
CODE NO.								
TANKS	Type	Location	No.	Vol. Ea. (Gals.)				(6868)
NO. 1	METAL	FUSELAGE	1	13540				912
NO. 2	METAL	FUSELAGE	1	21580				1454
NO. 3	METAL	FUSELAGE	1	21200				1435
NO. 4	METAL	FUSELAGE	1	19660				1351
NO. 5	METAL	FUSELAGE	1	10650				713
NO. 6	METAL	FUSELAGE	1	9360				631
NO. 7	METAL	FUSELAGE	1	5340				363
20 INTEGRAL TANK SEALS & SEALANT								
21 BACKING BOARD								
22 TANK SUPPORTS & PADDING								212
23 TANK BAY SEALING								
24 INSULATION PROVISIONS								3617
25 TANK RELEASE & CONTROLS								
26 OIL COOLING INSTALLATION								
27 COOLERS & SUPPORTS (SIZE) (NO.)								
28 DUCTS & SHUTTERS								
29 AUTOMATIC OIL TEMP. CONTROL VALVE								
30 SHUTTER CONTROLS								
31								
32 FUEL VAPOR RECOVERY								
33								
34 OIL DILUTION SYSTEM								
35								
36 FUEL VAPOR INERTION SYSTEM - CYL. & SUPPORTS								
37 - GENERATOR								
38 - CONTROLS, ETC.								
39 PUMP INSTALLATION			No.	Type				
40 ENGINE DRIVEN								
41 BOOSTER			4	HYDRAULIC				240
42 HAND (INCL. CONTROLS)								
43 TRANSFER								
44 HYDRAULIC PLUMBING								195
45								
46 FILLING SYSTEM - GROUND								336
47 - IN FLIGHT								
48								
49 DISTRIBUTION SYSTEM								502
50 TRANSFER SYSTEM								100
51 VENT SYSTEM								120
52 PRESSURIZATION SYSTEM								
53 DUMP SYSTEM								235
54								
55 ELECTRICAL PROVISIONS								50
56 TOTALS - LUBRICATING & FUEL SYSTEMS								12755
57 TOTALS (TO BE BROUGHT FORWARD)								12755

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NAME D D M

DATE 1 June 1956

PROPULSION GROUP

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MODEL Sys. 11AP

REPORT NA-56-450

		Auxiliary		Main	
1					
2	CODE NO.				
3	WATER INJECTION SYSTEM				
4	TANKS (NO.) (GALS/TANK)				
5	PUMP				
6	METERING UNIT				
7	VALVES & PLUMBING				
8	CONTROLS				
9					
10					
11	ENGINE CONTROLS				300
12	IGNITION				
13	THROTTLE			300	
14	MIXTURE				
15	SUPERCHARGER (SUP. INTEG. WITH ENG.)				
16	AFTERBURNER				
17					
18					
19					
20	STARTING SYSTEM (INTEGRAL IN ENGINE)				
21	STARTER POWER UNIT (TYPE:)				
22	STARTER (TYPE:)				
23	STARTER CONTROLS				
24	CRANK & EXTENSION				
25	PRIMER & PIPING				
26	MESHING SOLENOID				
27	SWITCHES, WIRING & CONDUIT				
28					
29					
30					
31					
32	PROPELLER INSTALLATION (DIA.) (NO.)				
33	PROPELLER				
34	CUFFS				
35	SPINNER				
36	CONTROLS	Type	* Aux.	* Main	
37	SPEED				
38	PITCH				
39	FEATHERING				
40	REVERSING				
41					
42					
43					
44					
45					
46					
47	OIL (GALS)				
48	TANK & PLUMBING				
49					
50					
51					
52					
53					
54					
55	TOTALS				300
56	TOTALS FROM PGS. 17 & 18				55125
57	TOTAL - PROPULSION GROUP				56025

*GFP Weight

SECRET

**When separate oil system used.

AN-9102-D

NAME J W C

DATE 1 June 1956

INSTRUMENT & NAVIGATIONAL EQUIPMENT GROUP INSTRUMENTS

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MODEL Sys. 118P

REPORT NA-56-450

1	2 FUNCTIONAL GROUPS & ITEMS	3	Number	Indicator	Transmitter & Amplifier	Installation	Total
3		CODE NO.					
4	FLIGHT INSTRUMENTS						
5	FLIGHT DISPLAY GROUP						
6	SPEED SITUATION		1	5		2	7
7	ATTITUDE DISPLAY		1	7		2	9
8	HEADING DISPLAY		1	12		4	16
9	VERTICAL SITUATION		1	5		2	7
10	ACCELEROMETER		1	2			2
11	CLOCK		1	1			1
12	CABIN ALTITUDE		1	1			1
13	PITOT SYSTEM				2	38	40
14	AIR DATA COMPUTER SYSTEM				15	5	20
15	WIRING AND MISCELLANEOUS					11	11
16							
17							
18	ENGINE INSTRUMENTS						
19	INTEGRATED ENGINE DISPLAYS		4	20	50	55	125
20	FUEL QUANTITY GAUGES		1	2	170	40	212
21	FUEL FLOWMETER		1	3	30	20	53
22	HYDRAULIC PRESSURE GAUGES		2	4	6	10	20
23	WIRING AND MISCELLANEOUS						40
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
51							
52							
53	INSTRUMENT POWER SYSTEM (TYPE						
54							
55							
56							
57	TOTAL - INSTRUMENTS						564

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* List items by functional groups (Flight, Engine & Misc.). List sub-groups by crew stations; add supp. pg. 21A if necessary.

NAME J. W. C
DATE 1 June 1956

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*Includes system from sources of power to main distribution points.

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*ELECTRICAL GROUP

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MODEL Sys. 118P

REPORT NA-56-450

						AC		DC	
1									
2									
3									
4	POWER SUPPLY EQUIPMENT	Driven By	KVA	CODE NO.	No.				
5	GENERATORS - MAIN	ENG. CSD	20	Amp.	2				
6	GENERATOR - EMERG.	HYD	3		1				
7	EXCITATION UNIT								
8	PROVISIONS								
9									
10	REMOTE GENERATOR DRIVES	HYDRAULIC							
11	BATTERY (AN) (NO.)								
12	BATTERY CONTAINER, OVERFLOW INST. & SUPPORTS								
13									
14	POWER CONVERSION EQUIPMENT		Model		No.				
15	INVERTER (DC TO AC)								
16	CONVERTER (AC TO DC)								
17	TRANSFORMER								
18	RECTIFIER								
19	MOTOR-GENERATOR								
20	PHASE ADAPTER								
21	FREQUENCY CONVERTER								
22									
23									
24	POWER DISTRIBUTION & CONTROL								
25	GENERATOR CONTROL BOXES & PARALLELING PROV.								
26	CUTOUTS & VOLTAGE REGULATORS								
27	AMMETERS & VOLTMETERS								
28	SWITCHES, RHEOSTATS, SWITCH PANELS OR BOXES								
29	CIRCUIT BREAKERS & FUSES								
30	JUNCTION, FUSE, DISTRIBUTION BOXES & PANELS								
31	RECEPTACLES & CONNECTOR PLUGS								
32	RELAYS								
33	WIRING								
34	CONDUIT								
35									
36	LIGHTS & SIGNAL DEVICES								
37	LIGHTS - INTERIOR								
38	EXTERIOR								
39	- LANDING (INCL. RETRACT MECH.)								
40									
41	SIGNAL DEVICES - LIGHTS								
42	- HORNS								
43	- BELLS								
44									
45									
46	EQUIPMENT SUPPORTS - WING								
47	- TAIL								
48	- BODY								
49	- NACELLE								
50	TOTALS								
51	TOTAL - ELECTRICAL GROUP								
52	FURNISHES POWER FOR - (ITEMS)								
53									
54									
55									
56									
57									

*Includes system from sources of power to main distribution points.

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NAME J W C

DATE 1 June 1956

FURNISHINGS & EQUIPMENT GROUP
ACCOMMODATIONS FOR PERSONNEL

SECRET

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MODEL Sys. 112P

REPORT NA-56-130

1	CODE NO.									
2	CREW SEATS & PASSENGER CHAIRS									
3	Location	No.	Cushions	Seat	Safety Belt	Harness & Inertia Reel	Adj. Mech.	Cotopult or Eject. Mech.	Tracks & Supports	
5	PILOT	1								150
6	ASST. PILOT									
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17	HEAD REST (IF NOT INTEGRAL WITH SEAT)									
18	BUNKS (NO.) & SUPPORTS									
19	PERISCOPE INSTALLATION									
20	LITTER SUPPORTS									
21	BOMBERS & GUNNERS KNEELING PADS (NO.)									
22	PARACHUTE STOWAGE PROVISIONS									
23	TOILETS & RELIEF TUBES									
24	WASH BASIN & SHOWERS									
25	WATER TANKS & PIPING									
26	DRINKING WATER CONTAINERS & SUPPORTS									
27	LOCKERS FOR - FOOD									
28	- PERSONAL EFFECTS									
29										
30	GALLEY STOVES & HOTPLATES									
31	REFRIGERATOR									
32										
33										
34										
35										
36										
37	ANTI-G SUIT PROVISIONS									
38										
39	OXYGEN INSTALLATION									
40	BOTTLES - INCL. CHARGE (TYPE) (SIZE) (NO.)									
41										
42	CONVERTOR & LIQUID OXYGEN (SIZE 5 LITER) (NO. 1)									
43	REGULATORS (TYPE) (NO.)									
44	SUPPORTS - BOTTLES & REGULATORS									
45	PLUMBING, ETC.									
46										
47										
48										
49										
50										
51										
52										
53										
54										
55										
56										
57	TOTAL - ACCOMMODATIONS FOR PERSONNEL (TO BE BROUGHT FORWARD)									

* If not specified as useful load or special equipment.

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N-9 107-D
AME J W C
ATE 1 June 1956

FURNISHINGS & EQUIPMENT GROUP
MISC. EQUIPMENT & FURNISHINGS
SECRET

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MODEL Sys. 118P
REPORT NA-56-450

	Misc. Equip.	Furnishings
CODE NO.		
MISCELLANEOUS EQUIPMENT		
PORTABLE PLATFORMS & LADDERS		
DATA CASES & REPORT OR FORM HOLDERS	5	
MANUALS - FLIGHT & MAINTENANCE - BALANCE COMPUTER & SUPPORT		
TOOL LOCKERS		
WINDSHIELD WIPER & WASHER INSTALLATION		
RELEASE MECHANISM & FITTINGS - TARGET & GLIDER TOW		
BILGE SYSTEM		
STALL WARNING DEVICES		
REAR VIEW MIRROR		
AUXILIARY FLOORING		
INSTRUMENT BOARDS & SUPPORTS	19	
CONSOLES	28	
CONTROL STANDS		
CARGO HANDLING EQUIPMENT		
RAMPS		
HOISTS & BOOMS		
MONORAILS		
MONORAIL MOTORS		
TIE DOWN FITTINGS		
PYROTECHNIC INSTALLATION		
SIGNAL PISTOL HOLDER		
SIGNAL AMMUNITION HOLDER (CAP.)		
PARACHUTE FLARE - CONTAINERS (NO.)		
- RACKS (CAPACITY)		
- RELEASE MECHANISM		
SMOKE CANDLE (GRENADE) HANDLE		
FLOAT LIGHT RACK & RELEASE MECH. (CAP.)		
FURNISHINGS		
FLOOR COVERING, RUGS, ETC.		
SOUNDPROOFING & THERMAL INSULATION		400
TRIM		
CURTAINS & SCREENS		
CRASH PADDING		
PARTITIONS (NON-STRUCTURAL)		
TOTALS - MISC. EQUIP. & FURNISHINGS	52	400
TOTAL (TO BE BROUGHT FORWARD)		452

(none specified as special equipment.)

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NAME J W C

DATE 1 June 1956

FURNISHINGS & EQUIPMENT GROUP

EMERGENCY EQUIPMENT

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MODEL Sys. 118P

REPORT NA-56-450

1	CODE NO.								
2									
3	FIRE EXTINGUISHERS	Engine	Baggage	Fuel					
4	BOTTLES	Type							
5		Size	50 DB F	AGENT EA					
6		No.	2						
7		Weight	150						
8	CONTROLS		40						
9	PLUMBING		185						
10	BOTTLE SUPPORTS		20						
11									
12									
13	TOTAL - COMPT.		395						395
14	PORTABLE (TYPE		(SIZE		(NO.				
15									
16									
17									
18	PORTABLE EXTINGUISHER SUPPORTS								
19									
20	FIRE DETECTION SYSTEM								70
21									
22	FIRE RESISTANT PAINT								
23	FIRE CURTAINS								
24									
25	FIRST AID KITS (NO.		) & STOWAGE						
26									
27	FLASHLIGHTS (NO.		)						
28									
29	STOWAGE - EMERGENCY RATIONS & WATER								
30									
31	LIFE RAFTS - (TYPE		(NO.						
32									
33									
34									
35									
36	SUPPORTS OR CRADLES								
37									
38	DITCHING STATION EQUIPMENT								
39									
40									
41									
42									
43									
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55	TOTAL - EMERGENCY EQUIPMENT								465
56	TOTALS FROM PGS. 28 & 29								70
57	TOTAL - FURNISHINGS & EQUIPMENT GROUP								1241

* If not specified as useful load or special equipment.

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N9102-D
AME JWC
ATE 1 June 1956

AIR CONDITIONING & ANTI-ICING
EQUIPMENT GROUP
AIR CONDITIONING

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	Pressurization System	Ventilating System	Heating System	Cooling System		
HEAT EXCHANGERS (NO.)	250					
HEATERS (BTU CAPACITY) (NO.)						
HEATING FLUID (GALS.)						
COMPRESSORS OR SUPERCHARGERS						
MOTORS	15					
TURBINES						
FANS	35					
TANKS						
WATER SEPARATOR						
REGULATOR						
SCOOPS						
DUCTING	1400					
SHROUDS						
HELIUM TANK AND HELIUM	75					
PLUMBING - HELIUM	750					
PUMP - HELIUM	25					
BOMB BAY HEATING						
CONTROLS - MANUAL						
- ELECTRICAL	30					
- HYDRAULIC						
- PNEUMATIC	50					
SUPPORTS & BRACKETS - WING						
- TAIL						
- BODY						
- NACELLE						
PRESSURIZATION SEALING & TEST	250					
TOTALS						
TOTAL - AIR CONDITIONING (TO BE BROUGHT FORWARD)						2600

If not specified as special equipment.

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AN-9 102-D

NAME J V C

DATE 1 June 1956

AIR CONDITIONING & ANTI-ICING EQUIPMENT GROUP ANTI-ICING

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MODEL Sys. 118P

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			Wing	Tail	Air Induction	Propeller	Canopy & Windshield	Fuel System	
1									
2									
3		CODE NO.							
* 4	HEATERS	No.	BTU Capacity						
5									
6									
7									
8									
9									
10									
* 11	HEAT EXCHANGERS (NO.)				25				
12	BLOWER				30				
13									
14									
15	DUCTING				50		85		
16	SHROUDING								
17									
18									
* 19	BOOTS								
20									
* 21	ATTACHING STRIPS								
22									
23	OIL SEPARATORS								
24									
25	AIR PUMPS								
26									
27	AIR LINES & HOSES								
28									
29	TANKS								
30									
* 31	FLUID (GALS.)								
32									
33									
34									
35	PLUMBING								
36									
37									
38	DISTRIBUTOR - VALVE								
39	- CONTROLS								
40									
41									
42	CONTROLS - MANUAL								
43	- ELECTRICAL				5		5		
44	- HYDRAULIC								
45	- PNEUMATIC				6		6		
46									
* 47	WIRING, SWITCHES, RELAYS								
48									
49	SUPPORTS & BRACKETS - WING								
50	- TAIL								
51	- BODY								
52	- MACELE								
53									
54	TOTALS				116		96		
55	TOTAL - ANTI-ICING								212
56	TOTAL FROM PG. 31								2880
57	TOTAL - AIR CONDITIONING & ANT: ICING EQUIPMENT GROUP								3092

*If not specified as special equipment.

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** From main distribution point to actuating unit.

AN-0102 D

NAME J W C

DATE 1 June 1956

AUXILIARY GEAR GROUP

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		Handling	Arrest.	Catapult	ATO
1					
2					
3	HANDLING GEAR				
4	ANCHOR				
5	ANCHOR LINE				
6	PENDANT & CLAMP FITTING				
7	LIZARD				
8	SHEAVES				
9	WINCH - COMPLETE				
10	WINCH CRANK				
11	ANCHOR HANDLING RIG OR DAVIT				
12	WINCH ENGINE OR MOTOR				
13					
14	HOISTING SLING				
15	WING HANDLING LINES				
16	WATER RUDDER				
17	FITTINGS ~~RETRIEVING~~ ~~HOOK~~ HANDLING GEAR	210			
18	- BEACHING GEAR ATTACHMENT				
19	- TIEDOWN				
20	- JACKING				
21	- TOWING				
22	- MOORING & SNUBBING				
23	- ANCHORAGE				
24	- LEVELING				
25	- HOISTING				
26					
27	ARRESTING OR DECELERATION GEAR				
28	TRAILING HOOK				
29	HOOK POINT (TYPE)				
30	EXTENSION GEAR				
31	RETRIEVING GEAR				
32	BUMPER				
33	SHOCK ABSORBER				
34	ATTACHMENT FITTINGS				
35					
36	BARRIER CRASH FITTINGS				
37					
38	DECELERATION - PARACHUTE				
39	- CONTAINER & FITTINGS				
40	- CONTROLS				
41					
42					
43	CATAPULTING GEAR				
44	CATAPULT FITTINGS				
45	CATAPULT HOOKS				
46	HOLDBACK FITTINGS				
47					
48	ASSISTED TAKE OFF				
49	HOOKS				
50					
51	CONTROLS - FIRING				
52	- BOTTLE RELEASE				
53	BOTTLE STOWAGE PROJ. (NO. BOTTLES)				
54					
55					
56	TOTALS	210			
57	TOTAL - AUXILIARY GEAR GROUP				210

* If not specified as special equipment.

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PREPARED BY: T A M		NORTH AMERICAN AVIATION, INC.		PAGE NO. 36 OF 51	
CHECKED BY: J H W				REPORT NO. NA-56-450	
DATE: 1 June 1956		WEIGHT EMPTY SUMMARY		MODEL NO. Sys. 118P	
I T E M		WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.
			ARM	MOMENT	ARM MOMENT
<u>STRUCTURAL GROUPS</u>					
<u>Wing Group</u>					
Outer Panel		21733	1725	37489425	170 3694610
Spoilers		1710	1880	3214800	166 283860
Tab (Left Hand Only)		250	2130	532500	178 44500
Folding Wing Tip		650	2020	1313000	140 91000
Total - Wing Group		24343		42549725	
<u>Tail Group</u>					
Stabilizer - Basic Structure		1400	221	309400	200 280000
Fin - Basic Structure		1640	2002	3283280	290 475600
Total - Tail Group		3040		3592680	
<u>Body Group</u>					
Basic Structure		26776	1405	37620280	183 4900008
Secondary Structure					
Fuselage					
Canopy & Operating Mechanism		750	281	210750	247 185250
Windshield		200	249	49800	232 46400
Doors & Operating Mechanism					
Main Landing Gear		1250	1550	1937500	175 218750
Nose Landing Gear		90	360	32400	185 16650
Access & Miscellaneous		100	1100	110000	200 20000
Engine Access		450	2040	918000	170 76500
Miscellaneous		260	2050	533000	200 52000
Total - Body Group		29876		41411730	
<u>Alighting Gear Group</u>					
Main Gear					
Running Gear		2147	1603	3441641	58 124526
Structure		8044	1605	12910620	100 804400
Controls		825	1573	1297725	180 148500
Total - Main Gear		11016		17649986	

PREPARED BY: T A M		NORTH AMERICAN AVIATION, INC.		PAGE NO. 37 OF 51	
CHECKED BY: J H W		SECRET		REPORT NO. NA-56-450	
DATE: 1 June 1956		WEIGHT EMPTY SUMMARY		MODEL NO. Sys. 118P	
I T E M		WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.
			ARM	MOMENT	ARM MOMENT
STRUCTURAL GROUPS (CONT'D)					
Alighting Gear Group (Cont'd)					
Nose Gear					
Running Gear		90	390	35100	118 10620
Structure		400	392	156800	138 55200
Controls		300	370	111000	195 58500
Total - Nose Gear		790		302900	124320
Total - Alighting Gear Group		11806		17952886	1201746
Surface Controls Group					
Cockpit Controls		(22)		(5566)	(4565)
Control Stick		11	262	2882	205 2255
Rudder Pedals		11	244	2684	210 2310
Spoiler Controls		(1218)		(2236380)	(215865)
Mechanical		110	1394	153340	199 21890
Hydraulic		1093	1880	2054840	175 191275
Artificial Feel		15	1880	28200	180 2700
Canard Controls		(1716)		(1385810)	(359500)
Mechanical		56	250	14000	200 11200
Hydraulic		1630	837	1364310	210 342300
Artificial Feel		30	250	7500	200 6000
Rudder Controls		(271)		(506950)	(53900)
Mechanical		60	1250	75000	205 12300
Hydraulic		181	2050	371050	200 36200
Artificial Feel		30	2030	60900	180 5400
Trim Tab Controls		81	2100	170100	180 14580
Wing Tip Folding Mechanism		390	2050	799500	160 62400
Power Control System		(1298)		(2423797)	(237275)
Pumps		244	2000	488000	160 39040
Accumulators		95	1059	100605	215 20425
Reservoirs		30	1950	58500	220 6600
Valves, Filters & Regulators		180	1967	354060	190 34200
Plumbing & Supports		530	1933	1024490	180 95400
Fluid		219	1818	398142	190 41610
Total - Surface Controls Group		4996		7528103	948085
Engine Section		306	2042	624852	194 59364
TOTAL - STRUCTURAL GROUPS		74367		113659976	12594323

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PREPARED BY: D D M	NORTH AMERICAN AVIATION, INC.			PAGE NO. 38 OF 51	
CHECKED BY: T M E	SECRET			REPORT NO. NA-56-450	
DATE: 1 June 1956	WEIGHT EMPTY SUMMARY			MODEL NO. Sys. 118P	
I T E M		WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.
			ARM	MOMENT	ARM MOMENT
<u>PROPULSION GROUP</u>					
<u>Engine Installation</u>					
Aerojet General Type HATR 2040 Scaled 103.1% (4)		15660	2042	31977720	194 3038040
<u>Accessory Gear Boxes & Drives</u>					
Gear Boxes (4)		340	1950	663000	151 51340
Drive Shafts & Couplings		164	1990	326360	156 255884
Supports		36	1950	70200	145 5220
Lubricating System		380	1940	737200	152 57760
Constant Speed Drives (2)		90	1925	173250	150 13500
Total Gear Boxes & Drives		1010		1970010	153404
<u>Air Induction System</u>					
Air Inlet Ducts		11500	1583	18204500	126 1449000
Variable Geometry Inlet		12050	1605	19340250	147 1771350
By Pass Provisions		1210	2035	2462350	167 202070
Ramp Bleed Provisions		630	1525	960750	120 75600
Fairing - Engine Inlet		290	1960	568400	182 52780
Total - Air Induction System		25680		41536250	3550800
Shroud - Afterburner		340	2085	708900	200 68000
Cooling & Drain Provisions		280	2025	567000	190 53200
<u>Fuel System</u>					
Fuel Cells - Fuselage		6860	1320	9055200	213 1461180
Fuel Cell Supports		212	1320	279840	213 45156
Insulating Provisions		3617	1358	4911886	200 723400
Boost Pumps		635	1720	1092200	160 101600
Filling System - Single Point		336	1290	433440	175 58800
Distribution System		590	1930	1138700	205 120950
Transfer System		100	1320	132000	177 17700
Vent System		120	1320	158400	260 31200
Dump System & Drains		235	2020	474700	265 38775
Electrical Provisions		50	1320	66000	177 8850
Total - Fuel System		12755		17742366	2607511
Engine Controls		300	1142	342600	215 64500
TOTAL - PROPULSION GROUP		56025		94844846	9535555
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PREPARED BY: J W C	NORTH AMERICAN AVIATION, INC.		PAGE NO. 39 OF 51	
CHECKED BY: W H L	SECRET		REPORT NO. NA-56-450	
DATE: 1 June 1956	WEIGHT EMPTY SUMMARY		MODEL NO. Sys. 118P	

I T E M	WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.	
		ARM	MOMENT	ARM	MOMENT
<u>EQUIPMENT GROUPS</u>					
<u>Instruments</u>					
Flight Instruments	114	655	74670	195	22230
Engine Instruments	450	1213	545850	205	92250
Total - Instruments	564		620520		114480
<u>Hydraulic Group</u>					
Utility System	(3736)		(6599332)		(7287800)
Pumps	510	2000	1020000	160	81600
Reservoirs	80	1950	156000	220	17600
Valves, Filters & Regulators	350	1964	687400	190	66500
Plumbing & Supports	2020	1683	3399660	200	404000
Fluid (105 Gals OS-45)	776	1722	1336272	205	159080
Fuel Pump Power System	(1354)		(2592282)		(2426600)
Pumps	244	2000	488000	160	39040
Reservoirs	20	1950	39000	220	4400
Valves, Filters & Regulators	180	1967	354060	190	34200
Plumbing & Supports	666	1881	1252746	180	119880
Fluid (33 Gal. OS-45)	244	1879	458476	185	45140
Total - Hydraulic Group	5090		9191614		971440
<u>Electrical Group</u>					
DC System	(35)		(12250)		(7700)
Power Conversion Equipment	30	350	10500	220	6600
Power Distribution & Control	5	350	1750	220	1100
AC System	(737)		(741686)		(147960)
Alternators	110	2000	220000	160	17600
Alternator Controls	50	350	17500	220	11000
Switches, Boxes, Plugs, Etc.	185	776	143560	210	38850
Wiring & Conduit	362	973	352226	205	74210
Lights & Signal Devices	30	280	8400	210	6300
Emergency System	(43)		(15050)		(9460)
Alternator and Drive	26	350	9100	220	5720
Excitation Unit	7	350	2450	220	1540
Provisions	10	350	3500	220	2200
Total - Electrical Group	815		768986		165120
SECRET					

PREPARED BY: J W C CHECKED BY: W H L DATE: 1 June 1956		NORTH AMERICAN AVIATION, INC. SECRET WEIGHT EMPTY SUMMARY		PAGE NO. 40 of 51 REPORT NO. NA-56-450 MODEL NO. Sys. 118P	
I T E M		WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.
			ARM	MOMENT	ARM MOMENT
<u>EQUIPMENT GROUPS (CONT'D)</u>					
<u>Electronics Group</u>					
AN/ARC-52 UHF Command		69			
AN/ARA-37 UHF/DF		11			
AN/ANH-5 Recorder		18			
AN/APX-19 IFF A/G		54			
AN/APX-27 IFF A/A		42			
AN/ART-27 Crash Locator Beacon		69			
Automatic Flight and Stability Control		290			
Auto Navigator		495			
Standby Platform		40			
Controls and Displays		20			
Shelves and Supports		80			
Reconnaissance Provisions		250			
Total - Electronics Group		1438	350	503300	210 301980
<u>Furnishings & Equipment Group</u>					
Accommodations for Personnel		(324)		(86200)	(69570)
Pilot's Ejection Seat & Belt		150	280	42000	217 32550
Periscope		125	228	28500	205 25625
Relief Provisions		4	280	1120	205 820
Oxygen Provisions		45	324	14580	235 10575
Miscellaneous Equipment		(52)		(13960)	(10875)
Instrument Board & Supports		19	255	4845	215 4085
Data Case & Form Holders		5	255	1275	210 1050
Consoles		28	280	7840	205 5740
Furnishings		(400)		(144000)	(84000)
Insulation		400	360	144000	210 84000
Emergency Equipment		(465)		(918790)	(96950)
Fire Extinguisher System		395	1978	781310	210 82950
Fire Detector System		70	1964	137480	200 14000
Total Furnishings & Equipment Group		1241		1162950	261395
<u>Air Conditioning</u>					
Pressurizing and Cooling System		(2880)	1190	(3427200)	220 (633600)
Heat Exchangers		250			
Helium System		850			
Scoops & Ducts		1450			
Controls		80			
Sealing & Test Provisions		250			
			SECRET		

The average arms for the Electronics Group have been assumed for the total installation.

PREPARED BY: J W C	NORTH AMERICAN AVIATION, INC.	PAGE NO. 41 OF 51
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DATE: 1 June 1956		MODEL NO. Sys. 118P
WEIGHT EMPTY SUMMARY		

I T E M	WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.	
		ARM	MOMENT	ARM	MOMENT
<u>EQUIPMENT GROUPS (CONT'D)</u>					
<u>Air Conditioning (Cont'd)</u>					
Anti-Icing System	212	785	166420	225	47700
Total - Air Conditioning	3092		3593620		681300
<u>Auxiliary Gear Group</u>					
Handling Gear	210	1566	328860	170	35700
Total - Auxiliary Gear Group	210		328860		35700
TOTAL - EQUIPMENT GROUPS	12450		16169850		2531415

<u>RECAPITULATION - WEIGHT EMPTY</u>					
Total - Structural Groups	74367		113659976		12594323
Total - Propulsion Group	56025		94844846		9535555
Total - Equipment Groups	12450		16169850		2531415
TOTAL - WEIGHT EMPTY	142842	1572.89	224674672	172.65	24661293

HORIZONTAL C.G. = $\frac{1572.89}{1335.81} - 834.19$ = <u>55.3% M.A.C.</u>					
VERTICAL C.G. = 200.0 - 172.7 = <u>27.3 Inches Below F.R.L.</u>					
SECRET					

PREPARED BY: D D M	NORTH AMERICAN AVIATION, INC.		PAGE NO. 42 OF 51		
CHECKED BY: T M E	SECRET		REPORT NO. NA-56-450		
DATE: 1 June 1956	USEFUL LOAD		MODEL NO. Sys. 118P		
ITEM	WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.	
		ARM	MOMENT	ARM	MOMENT
<u>USEFUL LOAD</u>					
<u>Non Expendable Items</u>					
Crew					
Pilot	270	273	73710	218	58860
Reconnaissance Package					
Detail Photo Mission	(1958)		(911044)		(97965)
Structure	660	473	312180	175	115500
Cameras and Stab. Mounts	700	487	340900	220	154000
System Controls	348	418	145464	215	74820
Wire and Prev.	215	450	96750	215	46225
Shelves and Supports	35	450	15750	212	7420
Trapped Fuel 320 Gallons	187	1321	247087	167	31229
Trapped Oil 8 Gallons	60	1990	119400	214	12840
Total - Non-Expendable Items	2475		1351181		500894
<u>Expendable Items</u>					
Fuel (101330 Gallons)	(59278)		(7832807)		(12703358)
Fus Tank No. 1, 13540 Gals.	7921	718	5687278	214	1695094
Fus Tank No. 2, 21580 Gals.	12624	1026	12952224	214	2701536
Fus Tank No. 3, 21200 Gals.	12402	1293	16035786	215	2666430
Fus Tank No. 4, 19660 Gals.	11501	1515	17424015	218	2507218
Fus Tank No. 5, 10650 Gals.	6230	1678	10453940	208	1295840
Fus Tank No. 6, 9360 Gals.	5476	1794	9823944	210	1149960
Fus Tank No. 7, 5340 Gals.	3124	1905	5951220	220	687280
Drop-Off Cowl	2115	1287	2722005	117	247455
Engine Oil 12 Gals.	90	2027	182430	213	19270
Total - Expendable Items	61483		81232842		12969983
TOTAL - USEFUL LOAD	63958		82584023		13470877
SECRET					

PREPARED BY: T A M	NORTH AMERICAN AVIATION, INC.			PAGE NO. 43 OF 51	
CHECKED BY: J H W	SECRET			REPORT NO. NA-56-450	
DATE: 1 June 1956	LANDING GEAR AND WING TIP MOMENT CHANGE			MODEL NO. Sys. 118P	
I T E M	WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.	
		ARM	MOMENT	ARM	MOMENT
<u>LANDING GEAR MOMENT CHANGE</u> <u>DOWN POSITION</u>					
<u>Main</u>					
Wheels, Brakes, Tires & Tubes	2147	1663	3441641	58	124526
Structure	8044	1605	12910620	100	804400
Controls	825	1573	1297725	180	148500
<u>Nose</u>					
Wheels, Tires, and Tubes	90	390	35100	118	10620
Structure	400	392	156800	138	55200
Controls	300	370	111000	195	58500
TOTAL LANDING GEAR - DOWN POSITION	11806		17952886		1201746
<u>RETRACTED POSITION</u>					
<u>Main</u>					
Wheels, Brakes, Tires and Tubes	2147	1483	3184001	182	390754
Structure	8044	1528	12291232	180	1447920
Controls	825	1573	1297725	175	144375
<u>Nose</u>					
Wheels, Tires and Tubes	90	317	28530	200	18000
Structure	400	346	138400	197	78800
Controls	300	370	111000	195	58500
TOTAL LANDING GEAR - RETRACTED POSITION	11806		17050888		2138349
TOTAL LANDING GEAR MOMENT CHANGE, DOWN TO UP	-		- 901998		+ 936603
<u>WING TIP MOMENT CHANGE</u>					
Up Position	650	2020	1313000	140	91000
Down Position	650	2020	1313000	120	78000
TOTAL WING TIP MOMENT CHANGE UP TO DOWN	-		-		- 13000
TOTAL MOMENT, LANDING GEAR UP AND WING TIP DOWN	-		- 901998		+ 923603
SECRET					

PREPARED BY: J W C	NORTH AMERICAN AVIATION, INC.		PAGE NO. 44 OF 51		
CHECKED BY: W H L	SECRET		REPORT NO. NA-56-450		
DATE: 1 June 1956	TAKE-OFF GROSS WEIGHT DETAIL PHOTO MISSION		MODEL NO. Sys. 118P		
I T E M	WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.	
		ARM	MOMENT	ARM	MOMENT
TAKE-OFF GROSS WEIGHT - DETAIL PHOTO MISSION - GEAR DOWN					
Weight Empty	142842		224674672		24661293
Useful Load	63958		82584023		13470877
TAKE-OFF GROSS WEIGHT - DETAIL PHOTO MISSION - GEAR DOWN	206800	1485.78	307258695	184.39	38132170
HORIZONTAL C.G. = $\frac{1485.78 - 834.19}{1335.81}$		48.8% MAC			
VERTICAL C.G. = 200.0 - 184.4		15.6 inches below FRL			
Plus:					
Moment Change Landing Gear Up and Wing Tip Down	-		- 901998		+ 923603
TAKE-OFF GROSS WEIGHT - DETAIL PHOTO MISSION - GEAR UP	206800	1481.42	306356697	188.86	39055773
HORIZONTAL C.G. = $\frac{1481.42 - 834.19}{1335.81}$		48.5% MAC			
VERTICAL C.G. = 200.0 - 188.9		11.1 inches below FRL			
SECRET					

PREPARED BY: J W C	NORTH AMERICAN AVIATION, INC.		PAGE NO. 45 OF 51	
CHECKED BY: W H L	SECRET		REPORT NO. NA-56-450	
DATE: 1 June 1956	ALTERNATE I-A		MODEL NO. Sys. 118P	
TAKE-OFF GROSS WEIGHT - RADAR MAPPING MISSION - COHERENT DOPPLER RADAR				

ITEM	WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.	
		ARM	MOMENT	ARM	MOMENT
TAKE-OFF GROSS WEIGHT - RADAR MAPPING MISSION - COHERENT DOPPLER RADAR - GEAR DOWN					
Take-Off Gross Weight - Detail Photo Mission - Gear Down	206800		307258695		38132170
Less:					
Reconnaissance Package Detail Photo Mission	- 1958		- 911044		- 397965
Plus:					
Reconnaissance Package - Radar Mapping Mission - Coherent Doppler Radar	(1952)		(983660)		(363840)
Structure	980	150	499800	175	171500
Equipment	692	505	349460	195	134940
Wiring & Provisions	210	480	100800	205	43050
Shelves and Supts.	70	480	33600	205	14350
TAKE-OFF GROSS WEIGHT - RADAR MAPPING MISSION - COHERENT DOPPLER RADAR - GEAR DOWN	206794	1486.17	307331311	184.23	38098045
HORIZONTAL C.G. = $\frac{1486.17 - 834.19}{1335.81} = 48.8\% \text{ MAC}$					
VERTICAL C.G. = $200.0 - 184.2 = 15.8 \text{ inches below FRL}$					
Plus:					
Moment Change Landing Gear Up and Wing Tip Down	-		- 901998		+ 923603
TAKE-OFF GROSS WEIGHT - RADAR MAPPING MISSION - COHERENT DOPPLER RADAR - GEAR UP	206794	1481.81	306429313	188.70	39021648
HORIZONTAL C.G. = $\frac{1481.81 - 834.19}{1335.81} = 48.5\% \text{ MAC}$					
VERTICAL C.G. = $200.0 - 188.7 = 11.3 \text{ inches below FRL}$					
SECRET					

PREPARED BY: J W C	NORTH AMERICAN AVIATION, INC.		PAGE NO. 46 of 51		
CHECKED BY: W H L	SECRET		REPORT NO. NA-56-450		
DATE: 1 June 1956	ALTERNATE I-B TAKE-OFF GROSS WEIGHT - RADAR MAPPING MISSION - AZIMUTH RADAR		MODEL NO. Sys. 118P		
ITEM	WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.	
		ARM	MOMENT	ARM	MOMENT
TAKE-OFF GROSS WEIGHT - RADAR MAPPING MISSION - AZIMUTH RADAR - GEAR DOWN					
Take-Off Gross Weight - Detail Photo Mission - Gear Down	206800		307258695		38132170
Less: Reconnaissance Package - Detail Photo Mission	- 1958		- 911044		- 397965
Plus: Reconnaissance Package - Radar Mapping Mission - Azimuth Radar	(1746)		(861925)		(334380)
Structure	1020	490	499800	177	180540
Equipment	501	500	250500	215	107715
Wiring and Provisions	175	495	86625	205	35875
Shelves and Supports	50	500	25000	205	10250
TAKE-OFF GROSS WEIGHT - RADAR MAPPING MISSION - AZIMUTH RADAR - GEAR DOWN	206588	1487.06	307209576	184.27	38068585
HORIZONTAL C.G. = $\frac{1487.06 - 834.19}{1335.81}$					= <u>48.9% MAC</u>
VERTICAL C.G. = $200.0 - 184.3 - 15.7$					<u>inches below FRL</u>
Plus: Moment Change Landing Gear Up and Wing Tip Down			- 901998		+ 923603
TAKE-OFF GROSS WEIGHT - RADAR MAPPING MISSION - AZIMUTH RADAR - GEAR UP	206588	1482.70	306307578	188.74	38992188
HORIZONTAL C.G. = $\frac{1482.70 - 834.19}{1335.81}$					= <u>48.5% MAC</u>
VERTICAL C.G. = $200.0 - 188.7 = 11.3$					<u>inches below FRL</u>
	SECRET				

PREPARED BY: J W C	NORTH AMERICAN AVIATION, INC.		PAGE NO. 47 OF 51	
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DATE: 1 June 1956	ALTERNATE I-C TAKE-OFF GROSS WEIGHT SEARCH PHOTO MISSION		MODEL NO. Sys. 118P	

ITEM	WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.	
		ARM	MOMENT	ARM	MOMENT
TAKE-OFF GROSS WEIGHT - SEARCH PHOTO MISSION-GEAR DOWN					
Take-Off Gross Weight - Detail Photo Mission - Gear Down	206800		307258695		38132170
Less:					
Reconnaissance Package - Detail Photo Mission	- 1958		- 911044		- 397965
Plus:					
Reconnaissance Package - Search Photo Mission	(1638)		(777560)		(314435)
Structure	500	475	237500	183	91500
Cameras and Mounts	550	495	272250	195	107250
System Controls	348	445	154860	195	67860
Wiring and Provisions	205	475	97375	200	41000
Shelves and Supports	35	445	15575	195	6825
TAKE-OFF GROSS WEIGHT - SEARCH PHOTO MISSION - GEAR DOWN	206480	1487.43	307125211	184.27	38048640
HORIZONTAL C.G. = $\frac{1487.43 - 834.19}{1335.81} = 48.9\% \text{ MAC}$					
VERTICAL C.G. = $200.0 - 184.3 = 15.7 \text{ inches below FRL}$					
Plus:					
Moment Change Landing Gear Up and Wing Tip Down	-		- 901998		- 923603
TAKE-OFF GROSS WEIGHT - SEARCH PHOTO MISSION - GEAR UP	206480	1483.06	306223213	188.75	38972243
HORIZONTAL C.G. = $\frac{1483.06 - 834.19}{1335.81} = 48.6\% \text{ MAC}$					
VERTICAL C.G. = $200.0 - 188.8 = 11.2 \text{ inches below FRL}$					
SECRET					

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DATE: 1 June 1956	ALTERNATE I-D				MODEL NO. Sys. 118P
TAKE-OFF GROSS WEIGHT - FERRET MISSION					
I T E M	WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.	
		ARM	MOMENT	ARM	MOMENT
<u>TAKE-OFF GROSS WEIGHT - FERRET MISSION - GEAR DOWN</u>					
Take-Off Gross Weight - Detail Photo Mission - Gear Down	206800		307258695		38132170
Less:					
Reconnaissance Package - Detail Photo Mission	- 1958		- 911044		- 397965
Plus:					
Reconnaissance Package - Ferret Mission	(1854)		(872390)		(360573)
Structure	860	480	412800	185	159100
Equipment	(706)		(322790)		(143233)
DLD-1	355	450	159750	200	71000
DLD-2	168	490	82320	203	34104
CW D/P	152	425	64600	207	31464
EHP	31	520	16120	215	6665
Wiring and Provisions	208	475	98800	205	42640
Shelves and Supports	80	475	38000	195	15600
TAKE-OFF GROSS WEIGHT - FERRET MISSION - GEAR DOWN	206696	1486.34	307220041	184.30	38094778
HORIZONTAL C.G. = $\frac{1486.34 - 834.19}{1335.81} = 48.8\% \text{ MAC}$					
VERTICAL C.G. = 200.0 - 184.3 = <u>15.7 inches below FFL</u>					
Plus:					
Moment Change Landing Gear Up and Wing Tip Down	-		- 901998		+ 923603
TAKE-OFF GROSS WEIGHT - FERRET MISSION - GEAR UP	206696	1481.97	306318043	188.77	39018381
HORIZONTAL C.G. = $\frac{1481.97 - 834.19}{1335.81} = 48.5\% \text{ MAC}$					
VERTICAL C.G. = 200.0 - 188.8 = <u>11.2 inches below FFL</u>					
SECRET					

PREPARED BY: J W C	NORTH AMERICAN AVIATION, INC. SECRET			PAGE NO. 49 of 51	
CHECKED BY: W H L				REPORT NO. NA-56-450	
DATE: 1 June 1956	EXTREME C.G. CONDITIONS			MODEL NO. Sys. 118P	
I T E M	WEIGHT LBS.	HORIZONTAL C. G.		VERTICAL C. G.	
		ARM	MOMENT	ARM	MOMENT
<u>MOST FORWARD C.G. CONDITION</u> Take-Off Gross Weight - Detail Photo Mission - Gear Down Plus: Moment Change, Landing Gear Up and Wing Tip Down	206800 -		307258695 - 901998		38132170 + 923603
MOST FORWARD C.G. CONDITION GEAR UP	206800	1481.42	306356697	188.86	39055773
HORIZONTAL C.G. = $\frac{1481.42 - 834.19}{1335.81} = 48.5\% \text{ MAC}$					
VERTICAL C.G. = $200.0 - 188.9 = 11.1 \text{ inches below FRL}$					
<u>MOST AFT C.G. CONDITION</u> Take-Off Gross Weight - Search Photo Mission - Gear Down Less: Total Fuel, 101330 Gals. Drop-Off Cowl	206480 -59278 - 2115		307125211 -78328407 - 2722005		38048640 -12703358 - 247455
MOST AFT C.G. CONDITION GEAR DOWN	145087	1558.20	226074799	172.98	25097827
HORIZONTAL C.G. = $\frac{1558.20 - 834.19}{1335.81} = 54.2\% \text{ MAC}$					
VERTICAL C.G. = $200.0 - 173.0 = 27.0 \text{ inches below FRL}$					
SECRET					

834.19

L.E.M.A.C.

TANK #1

TANK #2

HORIZONTAL DATUM

DROP OFF

STATIC GROUND LINE 3°

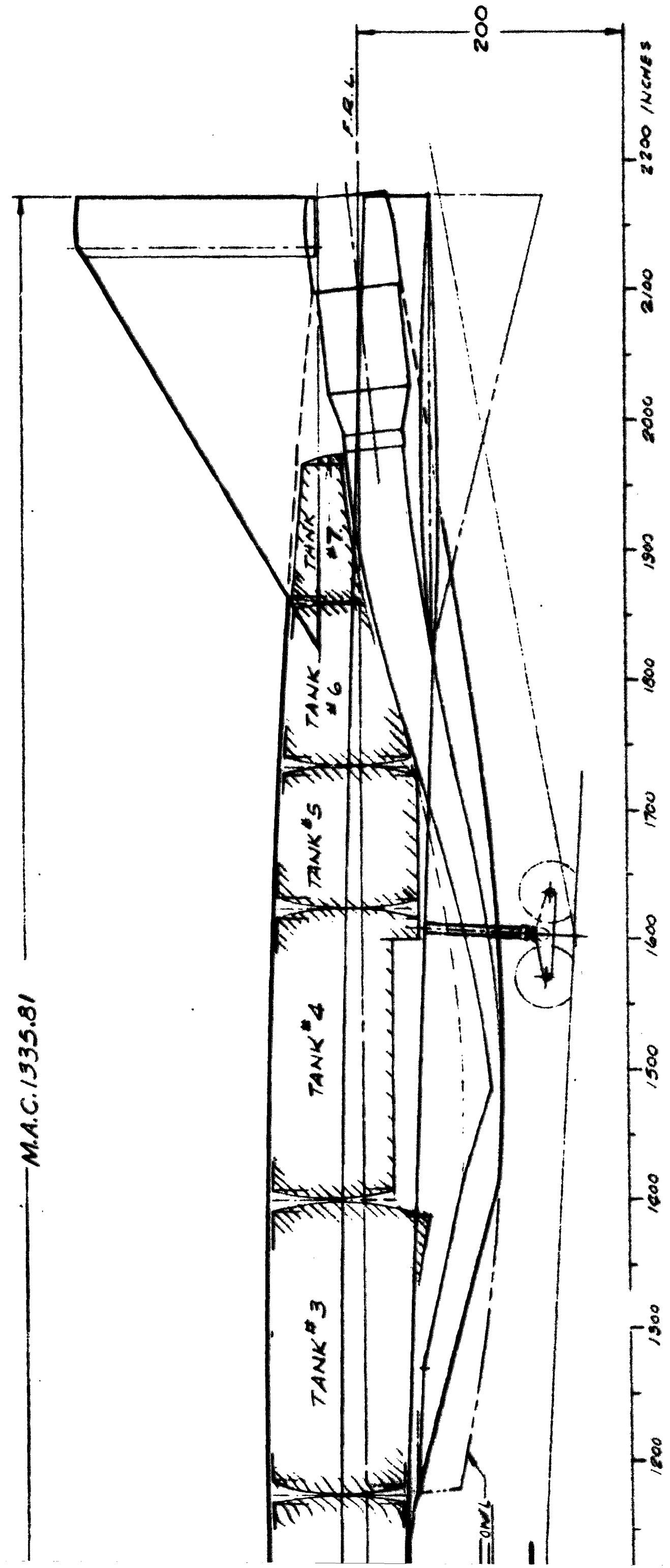
VERTICAL DATUM



1

DESIGN NO. <i>DLE</i>	NORTH AMERICAN AVIA	
DESIGN BY <i>JMK</i>	INTERNATIONAL AIRPORT LOS ANGELES	
DATE <i>1 June 1956</i>	<i>AIRPLANE DIA</i>	

M.A.C. 1335.81



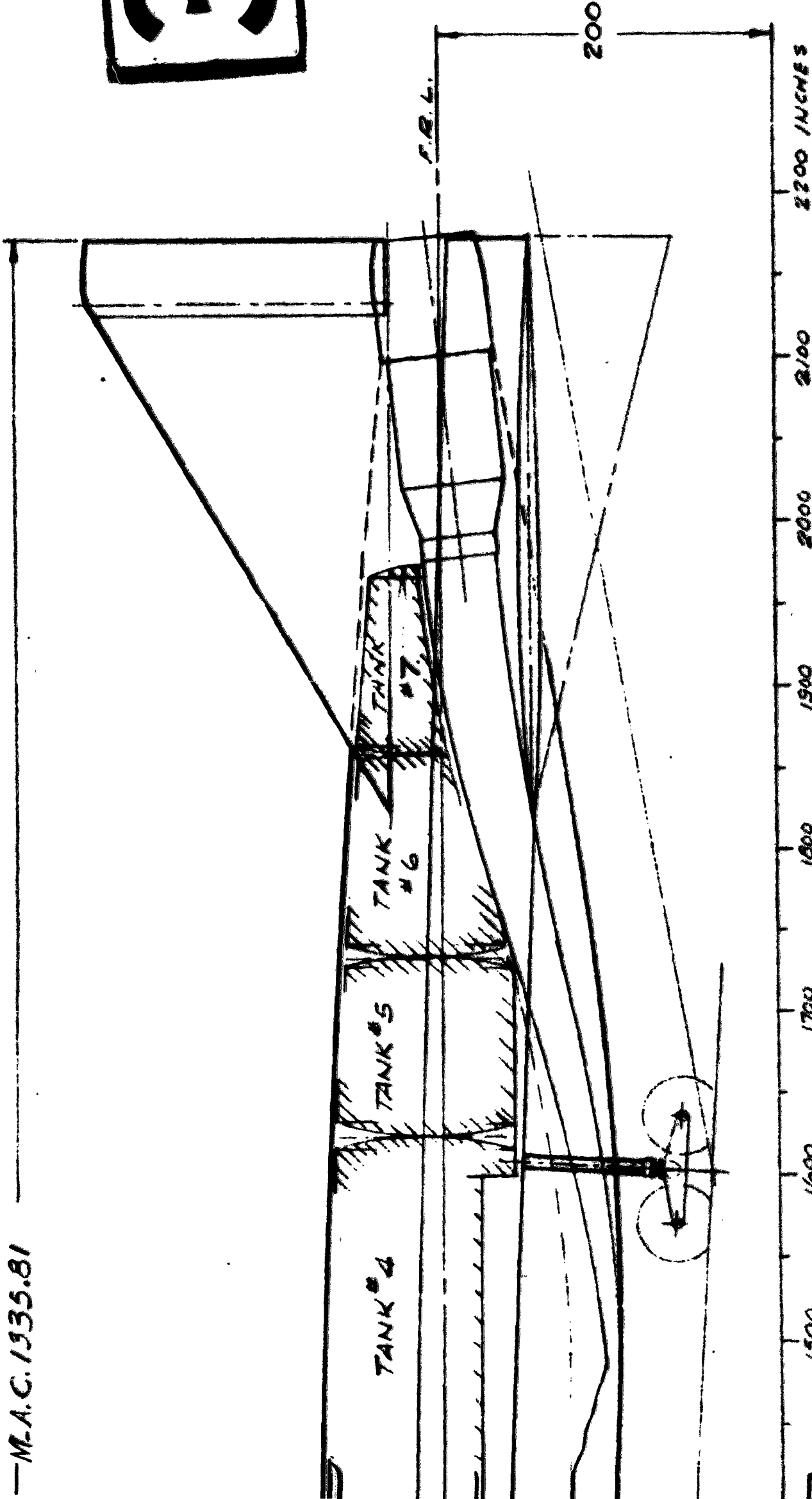
2

7A 70

DESIGNED BY <i>DLE</i>	NORTH AMERICAN AVIATION, INC. INTERNATIONAL AIRPORT LOS ANGELES 42, CALIFORNIA		DATE <i>5/10/51</i>
DRAWN BY <i>JMC</i>	AIRPLANE DIAGRAM		REVISION NO. <i>100,000-1670</i>
DATE <i>14 June 1956</i>			APPROVED BY <i>SP2. HRP</i>
		SCALE 1" = 80"	

—M.A.C. 1335.81

3



TANK	GALLONS
1	13540
2	21580
3	21200
4	19660
5	10650
6	9360
7	5340
TOTAL	101330

5

NORTH AMERICAN AVIATION, INC.

INTERNATIONAL AIRPORT
LOS ANGELES 48, CALIFORNIA

APPENDIX I

SECRET

REPORT NA-56-420

APPENDIX I

SUPPORTING DATA

RECONNAISSANCE

WEAPONS SYSTEM 118P

PHASE III

No. of Pages 47

Date: 1 June 1956

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STRUCTURAL GROUPS

PART I INTRODUCTION

The purpose of this section is to provide a statement of the Method of Structural Weight Estimation used to produce the data presented in the body of this report. The section is divided into parts which correspond to the outline below.

- PART I INTRODUCTION.
- PART II WING GROUP WEIGHT.
- PART III HORIZONTAL TAIL WEIGHT.
- PART IV VERTICAL TAIL WEIGHT.
- PART V FUSELAGE GROUP WEIGHT.
- PART VI LANDING GEAR GROUP WEIGHT.
- PART VII ENGINE SECTION WEIGHT.
- PART VIII COMPARISON OF ACTUAL WEIGHT DATA WITH ESTIMATES PRODUCED BY THE METHOD PRESENTED IN THIS SECTION.
- PART IX GENERAL CURVES.
- PART X REMARKS SECTION.
- PART XI SUPPLEMENTAL DATA

In each of the five parts following the introduction an equation is presented which expresses weight in pounds as a function of a set of variables. The variables are defined in the paragraphs immediately following each equation. Some of the variables in the basic equations are defined by mathematical expressions. In such cases the mathematical expressions are shown and in addition general curves representing the variables are presented in Part IX. Following the equations and the definitions there is a discussion of the meaning of a coefficient. The coefficient and the set of increments applied to it in the table following the discussion provide an adjustment to the equation so that it can be made to describe a physical entity. After that, the last unit of each part is a statement of the numerical values assigned to the variables in the equation to produce the weight data shown in the body of the report.

In Part VII there is a statement of the origin of the Engine Section Weight.

SECRET

PREPARED BY: W A H	NORTH AMERICAN AVIATION, INC.	PAGE NO. 2 OF 47
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In Part VIII there is a set of graphs which give an indication of the performance of the estimation method. There is a graph corresponding to each equation and one corresponding to the sum of all of the equations. The graphs show a series of points representing ratios. The points fall about a line representing the value 1.0. If the estimation method provided an absolutely accurate description of the structural unit the ratio of actual weight to estimated weight represented by points would be unity in all cases. Since the ratio differs from unity the scatter shown on any graph is an indication of the ability of the corresponding equation to provide an approximation of physical reality.

A set of general curves are presented in Part IX. The curves are graphs of some of the variables used in this report that are defined by mathematical expressions.

In the body of this substantiation a set of coefficients are established. The purpose of the coefficients is to provide a relationship between the mathematical model and a reference set of real airplanes. The reference set differs from the projected aircraft that is the subject of the substantiation. The differences usually originate from changes in requirements and in technology. The increments that are applied to compensate for changes of that nature are explained by the remarks in Part X.

PART II. WING GROUP WEIGHT

1. Wing Weight Equation.

$$W_N = \delta_N \left\{ 41.5 C_G^{1/4} S^{3/4} + \left[\frac{R^{3/2} S^{1/2} N J}{10 K f t \cos^2 \Lambda (1 - 2 \sin \Lambda)} \right] \times \left[G - \frac{(\Omega + \omega)(1 + \lambda) J J''}{(J + \lambda) J} \right] \right\} \rho$$

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DATE 1 June 1956	SUPPORTING DATA	MODEL NO. Sys. 118P

2. Definitions of Symbols.

W_w = Wing Group Weight in pounds.

δ_w = A quantity defined in conjunction with Table 1, page 6.

C = Secondary Structure Factor.

$$= .035 - .0327 e^{-.00247\sqrt{GN}}$$

G = Design Gross Weight for Stress Analysis, expressed in pounds.

N = The Ultimate Positive Maneuvering Load Factor corresponding to the Design Gross Weight for Stress Analysis.

S = Gross wing area in square feet.

AR = The aerodynamic aspect ratio of the Wing.

$$J = \int_0^1 \frac{[3\lambda + u(1-\lambda)] u^2}{[\lambda\sigma + u(1-\lambda\sigma)]} du$$

λ = Planform Taper Ratio

$$= \frac{C_t}{C_r} = \frac{\text{Tip Chord in inches.}}{\text{Root Chord in inches.}}$$

$$u = \beta / (4/2)$$

β = Any arbitrary point along the Wing Semi-Span.

b = Wing Span in the same units of length as those used in expressing β .

σ = Thickness Taper Ratio

$$= \frac{t_t}{t_r} = \frac{\text{Tip Thickness in percent of Chord.}}{\text{Root Thickness in percent of Chord.}}$$

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K = A ratio of two distances which may be defined as:

- (a) The distance, in feet, from the centroid of the upper cap material to the centroid of the lower cap material.
- (b) The maximum depth, in feet, of the Airfoil Section.

The ratio is produced by dividing the distance defined in (a) by the distance defined in (b). The numerical value may be computed by the equation below.

$$K = .92 - \frac{R^{1/2}(1+\lambda)}{S^{1/2}t(1+\lambda\theta)} (.0333 + .000004 P^{3/4})$$

t = The Root Airfoil Thickness Ratio in the Streamline.

P = The Average Unit Surface Loading, in pounds per foot, caused by bending.

$$= \frac{R^{3/2}(1+\lambda) N J'}{22.08 S^{1/2} t T \cos \Lambda} \left[G - \frac{(\Omega + \omega)(1+\lambda) \gamma J'''}{(\gamma + \lambda) J'} \right]$$

$$J' = \int_0^1 \frac{u^2 [3\lambda + u(1-\lambda)]}{[\lambda\theta + u(1-\lambda\theta)][\lambda + u(1-\lambda)]} du$$

T = Structural Chord Factor.

$$= \frac{\cos \Lambda}{1 - .2r \sin \Lambda \cos \Lambda [1 + 1.2r \sin \Lambda \cos \Lambda]}$$

Λ = The angle of sweep of the 40% chord line of the wing.

r = The rate of taper of the wing.

$$= \frac{4(1-\lambda)}{R(1+\lambda)}$$

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Ω = The deadweight of the wing structure.

ω = The deadweight of the contents of the wing corresponding to

$$J = \int_0^1 \frac{u^2 \left[\frac{3\lambda}{\gamma} + u \left(1 - \frac{\lambda}{\gamma} \right) \right]}{[\lambda \sigma + u(1-\lambda \sigma)][\lambda + u(1-\lambda)]} du$$

f = The average allowable bending stress in pounds per square inch (Aluminum Structure)

$$= \frac{P}{.500 + (1.85 \times 10^{-6})P}$$

$$J = \int_0^1 \frac{u^2 \left[\frac{3\lambda}{\gamma} + u \left(1 - \frac{\lambda}{\gamma} \right) \right]}{[\lambda \sigma + u(1-\lambda \sigma)]} du$$

γ = A quantity which defines the slope of the Dead Weight Distribution.

$$\phi_N = \frac{1.080}{(T-1900)^{.00937}}$$

T = The date of the first weighing of the first airplane of the type. The dates are expressed as years and tenths of years.

3. The Meaning of δ_M .

In deriving the wing weight equation defined in paragraph 1, two distinct phases of development were necessary. The two phases were:

- An idealized model of wing structure was constructed.
- An idealized model was related to a set of physical data.

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In general, the methods utilized in Stress Analysis were followed in executing the first phase of development. In the second phase the numerical values of wing weights produced by the idealized model were compared with actual weight data. The comparison led naturally to an attempt to reduce all of the wings to a common basis. The reduction to a common basis was accomplished by removing from the actual weight data the weight penalty associated with those items which were not common to all airplanes of the reference set. Examples of items for which weight penalties were removed are:

- (a) Ailerons
- (b) Flaps
- (c) Slats
- (d) Folding Provisions

For example, the weight increment removed for Slats is the difference between two different types of Leading Edges. One type is a Plain Leading Edge and the other is a Leading Edge with a Slat. The difference in the weights of the two is the penalty due to the Slat. After all such increments have been removed there remains a Basic Wing Weight. The equation presented in paragraph 1 represents the weight of such a Basic wing. The degree of correspondence between the weights produced by the equation and a number of Actual Wing Weights is indicated by the plot on page 24.

In using the equation to estimate the weight of a slab wing with no Ailerons, Slats, Flaps, Folding Provisions, Heated Leading Edges, etc, a value of $S_w = 1.0$ would be used. To account for the inclusion of such items or for special design features, positive or negative increments must be added to the value 1.0. Table 1 shows the increments added to the basic value 1.0 to produce the estimate of wing weight for the airplane design which is the subject of this report.

TABLE 1
WING WEIGHT INCREMENTS

Basic		1.000	
		See Part I Paragraph	
Increments			
Spoilers		+	.130
Trailing Edge		+	.040
Folding Tips and Provisions		+	.030
Additional Landing Gear Provisions	1	+	.020
Tab		+	.012
Delete Wing Center Section & Attach Prov.	2	-	.118
Three Spar Multi-Rib Type Construction	3	-	.300
Stressed Access Covers	4	-	.005

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TABLE 1 (CONT'D)

	See Part X Paragraph		
Increments (Cont'd)			
High Strength Alloys	5	- .040	
Temperature Penalty - Secondary Structure	6	+ .030	
Additional Matl. for Torsional Stiffness		+ .013	
The Value of δ_w			.812

4. The Numerical Values assigned to the Variables.

In the estimation process which produced the wing weight shown in this report the values assigned to the variables in the equation were those listed below.

- $\delta_w = .812$
 $C = .0282$
 $G = 201100$ pounds.
 $N = 2.0$
 $S = 6396$ square feet.
 $R = .6780$
 $J = .4894$
 $\lambda = .1758$
 $b = 65.85$ feet.
 $\sigma = 1.0$
 $K = .9067$
 $t = .03$
 $P = 16935$ pounds per foot.
 $J' = .6686$
 $\tau = 2.0938$
 $\Lambda = 65.13$ degrees.
 $r = 4.1355$
 $\Omega = 24343$ pounds.

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$\omega = 2053$ pounds.

$J'' = .4910$

$f = 20830$ pounds per square inch.

$J = .48938$

$\gamma = 3.0$

$\phi_N = 1.0393$

$T = 1963.5$

PART III. HORIZONTAL TAIL WEIGHT.

1. Horizontal Tail Weight Equation.

$$W_H = \delta_N \left[41.5 C T L^{1/4} S^{3/4} + \frac{R^{3/2} S^{1/2} T L J}{8.00 K f t \cos^2 \Lambda (1 - .2 \sin \Lambda)} \right] \phi_N$$

2. Definitions of Symbols.

W_H = Horizontal Tail Weight in pounds.

δ_N = A quantity defined in conjunction with Table 2 page 11.

C = Secondary Structure Factor

$$= .035 - .0327 e^{-.00275 \sqrt{T}}$$

* T_L = Limit critical Horizontal Tail Load, in pounds, for both panels.

* The horizontal tail weight equation has been modified for a factor of safety of 1.25.

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S = Horizontal Tail Area in square feet.

- (a) If S is Gross Horizontal Tail Area, then the value of δ_H for a Basic Slab Tail is 1.0
- (b) If S is Exposed Horizontal Tail Area, then the value of δ_H for a Basic Slab Tail is 1.1.

AR = The Aerodynamic Aspect Ratio of the Horizontal Tail corresponding to S .

$$S = \int_0^1 \frac{[3\lambda + u(1-\lambda)]u^2}{[\lambda\sigma + u(1-\lambda\sigma)]} du$$

λ = Planform Taper Ratio

$$= \frac{C_t}{C_r} = \frac{\text{Tip Chord in Inches}}{\text{Root Chord in Inches}}$$

$$u = \beta / (b/2)$$

β = Any arbitrary point along the Semi-Span of the Horizontal Tail.

b = Horizontal Tail Span in the same units of length as those used in expressing β . The value of must correspond to S .

σ = Thickness Taper Ratio

$$= \frac{t_t}{t_r} = \frac{\text{Tip Thickness in Percent of Chord.}}{\text{Root Thickness in Percent of Chord.}}$$

K = A ratio of two distances which may be defined as:

- (a) The distance, in feet, from the centroid of the upper cap material to the centroid of the lower cap material.
- (b) The maximum depth, in feet, of the airfoil section

The ratio is produced by dividing the distance defined in (a) by the distance defined in (b). The numerical value may be computed by the equation below.

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$$K = .92 - \frac{R^{1/2}(1+\lambda)}{5^{1/2}t(1+\lambda_0)} (.0333 + .000004 P^{3/4})$$

t = The Root Airfoil Thickness Ratio, in the Streamline.

P = The Average Unit Surface Loading, in pounds per foot. caused by bending.

$$= \frac{R^{3/2}(1+\lambda)\pi J'}{17.665^{1/2}t\tau \cos \Lambda}$$

$$J' = \int_0^1 \frac{u^2 [3\lambda + u(1-\lambda)]}{[\lambda_0 + u(1-\lambda_0)][\lambda + u(1-\lambda)]} du$$

τ = Structural Chord Factor.

$$= \frac{\cos \Lambda}{1 - .2r \sin \Lambda \cos \Lambda [1 + .2r \sin \Lambda \cos \Lambda]}$$

Λ = The angle of sweep of the 40% chord line of the Horizontal Tail.

r = The rate of taper of the Horizontal Tail.

$$= \frac{4(1-\lambda)}{R(1+\lambda)}$$

f = The average allowable bending stress in pounds per square inch (Aluminum Structure)

$$= \frac{P}{.500 + (1.85 \times 10^{-9})P}$$

$$\phi_H = \frac{11.797}{(\tau - 1900) \cdot 596}$$

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T = The date of the weighing of the first airplane of the type. The dates are expressed as years and tenths of years.

3. The Meaning of δ_H .

The Horizontal Tail Weight Equation is essentially the same as the Wing Weight Equation. The meaning of δ_H is intrinsically the same as that of δ_W . It relates the mathematical model to physical reality. The numerical value of δ_H is computed as shown on Table 2.

TABLE 2

HORIZONTAL TAIL WEIGHT INCREMENTS

Basic			1.100
	See Part X Paragraph		
Increments			
Full Depth Honeycomb Type Construction	7	- .160	
Transfer of Fitting to Fuselage		- .120	
High Strength Alloys	5	- .080	
Temperature Penalty - Primary Structure	8	+ .050	
Temperature Penalty - Secondary Structure	6	+ .072	
Simplified Spindle Provisions		- .122	
Transfer Fairing to Fuselage		- .120	
The Value of δ_H			.620

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4. The Numerical Values Assigned to the Variables.

In the estimation process which produced the Horizontal Tail weight shown in this report the values assigned to the variables in the equation were those listed below.

δ_N = .620
 C = .0209
 π = 93360 pounds.
 S = 435 square feet.
 R = 1.439
 J = .5335
 λ = .2321
 b = 25.02 feet.
 σ = 1.0
 K = .8418
 t = .03
 D = 25158 pounds per foot.
 J' = .7262
 τ = 1.0716
 A = 46.1 degrees.
 r = 1.7324
 f = 26060 pounds per square inch.
 ρ_N = .9933
 T = 1963.5

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PART IV. VERTICAL TAIL WEIGHT

1. Vertical Tail Weight Equation.

$$W_v = \delta_v \left[83.0 C \pi^{1/4} S^{3/4} + \frac{R^{3/2} S^{1/2} \pi J}{K_f t \cos^2 \Lambda (1 - .2 \sin \Lambda)} \right] \phi_v$$

2. Definitions of Symbols.

W_v = Vertical Tail Weight in pounds.

δ_v = A quantity defined in conjunction with Table 3 page 16.

C = Secondary Structure Factor

$$= .035 - .0327 e^{-.00390 \sqrt{\pi}}$$

* π = Limit critical Vertical Tail Load in pounds.

S = Vertical Tail Area in square feet.

R = The Aerodynamic Aspect Ratio of the Vertical Tail.

$$J = \int_0^1 \frac{[3\lambda + u(1-\lambda)]u^2}{[\lambda\sigma + u(1-\lambda\sigma)]} du$$

λ = Planform Taper Ratio

$$= \frac{C_t}{C_r} = \frac{\text{Tip Chord in Inches.}}{\text{Root Chord in Inches.}}$$

$$u = \beta / (b/2)$$

* The vertical tail weight equation has been modified for a factor of safety of 1.25

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β - Any arbitrary point along the Semi-Span of the Vertical Tail.

b - Horizontal Span in the same units of length as those used in expressing β . This quantity is approximately twice the distance from the tip to the point of attachment to the fuselage.

σ - Thickness Taper Ratio

$\frac{t_t}{t_r}$ - Tip Thickness in Percent of Chord.
Root Thickness in Percent of Chord.

K - A ratio of two distances which may be defined as:

(a) The distance, in feet, from the centroid of the upper cap material to the centroid of the lower cap material.

(b) The maximum depth, in feet, of the airfoil section.

The ratio is produced by dividing the distance defined in (a) by the distance defined in (b). The numerical value may be computed by the equation below.

$$K = .92 - \frac{R^{1/2}(1+\lambda)}{S^{1/2}t(1+\lambda\sigma)} (.0333 + .000004 P^{3/4})$$

t - The Root Airfoil Thickness Ratio, in the Streamline.

P - The Average Unit Surface Loading, in pounds per foot, caused by bending.

$$= \frac{R^{3/2}(1+\lambda)\pi J'}{8.832 S^{1/2} t \tau \cos \Lambda}$$

$$J' = \int_0^1 \frac{u^2 [3\lambda + u(1-\lambda)]}{[\lambda\sigma + u(1-\lambda\sigma)][\lambda + u(1-\lambda)]} du$$

τ - Structural Chord Factor.

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$$\tau = \frac{\cos \Lambda}{1 - .2r \sin \Lambda \cos \Lambda [1 + 1.2r \sin \Lambda \cos \Lambda]}$$

Λ = The angle of sweep of the 40% chord line of the Vertical Tail.

r = The rate of taper of the Vertical Tail.

$$= \frac{2(1-\lambda)}{R(1+\lambda)}$$

f = The average allowable bending stress in pounds per square inch (Aluminum Structure)

$$= \frac{P}{.500 + (1.85 \times 10^{-5})P}$$

$$\phi_v = \frac{18.843}{(T-1900) \cdot 286}$$

T = The date of the weighing of the first airplane of the type. The dates are expressed as years and tenths of years.

3. The Meaning of δ_v .

The Vertical Tail Weight Equation is essentially the same as the Wing Weight Equation. The meaning of δ_v is intrinsically the same as that of δ_w . It relates the mathematical model to physical reality. The numerical value of δ_v is computed as shown on Table 3.

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TABLE 3

VERTICAL TAIL WEIGHT INCREMENTS

Basic			1.000
	See Part X Paragraph		
Increments			
Full Depth Honeycomb Type Construction	7	-.100	
Balance Weights		+.157	
Temperature Penalty - Secondary Structure	6	+.066	
Additional Matl. for Torsional Stiffness		+.187	
The Value of δ_v			1.310

NOTE: The value of δ_v as noted in Table 3 applies to one vertical. It must be doubled for two. The value given below is 2.620 since there are two vertical surfaces.

4. The Numerical Values assigned to the Variables.

In the estimation process which produced the Vertical Tail weight shown in this report the values assigned to the variables in the equation were those listed below.

$$\delta_v = 2.620$$

$$C = .0132$$

$$TL = 10660 \text{ pounds.}$$

$$S = 250 \text{ square feet.}$$

$$AR = .9064$$

$$J = .4290$$

$$\lambda = .1034$$

$$b = 15.03 \text{ feet.}$$

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$\sigma = 1.0$
 $K = .8481$
 $l = .03$
 $P = 5830$ pounds per foot.
 $J' = .6120$
 $\tau = 1.1066$
 $A = 45.97$ degrees
 $r = 1.7929$
 $f = 9590$ pounds per square inch.
 $\phi_v = .4759$
 $T = 1963.5$

PART V. FUSELAGE GROUP WEIGHT.

1. Fuselage Weight Equation.

$$W_F = \delta_F \left[\xi (S_F + S_C)^{7/8} G^{3/8} V^{3/8} N^{3/16} x \right. \\ \left. (E^{1/8} + e^{-100E}) \right] \left[\eta + .01 \left(\frac{L}{D} \right)^{3/2} \right]^{1/2} \phi_F$$

2. Definitions of Symbols.

W_F = Fuselage Group Weight in pounds.

δ_F = A quantity defined in conjunction with Table 4 page 19.

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- β = .013 For aircraft having engines within the Fuselage Mold Line.
- = .010 For aircraft having no engines within the Fuselage Mold Line.
- S_F = Net Fuselage Surface Area in square feet.
- S_c = Canopy Surface Area in square feet.
- G = Design Gross Weight for Stress Analysis expressed in pounds.
- V = The speed, in knots, at sea level that corresponds to a particular value of q , q being dynamic pressure in pounds per square foot. The particular value of q is the design q of the airplane regardless of the altitude at which it occurs.
- N = The Ultimate Positive Maneuvering Load Factor corresponding to the Design Gross Weight for Stress Analysis. (The factor of safety for this airplane is 1.25)
- E = An integer expressing the number of engines housed within the Fuselage Mold Line.
- η = .80 For aircraft having engines within the Fuselage Mold Line.
- = .75 For aircraft having no engines within the Fuselage Mold Line.
- L = The Fuselage length in feet.
- D = The Fuselage mean diameter * at the maximum section. The mean diameter is expressed in feet.
- T = The date of the first weighing of the first airplane of the type. The dates are expressed as years and tenths of years.

$$q_F = \frac{2.307}{(T-1900) \cdot 234}$$

* The Mean Diameter is defined as:

$$\frac{\text{Maximum Width} + \text{Maximum Depth}}{2}$$

2

The Width and the Depth occur at the same section.

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3. The Meaning of δ_F .

The meaning of δ_F is essentially the same as that of δ_w . It provides an adjustment to the equation defining the weight of a basic fuselage to compensate for design features, variations in design practice, etc. In so doing it causes the equation to describe the piece of hardware under consideration. The numerical value of δ_F is computed as shown in Table 4.

TABLE 4
FUSELAGE WEIGHT INCREMENTS

Basic			1.000
	See Part I Paragraph		
Increments			
Wing Moment Carry thru Structure	2	+ .133	
Transfer of Empennage Figs to Fuselage		+ .011	
Baffles & Seals for Equipment Bay Cooling		+ .025	
Temperature Affects for Canopy	9	+ .030	
High Strength Alloys	5	- .060	
Stressed Access Covers & Doors	4	- .100	
Temperature Affects for Primary Structure	8	+ .170	
Transfer of Horiz. Tail Fairing to Fuselage		+ .010	
Fuselage Reallocated to Air Intake Ducts		- .195	
Fuselage Shape Coefficient	10	+ .185	
The Value of δ_F			1.209

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4. The Numerical Values Assigned to the Variables.

In the estimation process which produced the Fuselage Weight shown in this report the values assigned to the variables were those listed below.

$$\begin{aligned}
 \delta_F &= 1.209 \\
 \xi &= .010 \\
 S_F &= 7058 \quad \text{square feet.} \\
 S_c &= 75 \quad \text{square feet.} \\
 G &= 179196 \quad \text{pounds.} \\
 V &= 665 \quad \text{knots.} \\
 N &= 2.0 \\
 E &= 0 \\
 \eta &= .75 \\
 L &= 165 \quad \text{feet.} \\
 D &= 21.17 \quad \text{feet.} \\
 T &= 1963.5 \\
 \varphi_F &= .8779
 \end{aligned}$$

PART VI. LANDING GEAR GROUP WEIGHT.

1. Landing Gear Weight Equation.

$$W_g = [\delta_g \varphi_g + v] \left[.14 e^{.0716 \mu} \Gamma^{2/3} \right] \varphi_g$$

2. Definitions of Symbols.

- W_g = Landing Gear Group Weight in pounds.
 δ_g = A quantity defined in conjunction with Table 5, page 21.

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$$\nu = \frac{135599}{(T-1900)^{2.304}}$$

= .15 for any aircraft other than those falling into the category specified above.

μ = The length of the Main Gear Strut measured from the center line of the trunnion to the center line of the axle with the Strut extended. The length is expressed in feet.

Γ = The Design Landing Weight in pounds.

T = The date of the first weighing of the first airplane of the type. The dates are expressed as years and tenths of years.

$$\phi_g = \frac{11.743}{(T-1900)^{.634}}$$

3. The Meaning of δ_g

The meaning of δ_g is essentially the same as that of δ_w . It provides an adjustment to the equation defining the weight of a Basic Landing Gear to compensate for design features, variations in design practice, etc. In so doing it causes the equation to describe the physical item under consideration. The numerical value of δ_g is computed as shown in Table 5.

TABLE 5
LANDING GEAR WEIGHT INCREMENTS

Basic			1.000
	See Part I Paragraph		
Increments			
Wing Lift Relief	11	- .100	
Bogie Type Gear		+ .100	
Temperature Affects	12	+ .053	
High Strength Alloys	5	- .060	
Reduced Sink Speed	13	- .033	
The Value of δ_g			.960

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4. The Numerical Values Assigned to the Variables.

In the estimation process which produces the Landing Gear Weight shown in this report the values assigned to the variables were those listed below.

$$\delta_g = .960$$

$$\nu = .150$$

$$\mu = 12.5 \text{ feet.}$$

$$\Gamma = 160227 \text{ pounds.}$$

$$T = 1963.5$$

$$g_g = .8455$$

PART VII. ENGINE SECTION WEIGHT.

The weight allowance for the Engine Section was selected by comparison with a series of comparable items for jet aircraft.

APPENDIX I

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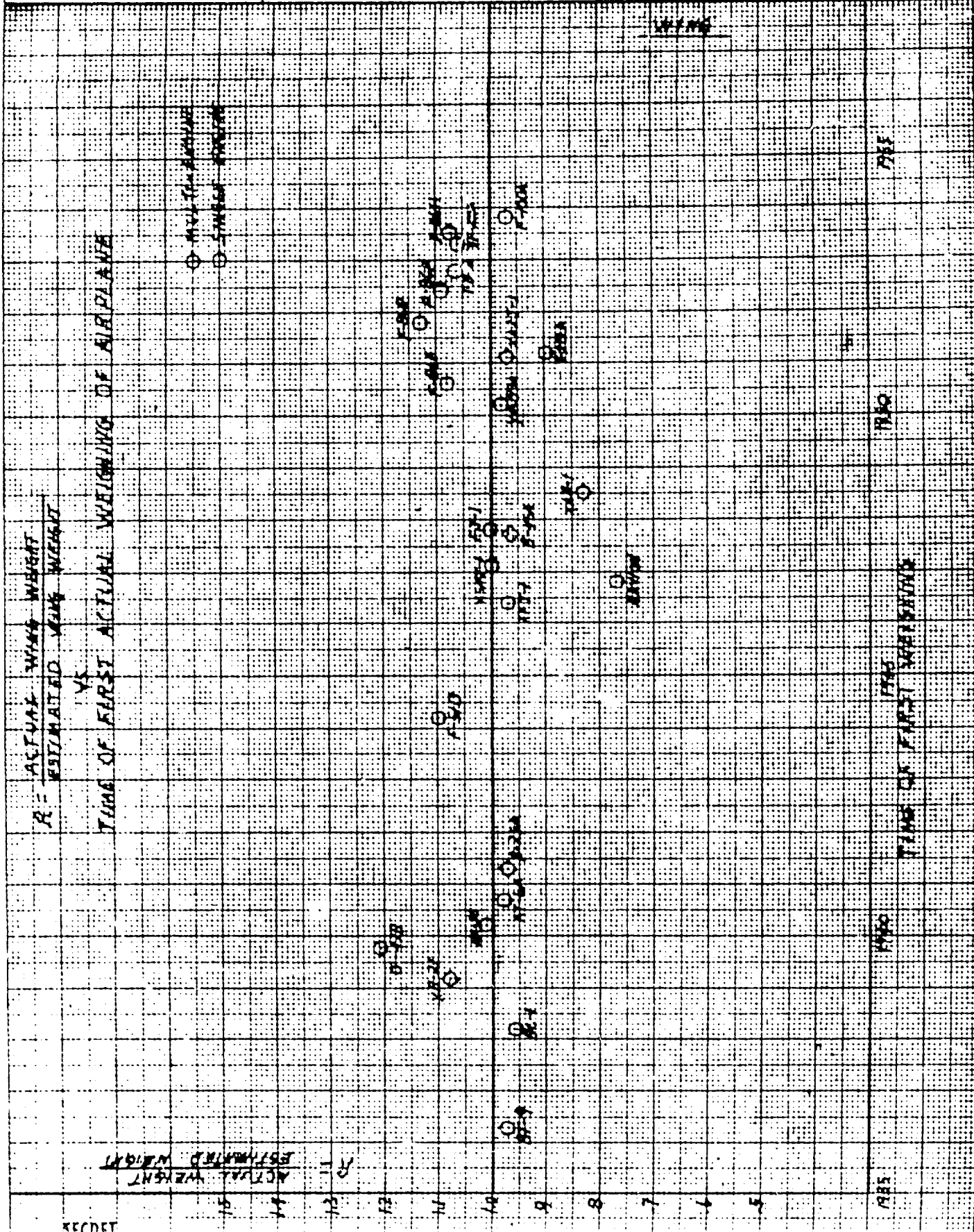
PAGE VIII. COMPARISON OF ACTUAL WEIGHT DATA WITH ESTIMATES
PRODUCED BY THE METHOD PRESENTED IN THIS SECTION.

A set of graphs is presented in this part of the report that give an indication of the performance of the estimation method. There is a graph corresponding to each equation and one corresponding to the sum of all of the equations. The graphs show a series of points representing ratios. The points fall about a line representing the value 1.0. If the estimation method provided an absolutely accurate description of the structural unit, the ratio of the actual weight to the estimated weight represented by the points would be unity in all cases. Since the ratio differs from unity the scatter shown on any graph is an indication of the ability of the corresponding equation to provide an approximation of physical reality.

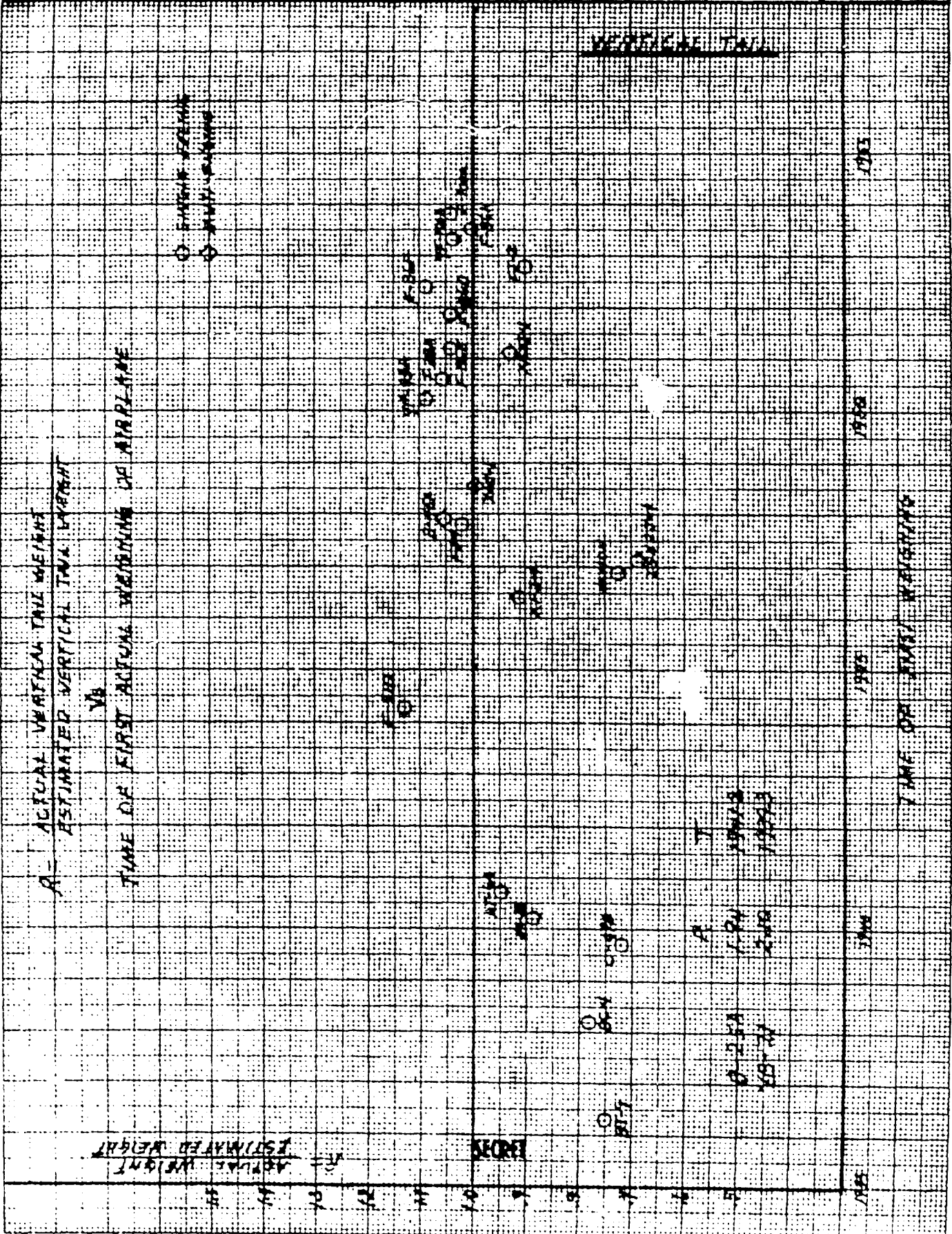
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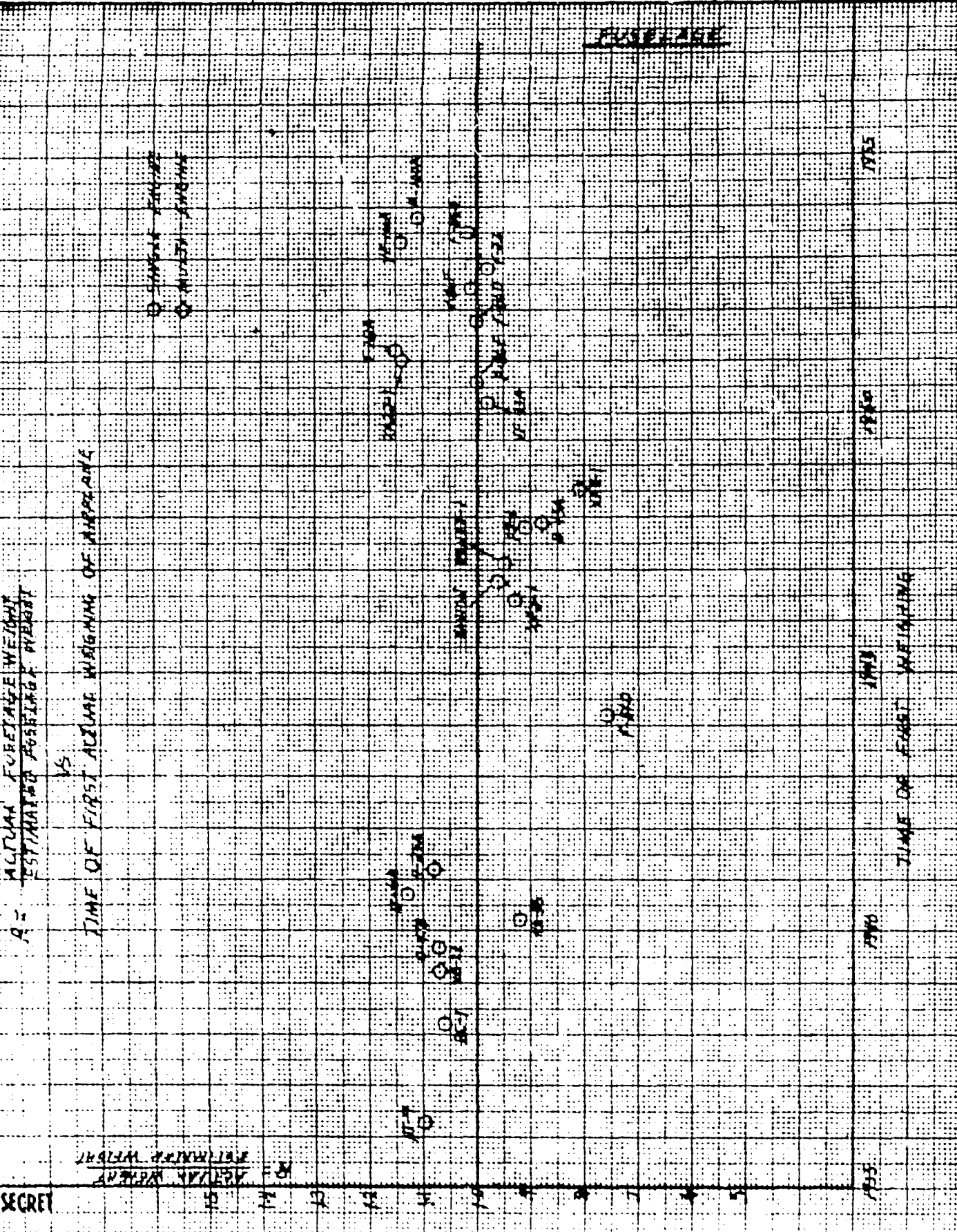
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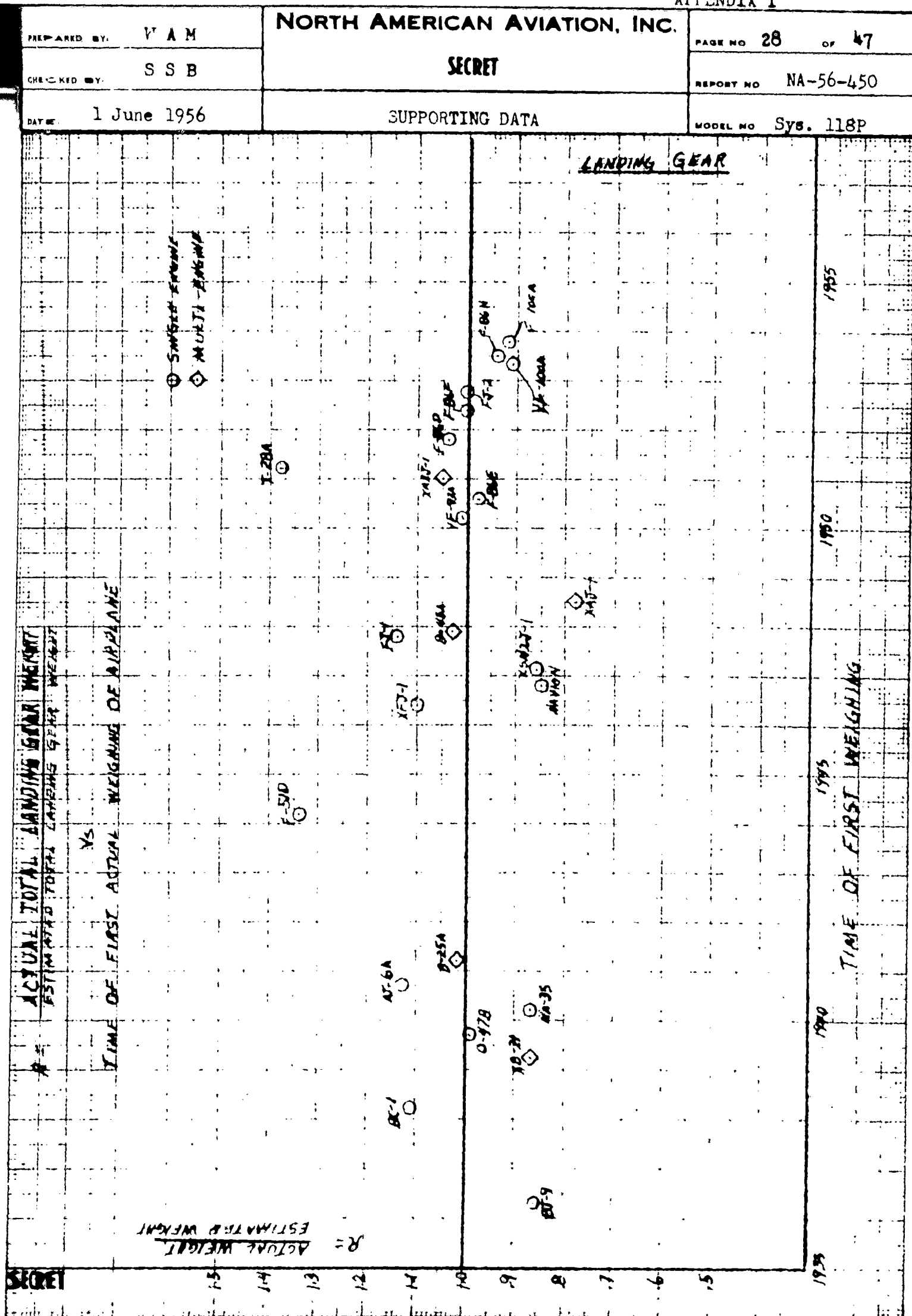
PREPARED BY: V A V	NORTH AMERICAN AVIATION, INC.	PAGE NO 26 OF 47
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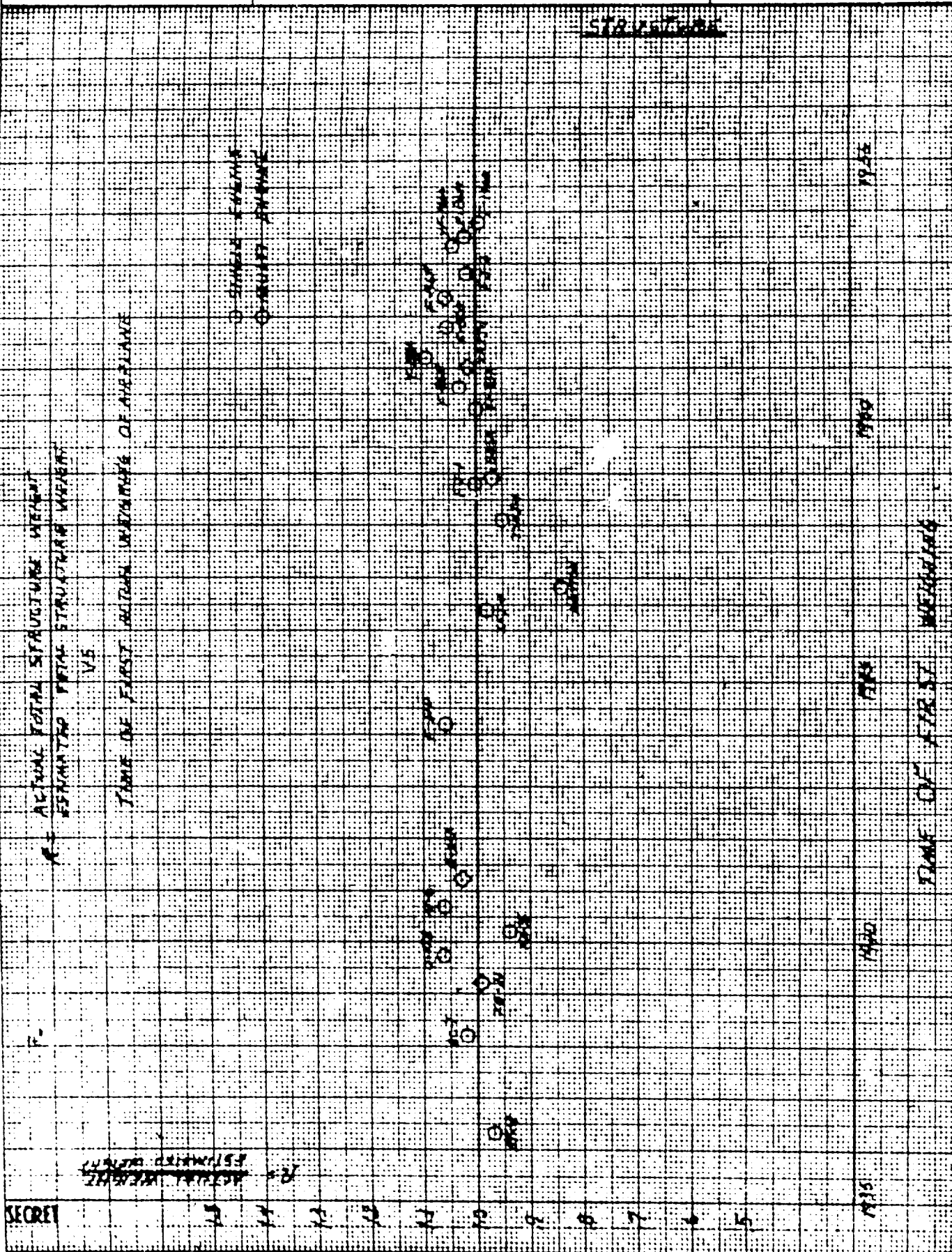


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LOS ANGELES 45 CALIFORNIA

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PART IX. GENERAL CURVES.

Some of the variables appearing in the basic weight equations are defined by mathematical expressions. Graphs of some of the more complicated functions have been plotted and are presented in this part of the report. The graphs presented are listed below:

- (a) C vs $GN \times 10^{-6}$
- (b) r vs R
- (c) T vs Λ
- (d) f vs P
- (e) J vs λ
- (f) J' vs λ
- (g) J'' vs λ
- (h) J''' vs λ

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SECONDARY STRUCTURE FACTOR

$\sqrt{0.0171}$

$C_1 = 0.35 - 0.327$



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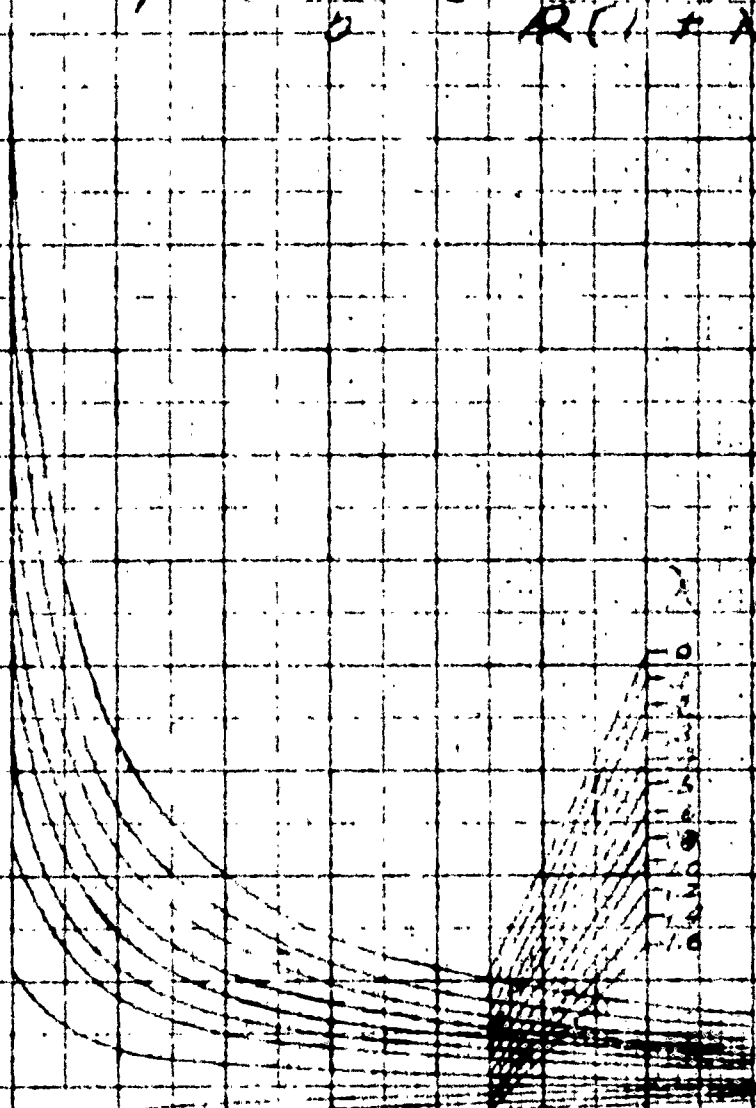
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RATE OF TAPER

$$r = \frac{4C}{D} = \frac{4(1-\lambda)}{R(1+\lambda)}$$

RATE OF TAPER
(C)

1.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
8
6
4
2
0
-2
-4
-6
-8
-1.0



ASPECT RATIO
(A)

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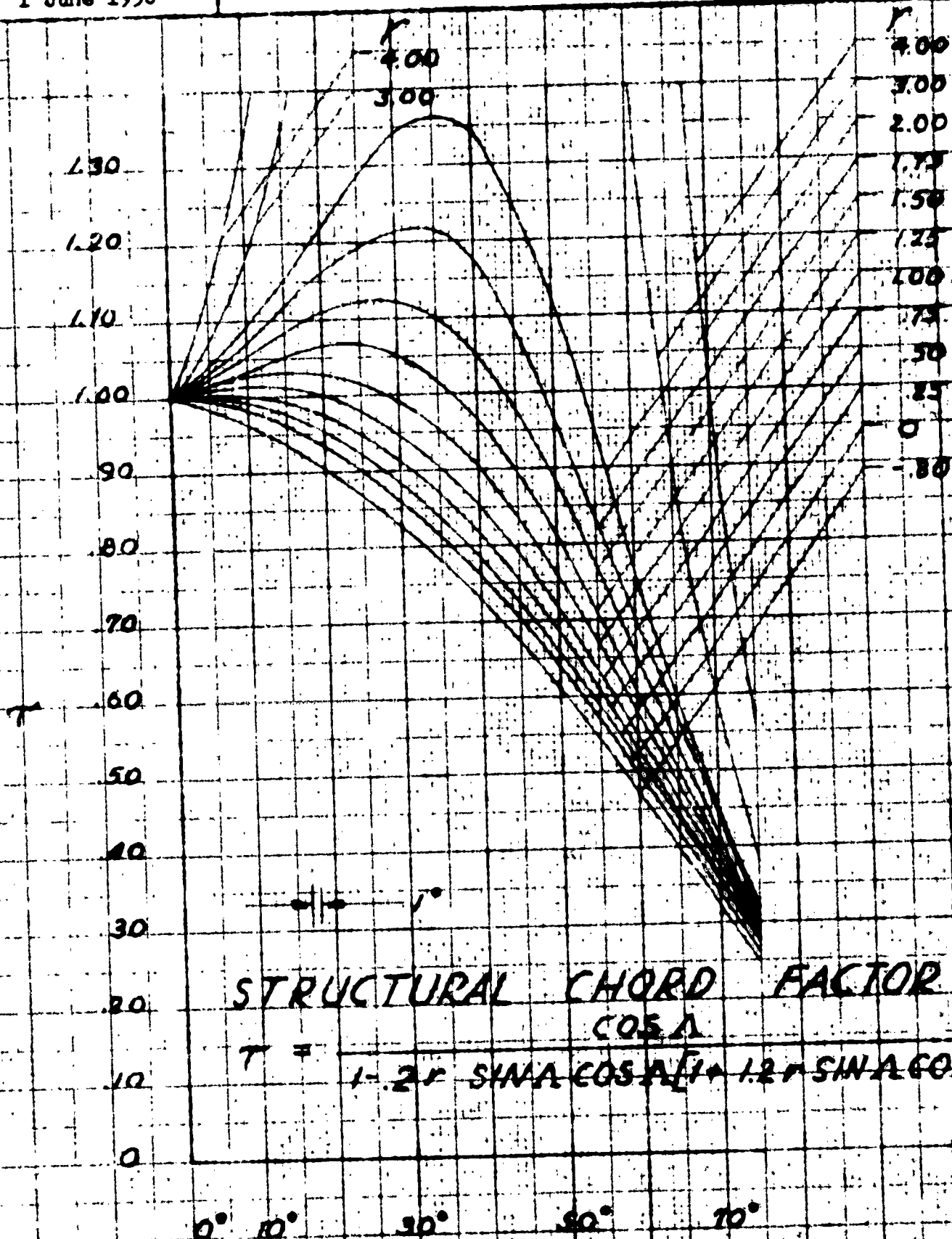
REPORT NO. NA-56-450

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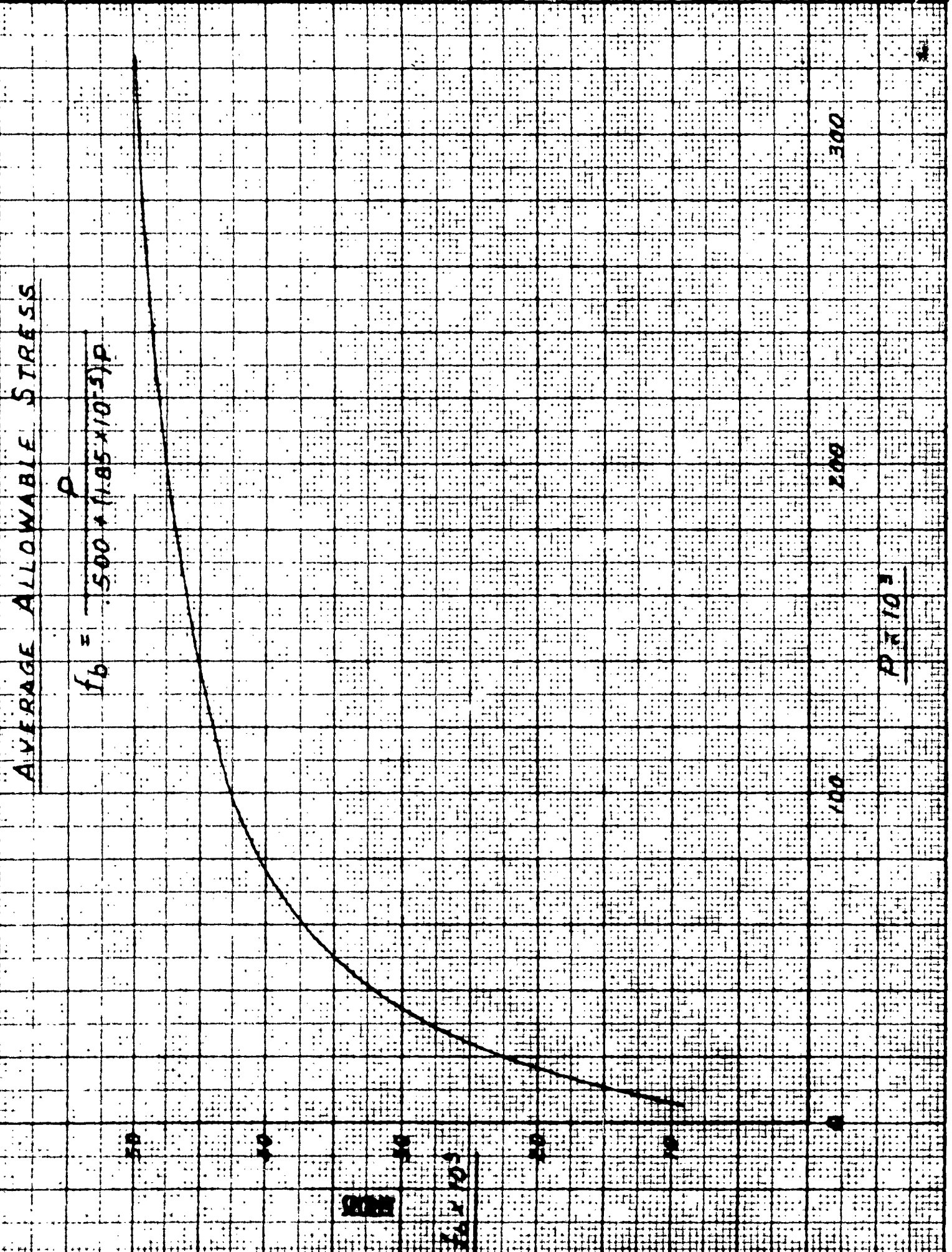
DATE 1 June 1956

SUPPORTING DATA

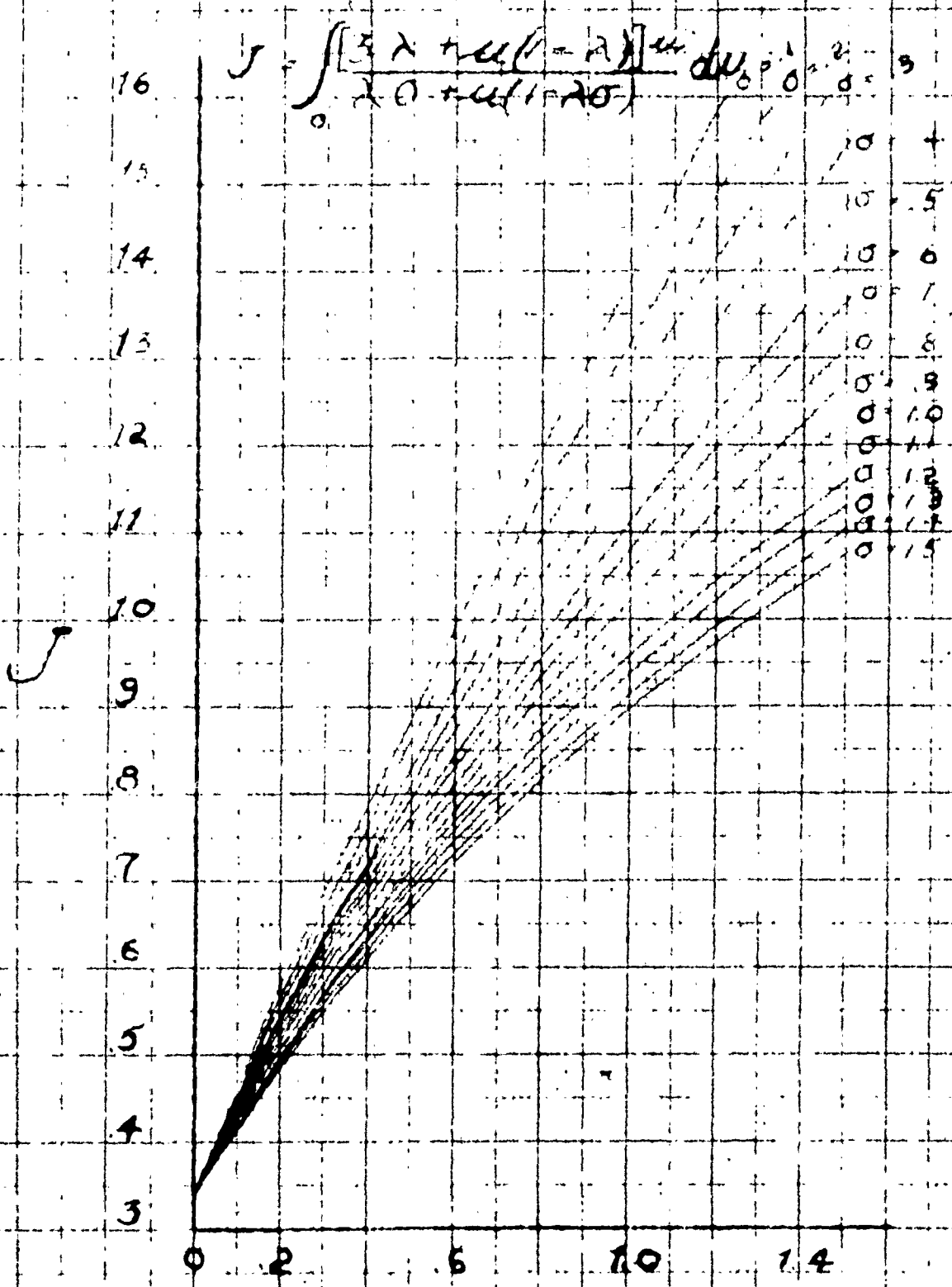
STRUCTURAL CHORD FACTOR
 $T = \frac{\cos A}{1 - 2r \sin A \cos A [1 + 1.2r \sin A \cos A]}$ ANGLE OF SWEEP @ 10% CHORD (A_{10})

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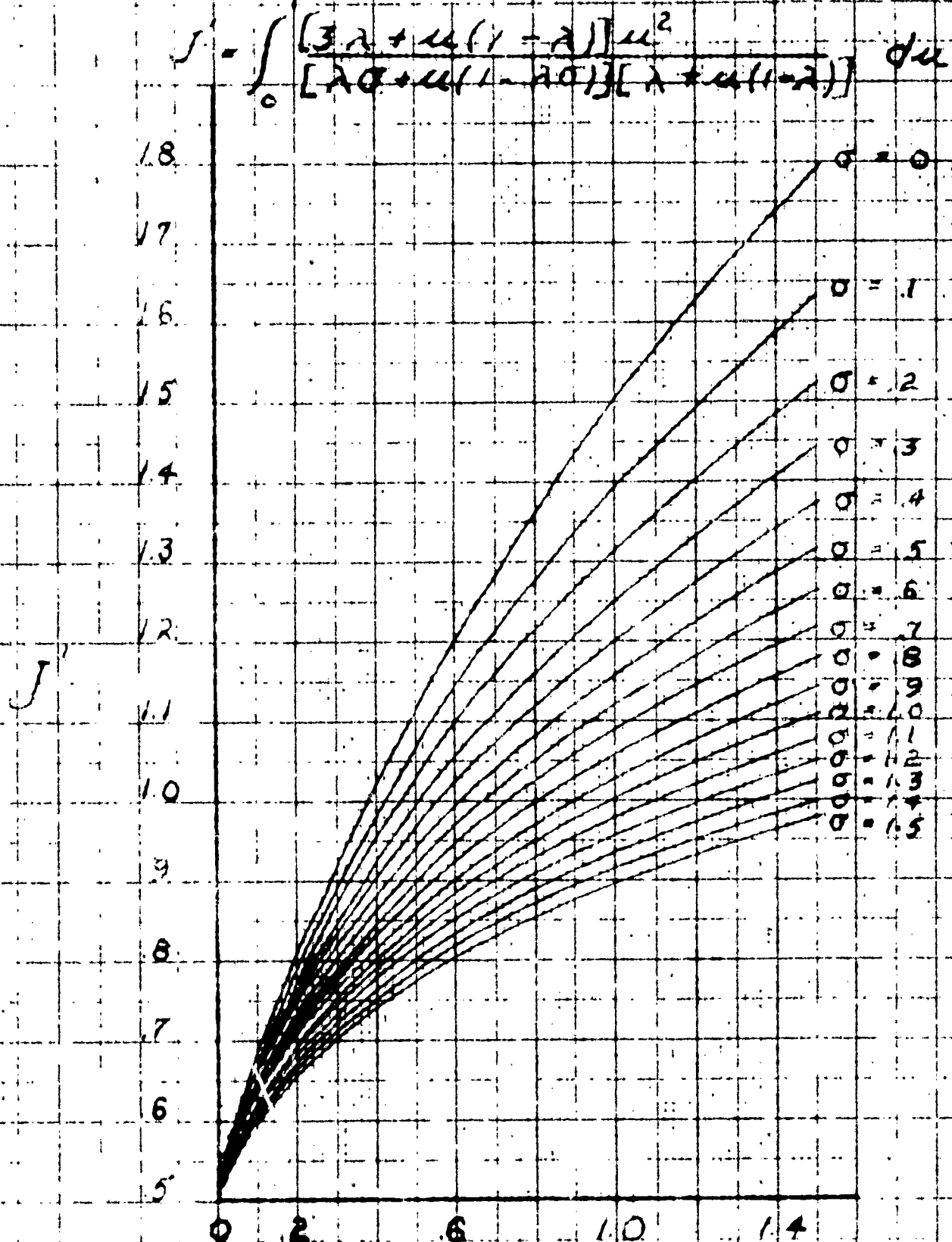


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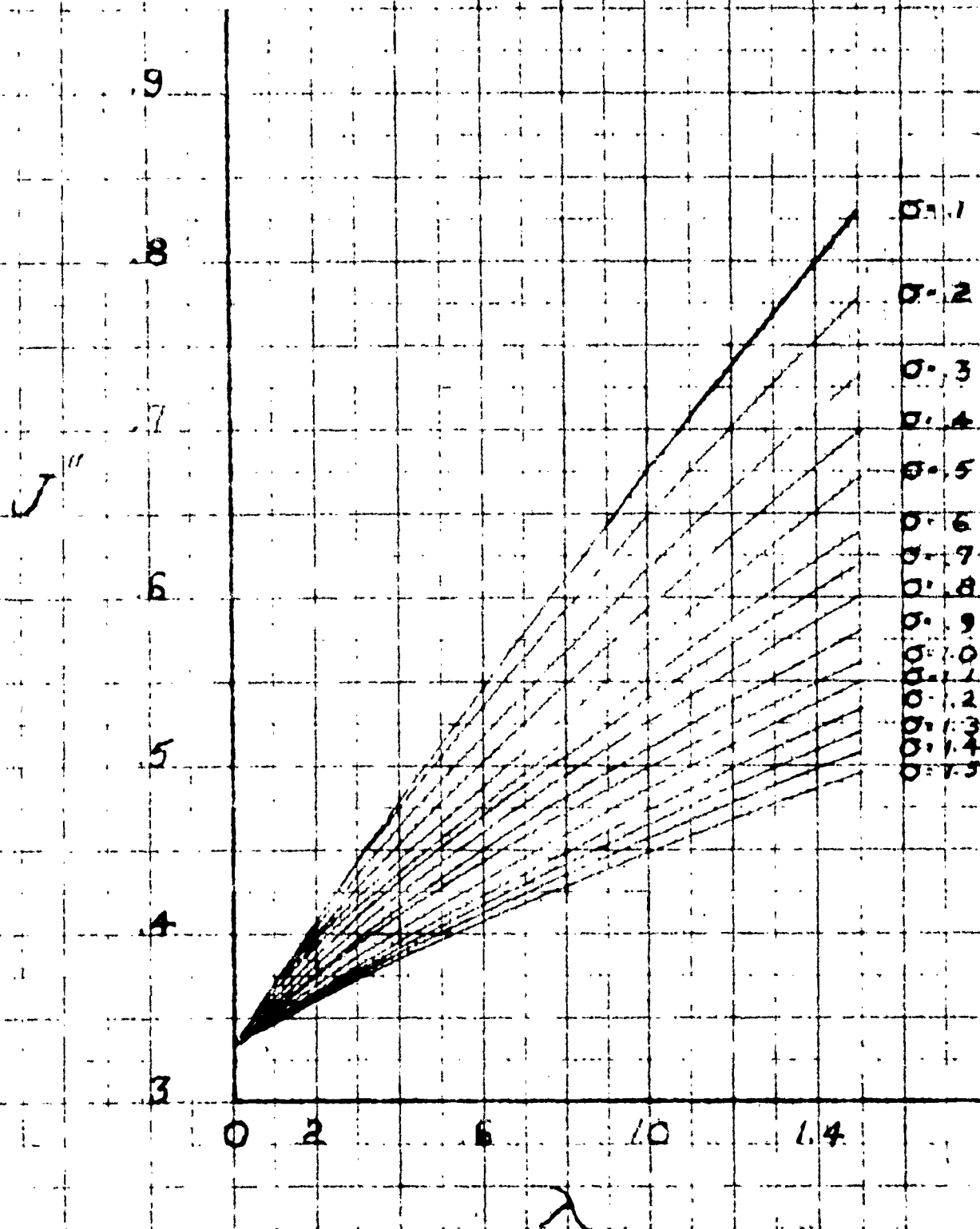


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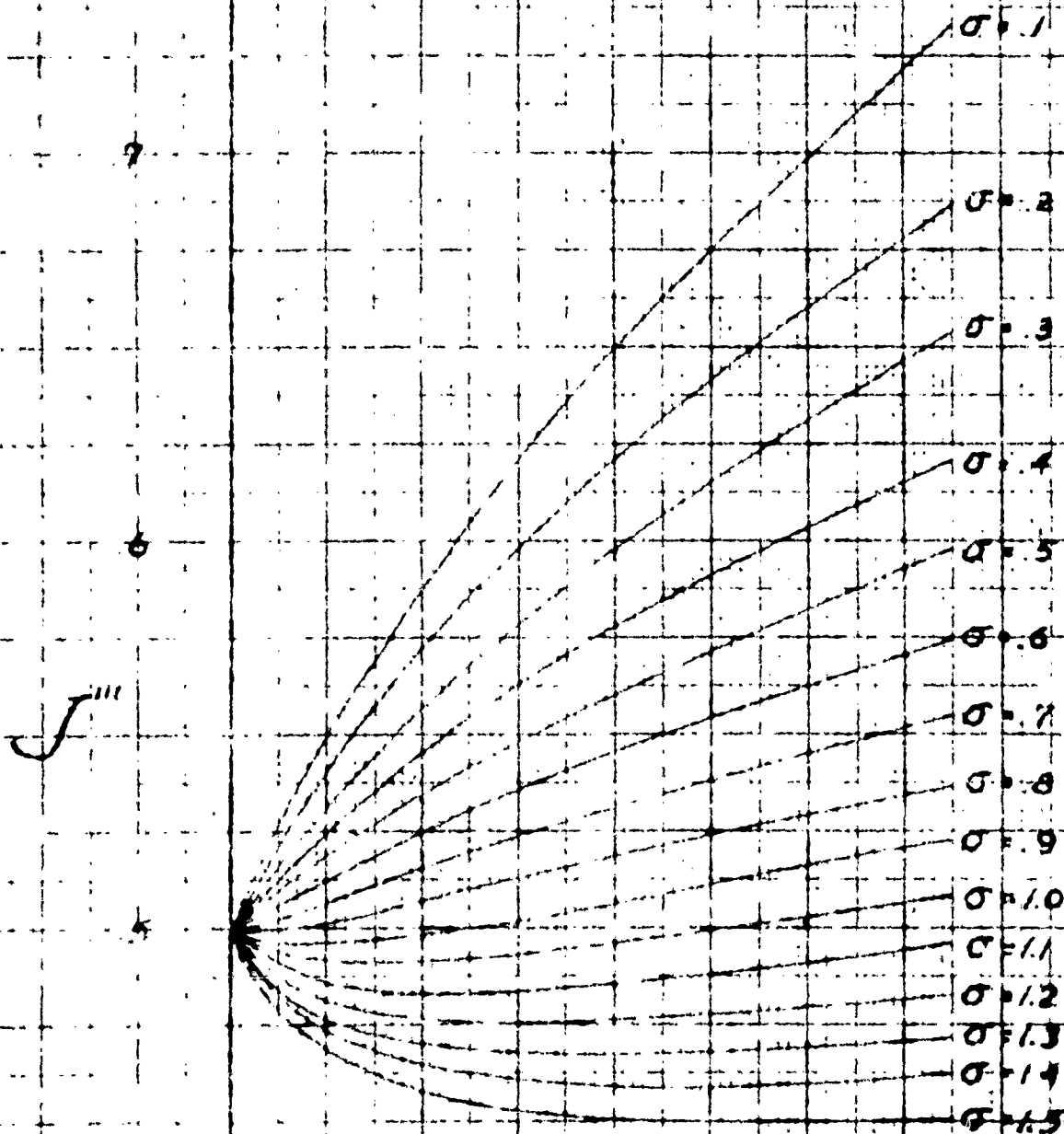
$$J'' = \int_0^1 \frac{u \left[\frac{\lambda}{5} + u \left(1 - \frac{\lambda}{5} \right) \right]}{[\lambda_0 + u(1 - \lambda_0)]} du$$



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$$\int_0^1 \frac{u^2 \left[\frac{5\lambda}{5} + u(1-\lambda) \right]}{[\lambda + u(1-\lambda)][\lambda + u(1-\lambda)]} du$$



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PART X REMARKS SECTION

Introduction - In the body of this substantiation a set of coefficients have been established. The purpose of the coefficients is to provide a relationship between the mathematical model and a set of real airplanes. The reference set differs somewhat from projected aircraft such as the Weapons System 118P. The increments that have been applied to the basic coefficients to compensate for change in requirements and in technology are explained in this section.

1. Additional Landing Gear Provisions (See Table 1 Page 6)
Additional structure is required to provide adequate load path to the landing gear support structure.
2. Delete Wing Center Section and Attach Provisions (See Table 1 Page 6)
The wing center section for this airplane is an integral part of the fuselage. Because of the unusually high fuselage width to wing span relationship it was found that the existing fuselage frames could be modified to efficiently provide adequate load path for wing bending moments. Therefore, an increment for the center section is deleted for reallocation to the Fuselage Group.
3. Three Spar Multi-Rib Type Construction (See Table 1 Page 6)
A relatively low wing loading obtained for this configuration dictates the use of minimum skin gages from a strength standpoint. Since thin skinplates are not efficient in bending it was deemed advisable to provide adequate bending strength through the use of three spar multi-rib type construction. Although torsional rigidity and wing stiffness from a flutter aspect required an increase in skin gage, the three spar multi-rib type construction is the lightest weight internal arrangement for the wing. Reference Report No. NA-56-424.
4. Stressed Access Covers (See Table 1 Page 6)
In the interest of obtaining the lightest structural weight for this airplane, a deviation from the normal practice of providing as much accessibility to equipment as possible is made. The number of doors permitted for this configuration will be kept to an absolute minimum. In addition, doors that are of the readily removable non-structural type, are to be replaced by the structural load carrying access type door. A weight increment is deleted for minimizing the number of doors and for the inclusion of stressed type access and equipment doors.
5. High Strength Alloys (See Table 1 Page 7)
In making this estimate, the assumption has been made that super high strength materials will be available and used in structural parts subjected to high stress concentrations, and used wherever weight advantage can be gained.

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PART X REMARKS SECTION (CONT'D)

6. Temperature Penalty - Secondary Structure (See Table 1 Page 7)
Stagnation temperatures of approximately 1125° F are expected at the leading edge structures of the wing and empennage. Therefore, an increment is added to account for the drop of material properties at temperature.
7. Full Depth Honeycomb Type Construction (See Table 2 Page 11)
Preliminary studies indicate that the lightest weight internal arrangement for the horizontal and vertical tail is full depth Honeycomb type construction.
8. Temperature Penalty - Primary Structure (See Table 2 Page 11)
Two flight conditions largely instrumental in designing the structural components of this airplane are: A. The subsonic mission (room temperature) at take-off gross weight less 9.6% fuel consumed; and B. The supersonic mission (7500 F) at take-off less 43% fuel consumed. Weight estimates were made with loads, temperatures and material properties compatible with the respective missions. Results indicate that major portions of the wing and vertical tail are critical for the subsonic mission, hence no temperature penalty is incurred. The supersonic mission is critical for the horizontal tail and the fuselage. A temperature penalty for the horizontal tail is caused by the drop of material properties due to a turbulent boundary layer temperature of 750 degrees fahrenheit.
9. Temperature Affect For Canopy (See Table 4 Page 19)
A weight increment is added to account for the use of additional glass required due to the expected elevated temperature at the canopy.
10. Fuselage Shape Coefficient (See Table 4, Page 19)
This increment is added to provide increased stiffness in the relatively flat panels of the fuselage.
11. Wing Lift Relief (See Table 5 Page 21)
In the computation of the loads for landing gears designed by this contractor in the past, no wing lift has been considered. Therefore, the basic formula allows no wing lift. In this study wing lift has been introduced. The resulting decrease in loads has allowed the use of lighter struts.
12. Temperature Effect For Tires (See Table 5 Page 21)
A weight increment is added to account for the use of high heat resistant silicons due to the expected elevated temperature in the wheel wells.
13. Reduced Sink Speed (See Table 5 Page 21)
An increment of weight has been removed for a reduction of airplane sink speed from 9 feet per second to 5.5 feet per second.

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PART XI SUPPLEMENTAL DATA

The data presented in Part XI of this substantiation is in compliance with Dayton Wire 2202, dated 20 March 1956, requesting the inclusion of additional information. The following is a listing of the required information that is either contained in Part XI or shown in the basic part of this report. Some of the data that is requested by the wire is in reports other than the weight report. In that case, the report numbers have been listed. The data has not been duplicated in this report.

- Item 1. Detail Weight Statement
See Pages 10 - 35 of this report
- Item 2. Assumed Basic Loads Curves for the Critical Condition
- Item 3. Dead Weight Distribution Curves
- Item 4. Critical Design Parameters
See Parts I thru VI of this substantiation
- Item 5. Structural Diagram
See Report NA-56-424, Airplane Structure Data for
Reconnaissance Weapons System 118P
- Item 6. Materials and Material Properties
See Report NA-56-424
- Item 7. An explanation of the Assumed Weight Allocations
See Part X of this substantiation

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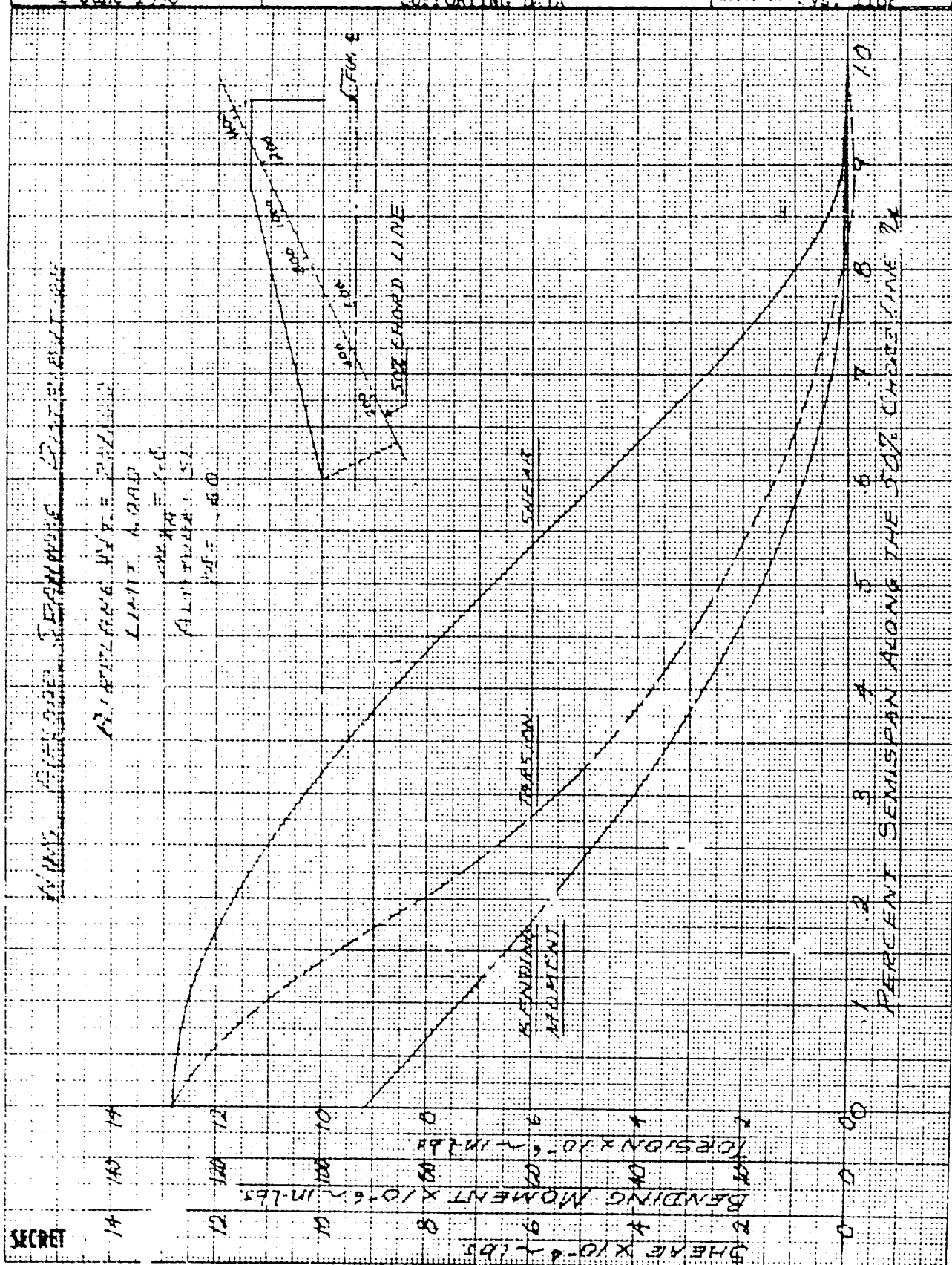
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DATE 1 June 1946

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CANARD AIRFIELD STATIONARY DATA

AIRFIELD STATIONARY DATA

100% CHORD LINE

100% CHORD LINE

100% CHORD LINE

100% CHORD LINE

100% CHORD LINE

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30 6 12

20 4 8

10 2 4

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NORTH AMERICAN AVIATION, INC.

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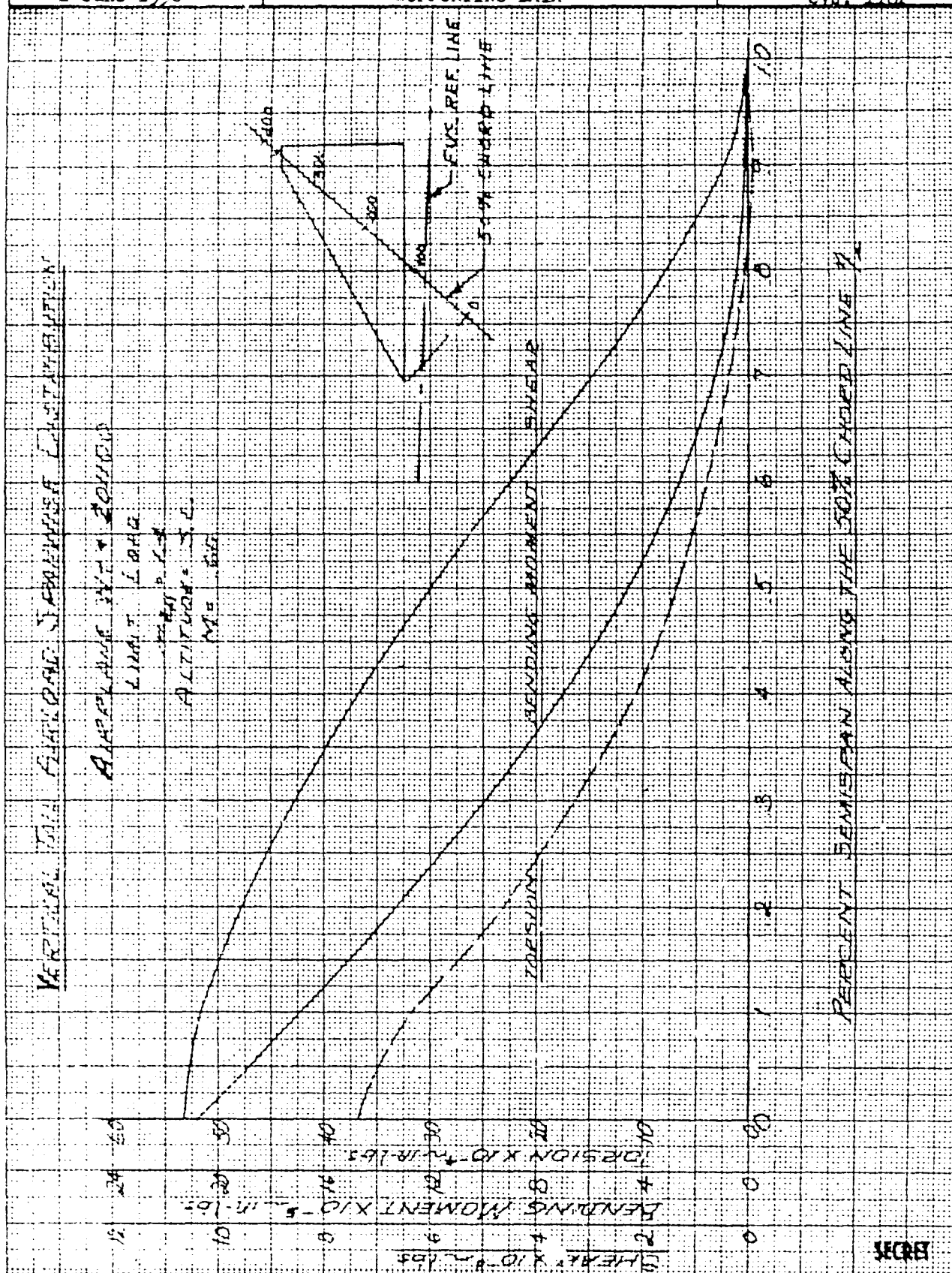
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DATE 1 June 1970

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MOBILE NO 898 118P



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45 4-

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W.A.M.

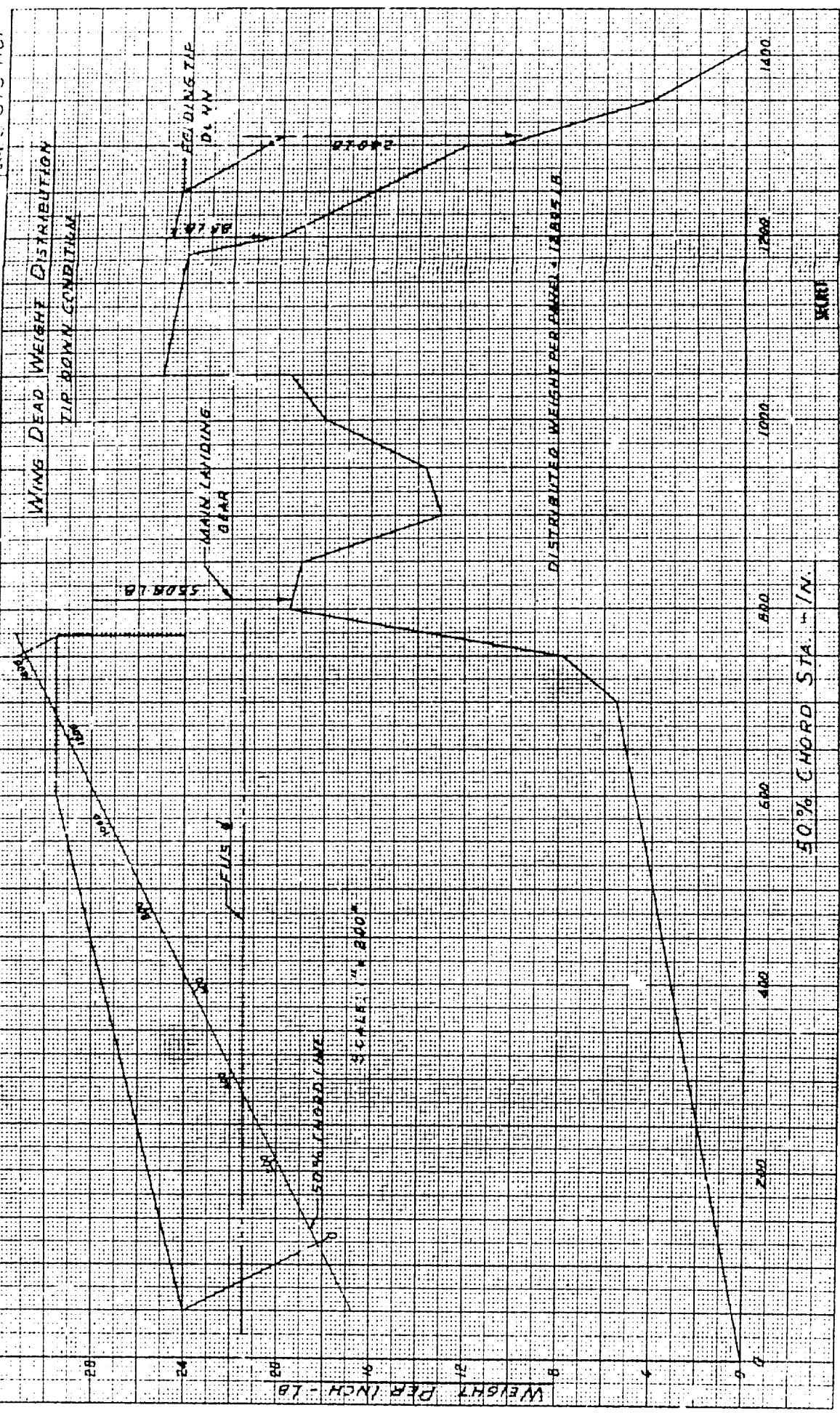
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NOTE: A SINGLE PANEL DISTRIBUTION FOR THE 7-6" CONDITION IS SHOWN



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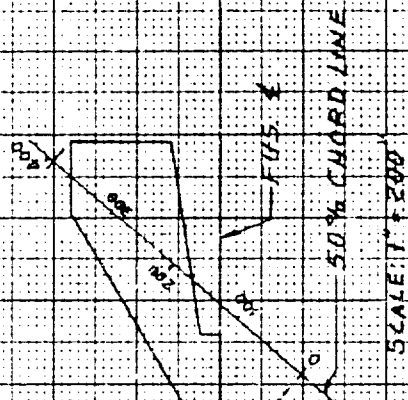
NA-56-450

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HORIZONTAL TAIL DEAD WEIGHT DISTRIBUTION

NOTE: A SINGLE PANEL DISTRIBUTION
FOR THE "LIG" CONDITION IS SHOWN.



$$\frac{W_E}{2} = 700 \text{ LB}$$

WEIGHT PER INCH - LB.

SCALE

400

200

100

0

50% CHORD STA. IN

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APPENDIX I

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Sys. 118P

1 June 1956

VERTICAL TAIL DEAD WEIGHT DISTRIBUTION

NOTE: A SINGLE PANEL DISTRIBUTION
FOR THE "1-G" CONDITION IS SHOWN.

FUS. REF. LINE
50% CHORD LINE
SCALE: 1" = 200"

$\frac{WV}{A} = 820 \text{ LB.}$

50% CHORD STA. - IN.

WEIGHT PER INCH - LB.

56RDZ-6551

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 88TH AIR BASE WING (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE OHIO

5 February 2008

88 CG/SCCMF
3810 Communications Blvd
Wright-Patterson AFB OH 45433-7802

Defense Technical Information Center
Attn: Ms. Kelly Akers (DTIC-R)
8725 John J. Kingman Rd, Suite 0944
Ft Belvoir VA 22060-6218

Dear Ms. Akers

This concerns Technical Report AD158508, Reconnaissance Weapon System 118P Phase 3 (N.A.A. Designation S.O. 2432) 1 Jun 1956.

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Point of contact is Lynn Kane at (937) 522-3091.

Sincerely

A handwritten signature in black ink, reading "Sherree M. Coon", is positioned above the typed name.

SHEREE COON
Freedom of Information Act Manager
Management Services Branch
Base Information Management Division

Attachments

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