RECORD REPRODUCTION COVER SHEET

The attached records are:

**Releasable** to the Public ☑

**Denied** to the Public ☐

Subject:

Tech Report #AD158508

Title:

Reconnaissance Weapon System 118P Phase 3 (N.A.A. Designation S.O. 2432) dated 1 JUN 1956

FOIA Control Number: 06-652 LK

Date Reproduced: 5 Feb 08

# RECONNAISSANCE WEAPON SYSTEM 118P PHASE 3 (N.A.A. DESIGNATION S.O. 2432)

NORTH AMERICAN AVIATION INC LOS ANGELES CA

01 JUN 1956

AD NUMBER

AD158508

CLASSIFICATION CHANGES

TO

unclassified

FROM

confidential

AUTHORITY

30 Jun 1968, DoDD 5200.9

| |
|---|
| AD NUMBER |
| AD158508 |
| CLASSIFICATION CHANGES |
| TO<br>confidential |
| FROM<br>secret |
| AUTHORITY |
| 30 Jun 1959, DoDD 5200.9 |



UNCLASSIFIED

Serial No. 2

File No. _____ Report No. NA-56-450

# NORTH AMERICAN AVIATION, INC.

INTERNATIONAL AIRPORT
LOS ANGELES 45, CALIFORNIA

ENGINEERING DEPARTMENT

AV 15850

## ESTIMATED WEIGHT AND BALANCE REPORT

FOR

RECONNAISSANCE WEAPON

SYSTEM 118P PHASE III

(N.A.A. DESIGNATION S.O. 2432)

CONTRACT NO. AF33(600)-31243

(E.O. NO. 55-8-118L)





PREPARED BY
STRUCTURES SECTION
W. A. Martin
SUPERVISOR - WEIGHT ESTIMATING

APPROVED BY

G. V. Johnson
G. V. Johnson
Group Leader - Weight Control

F. L. Schleicher
F. L. Schleicher
Chief Structures Engineer

Total Pages 51
Appendix I - 47 Pages

REVISIONS

Date 1 June 1956

| DATE | Rev No. | PAGES AFFECTED | REMARKS |
|---|---|---|---|
| MAY 21 1958 | | | |

58AA 6066

[redacted] 56RDZ-6551

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 Sideleoking 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.

PREPARED BY J W C | NORTH AMERICAN AVIATION, INC. | PAGE NO 3 OF 51

CHECKED BY W H L | [redacted] | REPORT NO. NA-56-450

DATE 1 June 1956 | SUMMARY | MODEL NO Sys. 118P

| CONDITION | | WEIGHT (LBS.) | HORIZONTAL C.G. AFT OF DATUM (INS.) | HORIZONTAL C.G. % M.A.C. | VERTICAL C.G. ABOVE DATUM (INS.) | VERTICAL C.G. BELOW F.R.L. (INS.) |
|---|---|---|---|---|---|---|
| WEIGHT EMPTY | | 142842 | 1572.89 | 55.3 | 172.65 | 27.3 |
| USEFUL LOAD | | 63958 | - | - | - | - |
| TAKE-OFF GROSS WEIGHT - DETAIL PHOTO MISSION | Gear Down | 206800 | 1485.78 | 48.8 | 184.39 | 15.6 |
| | Gear Up | | 1481.42 | 48.5 | 188.86 | 11.1 |
| ALTERNATE TAKE-OFF GROSS WEIGHTS | | | | | | |
| RADAR MAPPING MISSION - COHERENT DOPPLER RADAR | Gear Down | 206794 | 1486.17 | 48.8 | 184.23 | 15.8 |
| | Gear Up | | 1481.81 | 48.5 | 188.70 | 11.3 |
| RADAR MAPPING MISSION - AZIMUTH RADAR | Gear Down | 206588 | 1487.06 | 48.9 | 184.27 | 15.7 |
| | Gear Up | | 1482.70 | 48.5 | 188.74 | 11.3 |
| SEARCH PHOTO MISSION | Gear Down | 206480 | 1487.43 | 48.9 | 184.27 | 15.7 |
| | Gear Up | | 1483.06 | 48.6 | 188.75 | 11.2 |
| FERRET MISSION | Gear Down | 206696 | 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 |



[redacted]

# GROUP WEIGHT STATEMENT

ESTIMATED - [redacted]

(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. | | |



[redacted]

CHECKED
NAME J W C
DATE 1 June 1956

GROUP WEIGHT STATEMENT
WEIGHT EMPTY


MODEL Syn. 118P
REPORT NA-56-450

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | WING GROUP | | | | | 24343 |
| 2 | CENTER SECTION - BASIC STRUCTURE | | | | | |
| 3 | INTERMEDIATE PANEL - BASIC STRUCTURE | | | | | |
| 4 | OUTER PANEL - BASIC STRUCTURE [redacted] | | | | 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 | | | | 630 | |
| 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 | | | | | | |
| 33 | LOCATION | WHEELS, BRAKES TIRES, TUBES, AIR | STRUCTURE | CONTROLS | | |
| 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 [redacted] | | | | | 306 |
| 52 | INBOARD | | | | | |
| 53 | CENTER | | | | 306 | |
| 54 | OUTBOARD | | | | | |
| 55 | DOORS, PANELS & MISC. | | | | | |
| 56 | | | | | | |
| 57 | TOTAL (TO BE BROUGHT FORWARD) | | | | | 74367 |

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

**GROUP WEIGHT STATEMENT**
**WEIGHT EMPTY**

PAGE 6 of 51
MODEL Sys. 118P
REPORT NA-56-450

| | | AUXILIARY | MAIN | | |
|---|---|---|---|---|---|
| 1 | PROPULSION GROUP | | | | 56025 |
| 2 | | | | | |
| 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 - SHROUD | | | 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 [redacted] GROUP | | | | 564 |
| 26 | HYDRAULIC [redacted] 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 |

[redacted] UNCLASSIFIED

AN-910 3-D
NAME J W C
DATE 1 June 1956

**GROUP WEIGHT STATEMENT**
**USEFUL LOAD & GROSS WEIGHT**

PAGE 7 of 51
MODEL Sys-118P
REPORT NA-56-450

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | LOAD CONDITIO | TAKE-OFF GROSS WEIGHT | | | DETAIL PHOTO MISSION | | |
| 2 | | | | | | | |
| 3 | CREW (NO. 1 ) | | | | 270 | | |
| 4 | PASSENGERS (NO. ) | | | | | | |
| 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-OFF COWL | | | | 2115 | | |
| 54 | | | | | | | |
| 55 | USEFUL LOAD | | | | 63958 | | |
| 56 | WEIGHT EMPTY | | | | 142842 | | |
| 57 | GROSS WEIGHT | | | | 206800 | | |

*If not specified as weight empty.

[redacted]

UNCLASSIFIED

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

**GROUP WEIGHT STATEMENT**
**USEFUL LOAD & GROSS WEIGHT**
[redacted]



| | | | | RADAR MAPPING MISSION | | | |
|---|---|---|---|---|---|---|---|
| 1 2 | LOAD CONDITION ALTERNATE | | | DOPPLER RADAR | AZIMUTH RADAR | SEARCH PHOTO MISSION | FERRET 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.

[redacted]
UNCLASSIFIED

-910 3-0
ME J W C
TE 1 June 1956

**GROUP WEIGHT STATEMENT**
**DIMENSIONAL & STRUCTURAL DATA**


MODEL Sys. 118P
REPORT NA 56-450

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| LENGTH - OVERALL (FT.) | 180.9 | | | | HEIGHT - OVERALL - STATIC (FT.) | | | 33.3 |
| | Main Floats | Aux. Floats | Booms | Fuse. or Hull | Nacelles Inboard | Nacelles Center | Nacelles 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.) ø | 3410 | 594 | 250 |
| WEIGHT/GROSS AREA (LBS./SQ. FT.) ø | 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.)
TAIL LENGTH - 25% MAC WING TO 25% MAC H. TAIL (FT.) 83.66

| AREAS (SQ. FT.) | | | |
|---|---|---|---|
| Flaps | L.E. | T.E. | |
| Lateral Controls | Slots | Spoilers 65.29 | [redacted] DEFLECTORS 52.23 |
| Speed Brakes | Wing | Fuse. or Hull | TAB |

| | | | | | | |
|---|---|---|---|---|---|---|
| ALIGHTING GEAR | (LOCATION) | | | | | |
| LENGTH - OLEO EXTENDED - ℄ AXLE TO ℄ TRUNNION (INCHES) | | | | | | |
| OLEO TRAVEL - FULL EXTENDED TO FULL COLLAPSED (INCHES) | | | | | | |
| FLOAT OR SKI STRUT LENGTH (INCHES) | | | | | | |

ARRESTING HOOK LENGTH - ℄ HOOK TRUNNION TO ℄ 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.) | Gross Weight | Ult. L.F. |
|---|---|---|---|
| FLIGHT | - | 201100 | 2.0 |
| LANDING | | 160287 | 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 ℄ at ℄ airplane.
ø Wing Data on Exposed Area
***Parallel to ℄ airplane.
****Total usable capacity.

# DETAIL WEIGHT STATEMENT

ESTIMATED - [redacted]

(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 | ~~MATR-2040~~ Scaled 103.1% | |
| | NO. | 4 | |
| PROPELLER | MANUFACTURED BY | | |
| | DESIGN NO. | | |
| | NO. | | |

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

**WING GROUP**
**BASIC STRUCTURE**



| | CODE NO. | Center Section | Interm. Panel | Outer Panel | Folding Tip | |
|---|---|---|---|---|---|---|
| UPPER - SPAR CAP - FRONT | | | | | | |
| - INTERMEDIATE | | | | | | |
| - REAR | | | | | | |
| - AUXILIARY | | | | | | |
| - INTERSPAR COVERING | | | | | | |
| SPANWISE STIFFENERS | | | | | | |
| - JOINTS, SPLICES & FASTENERS | | | | | | |
| LOWER - SPAR CAP - FRONT | | | | | | |
| - INTERMEDIATE | | | | | | |
| - REAR | | | | | | |
| - AUXILIARY | | | | | | |
| - INTERSPAR COVERING | | | | | | |
| SPANWISE STIFFENERS | | | | | | |
| - JOINTS, SPLICES & FASTENERS | | | | | | |
| SPAR WEB & STIFFENERS - FRONT | | | | | | |
| - INTERMEDIATE | | | | | | |
| - REAR | | | | | | |
| - AUXILIARY | | | | | | |
| - JOINTS, SPLICES & FASTENERS | | | | | | |
| INTERSPAR - RIBS | | | | | | |
| - BULKHEADS | | | | | | |
| - CHORDWISE STIFFENERS | | | | | | |
| LEADING EDGE - COVERING | | | | | | |
| - STIFFENERS | | | | | | |
| - RIBS | | | | | | |
| - AUXILIARY SPARS | | | | | | |
| - JOINTS, SPLICES & FASTENERS | | | | | | |
| TRAILING EDGE - COVERING | | | | | | |
| - STIFFENERS | | | | | | |
| - RIBS | | | | | | |
| - AUXILIARY SPARS | | | | | | |
| - JOINTS, SPLICES & FASTENERS | | | | | | |
| TIPS | | | | | | |
| FIREWALL ( STRUCTURAL) | | | | | | |
| TOTALS - BASIC STRUCTURE | | | | 21733 | 650 | |
| TOTAL (TO BE BROUGHT FORWARD) | | | | | | 22383 |

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

## WING GROUP
## CONTROL SURFACES

PAGE 12 of 51
MODEL Sys. 118P
REPORT NA-56-450

| | CODE NO. | Aileron Inb'd | Aileron Outb'd | T.E. Flaps Inb'd | T.E. Flaps Outb'd | L.E. Flaps or Slats Inb'd | L.E. Flaps or Slats Outb'd | Spoilers | Speed Brakes | |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 | SPARS | | | | | | | | | |
| 9 | RIBS | | | | | | | | | |
| 12 | COVERING & STIFFENERS | | | | | | | | | |
| 15 | T.E. STRIPS | | | | | | | | | |
| 17 | FABRIC & DOPE | | | | | | | | | |
| 21 | TABS | | | | | | | | | |
| 25 | TORQUE TUBES | | | | | | | | | |
| 29 | BALANCE WEIGHTS & SUPPORTS | | | | | | | | | |
| 31 | AERO. SEAL | | | | | | | | | |
| 34 | CONTROL HORNS | | | | | | | | | |
| 37 | ACCESS DOORS (NON STRUCT.) | | | | | | | | | |
| 39 | HINGES & PINS | | | | | | | | | |
| 40 | EXTERIOR FINISH | | | | | | | | | |
| 41 | TOTALS - SURFACE | | | | | | | | | |
| 43 | CONTROL SURFACE SUPPORTS | | | | | | | | | |
| 44 | HINGES | | | | | | | | | |
| 45 | BRACKETS | | | | | | | | | |
| 46 | TRACKS | | | | | | | | | |
| 47 | CARRIAGES | | | | | | | | | |
| 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 |

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

[redacted]

TAIL GROUP
BASIC STRUCTURE


MODEL Sys. 118?
REPORT NA-56-450

| | | Control [redacted] | | Fins - Vertical [redacted] | | | |
|---|---|---|---|---|---|---|---|
| | CODE NO. | C.S.F. | O.P. | Center | Outer | Dorsal | |
| UPPER - SPAR CAP - FRONT | | | | | | | |
| - INTERMEDIATE | | | | | | | |
| - REAR | | | | | | | |
| - AUXILIARY | | | | | | | |
| - INTERSPAR COVERING | | | | | | | |
| SPANWISE STIFFENERS | | | | | | | |
| - JOINTS, SPLICES & FASTENERS | | | | | | | |
| LOWER - SPAR CAP - FRONT | | | | | | | |
| - INTERMEDIATE | | | | | | | |
| - REAR | | | | | | | |
| - AUXILIARY | | | | | | | |
| - INTERSPAR COVERING | | | | | | | |
| SPANWISE STIFFENERS | | | | | | | |
| - JOINTS SPLICES & FASTENERS | | | | | | | |
| SPAR WEB & STIFFENERS - FRONT | | | | | | | |
| - INTERMEDIATE | | | | | | | |
| - REAR | | | | | | | |
| - AUXILIARY | | | | | | | |
| - JOINTS, SPLICES & FASTENERS | | | | | | | |
| INTERSPAR - RIBS | | | | | | | |
| - BULKHEADS | | | | | | | |
| - CHORDWISE STIFFENERS | | | | | | | |
| LEADING EDGE - COVERING | | | | | | | |
| - STIFFENERS | | | | | | | |
| - RIBS | | | | | | | |
| - AUXILIARY SPARS | | | | | | | |
| - JOINTS, SPLICES & FASTENERS | | | | | | | |
| TRAILING EDGE - COVERING | | | | | | | |
| - STIFFENERS | | | | | | | |
| - RIBS | | | | | | | |
| - AUXILIARY SPARS | | | | | | | |
| - JOINTS, SPLICES & FASTENERS | | | | | | | |
| TIPS | | | | | | | |
| TOTALS | | | | | | | |
| TOTALS - BASIC STRUCTURE | | 1400 | | | 1640 | | |
| TOTAL ([redacted] | | | | | | | 3040 |

[redacted]

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

**BODY GROUP**
**BASIC STRUCTURE**

PAGE 14 of 53
MODEL Syd. 119F
REPORT NA-56-450

| | | Fuselage [redacted] | Booms |
|---|---|---|---|
| 1 | | | |
| 2 | | CODE NO. | |
| 3 | | SECTION | |
| 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.

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

**BODY GROUP**
**SECONDARY STRUCTURE**

PAGE 15 of 51
MODEL Sys. 11HF
REPORT NA-56-450

| | | Fuselage or Hull | | | | Booms | Speed Brakes |
|---|---|---|---|---|---|---|---|
| CODE NO. | | | | | | | |
| SECTION | | | | | | | |
| ENCLOSURES (EXCLUDING TURRET ENCLOSURES) | 750 | | | | | | |
| CANOPY | | | | | | | |
| CANOPY-OPERATING MECHANISM | | | | | | | |
| -RAILS | | | | | | | |
| -CYLINDERS, PLUMBING, FLUID | | | | | | | |
| | | | | | | | |
| GUNNER - TAIL | | | | | | | |
| | | | | | | | |
| BOMBARDIER | | | | | | | |
| SIGHTING BLISTERS | | | | | | | |
| | | | | | | | |
| WINDSHIELD (EXCLUDING BULLET PROTECTION) | 200 | | | | | | |
| | | | | | | | |
| WINDOWS & PORTS INCL. FRAMES | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| FLOORING & SUPPORTS (SECONDARY STRUCTURE) | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| STAIRWAYS & LADDERS (FIXED) | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| STERNPOST & FITTINGS | | | | | | | |
| NOSE BUMPER (HULL) | | | | | | | |
| RUBBING STRIPS | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| TAIL CONE | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| SPEED BRAKES - STRUCTURE | | | | | | | |
| - SUPPORTS | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| TOTALS | 950 | | | | | | |
| TOTALS - SECONDARY STRUCTURE | | | 950 | | | | |
| TOTAL (TO BE BROUGHT FORWARD) | | | | | | | 950 |

* From main distributing point to actuating unit.

AN-5102-D
NAME T A M
DATE 1 June 1956

**BODY GROUP**
**SECONDARY STRUCTURE**
**(DOORS, PANELS & MISCELLANEOUS)** [redacted]


MODEL Sys. 111P
REPORT NA-56-450

| | Location* | Type Power | Area Sq. Ft. | Structure | Operating Mechanism: Mechanism & Controls | Power Trans. | Actuator | Lock Mech. | Emerg. |
|---|---|---|---|---|---|---|---|---|---|
| CODE NO. | | | | | | | | | |
| DOORS & FRAMES | | | | | | | 3 | | |
| - LANDING | | | | | | | | | |
| [redacted] MAIN | | | | 1250 | | | | | |
| NOSE | | | | 90 | | | | | |
| - BOMB | | | | | | | | | |
| - GUN | | | | | | | | | |
| - AMMUNITION | | | | | | | | | |
| - ROCKET | | | | | | | | | |
| - LIFE RAFT | | | | | | | | | |
| - ESCAPE | | | | | | | | | |
| - WATER TIGHT | | | | | | | | | |
| - COMPARTMENT | | | | | | | | | |
| - ENTRANCE | | | | | | | | | |
| - ACCESS | | | | 100 | | | | | |
| - ENGINE | | | | 450 | | | | | |
| - CAMERA | | | | | | | | | |
| PANELS - (NON STRUCTURAL) | | | | | | | | | |
| WALKWAYS, STEPS, GRIPS | | | | | | | | | |
| MISCELLANEOUS | | | | 260 | | | | | |
| FAIRING & FILLETS | | | | | | | | | |
| EXTERIOR FINISH | | | | | | | | | |
| TOTALS | | | | 2150 | | | | | |
| TOTAL - SECONDARY STRUCTURE (DOORS, PANELS, MISC.) | | | | | 2150 | | | | |
| TOTALS FROM PGS. 8 & 9 | | | | | | | | | 27726 |
| TOTAL - BODY GROUP | | | | | | | | | 29876 |

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

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

AN-9 102-D
NAME T A M
DATE June 1956

## ALIGHTING GEAR GROUP

[redacted]

PAGE 17 of 51
MODEL Sys. 118P
REPORT TM-56-450

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | |
| 2 | 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 | Hook | | | | | | | |
| 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 | SKIIS | | | | | | | | | |
| 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 SNUBBER | | | | | | | | | |
| 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. [redacted]

**Ft. lbs./brake

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

# ALIGHTING GEAR GROUP
## CONTROLS



| | **LOCATION | MAIN | | | NOSE | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Actuator | Brake Oper. | Emerg. Ext. | Steering | Retract | Brake Oper. | Emerg. Ext. | Retract | Emerg. Ext. | Retract | Emerg. Ext. |
| 5 | CODE NO. | | | | | | | | | | | |
| 6 | MECHANICAL OPER. MECH. | | | | | | | | | | | |
| 7 | CONTROLS | | | | | | | | | | | |
| 8 | ACTUATORS | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | |
| 12 | ELECTRICAL OPER. MECH. | | | | | | | | | | | |
| 13 | CONTROLS | | | | | | | | | | | |
| *14 | WIRING, CONDUIT, ETC. | | | | | | | | | | | |
| 15 | OPERATING MOTORS | | | | | | | | | | | |
| 16 | MECHANISM | | | | | | | | | | | |
| 17 | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | |
| 20 | HYDRAULIC OPER. MECH. | | | | | | | | | | | |
| 21 | CONTROLS | | | | | | | | | | | |
| *22 | PLUMBING & FLUID | | | | | | | | | | | |
| 23 | PUMPS | | | | | | | | | | | |
| 24 | RESERVOIRS | | | | | | | | | | | |
| 25 | ACCUMULATORS | | | | | | | | | | | |
| 26 | ACTUATORS | | | | | | | | | | | |
| 27 | MECHANISM | | | | | | | | | | | |
| 28 | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 31 | PNEUMATIC OPER. MECH. | | | | | | | | | | | |
| 32 | CONTROLS | | | | | | | | | | | |
| *33 | PLUMBING | | | | | | | | | | | |
| 34 | PUMPS | | | | | | | | | | | |
| 35 | BOTTLES (AIR) | | | | | | | | | | | |
| 36 | ACTUATORS | | | | | | | | | | | |
| 37 | MECHANISM | | | | | | | | | | | |
| 38 | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |
| 41 | LOCKING MECHANISM | | | | | | | | | | | |
| 42 | BRACES | | | | | | | | | | | |
| 43 | LINKS | | | | | | | | | | | |
| 44 | PARKING BRAKE CONTROL | | | | | | | | | | | |
| 45 | POSITION INDICATING MECH. | | | | | | | | | | | |
| 46 | | | | | | | | | | | | |
| 47 | | | | | | | | | | | | |
| 48 | SUPP'TS, GUIDES, ETC. - WING | | | | | | | | | | | |
| 49 | - TAIL | | | | | | | | | | | |
| 50 | - BODY | | | | | | | | | | | |
| 51 | - NACELLE | | | | | | | | | | | |
| 52 | | | | | | | | | | | | |
| 53 | TOTALS | | | | | | | | | | | |
| 54 | TOTALS - CONTROLS | | 825 | | | 300 | | | | | | |
| 55 | TOTALS FROM PG. 11 | | 10191 | | | 490 | | | | | | |
| 56 | TOTALS | | 11016 | | | 790 | | | | | | |
| 57 | TOTAL - ALIGHTING GEAR GROUP | | | | | | | | | | | 11806 |

*From main distribution point or actuating unit.

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

AN-910 2-D
NAME J W C
DATE 1 June 1956

SURFACE CONTROLS GROUP
COCKPIT & AUTOPILOT



| | | Cockpit Controls | Autopilot |
|---|---|---|---|
| | [redacted] | | |
| | CODE NO. | | |
| | CONTROL COLUMNS | | |
| | CONTROL STICK [redacted] (PILOT) | 11 | |
| | CONTROL STICK OR COLUMN (ASSIST. PILOT) | | |
| | CONNECTING MEMBERS FOR ABOVE | | |
| | SUPPORTS | | |
| | RUDDER PEDALS | | |
| | RUDDER PEDALS, INCLUDING BRAKE TREADLE (PILOT) | 11 | |
| | RUDDER PEDALS, INCLUDING BRAKE TREADLE (ASSIST. PILOT) | | |
| | CONNECTING MEMBERS FOR ABOVE | | |
| | SUPPORTS | | |
| | INTEGRAL PARKING LOCK | | |
| | CONTROL STICK | | |
| | RUDDER PEDALS | | |
| | SURFACES | | |
| | AUTOPILOT OR AUTO. FLIGHT CONTROL (TYPE: INCLUDED IN ELECTRONIC SECTION | | |
| | CONTROLLER | | |
| | TRANSMITTER | | |
| | SERVO AMPLIFIER | | |
| | SERVO MOTORS | | |
| | GYROS | | |
| | SUPPORTS & BRACKETS | | |
| *48 | PLUMBING & FLUID | | |
| *49 | ELECTRIC PANELS, BOXES, SWITCHES, RELAYS, WIRING | | |
| 50 | PULLEYS, SPROCKETS, CHAINS, CABLES | | |
| 56 | TOTALS - COCKPIT CONTROLS & AUTOPILOT | 22 | |
| 57 | TOTAL (TO BE BROUGHT FORWARD) | | 22 |

*From main distribution point to actuating units.

[redacted]

AN-9102-D
NAME J W C
DATE 1 June 1956

## SURFACE CONTROLS GROUP
## SYSTEM CONTROLS


MODEL Sys. 118P
REPORT NA-56-450

| | CODE NO. | All. | Canard [redacted] | Rud. | Wing Sweep | Wing Invid. | L.E. Flaps or Slats | T.E. Flaps | Spoilers | Speed Brakes | Stab. Adj. | Wing Tip Fold |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | 3 | | | 55 |
| *22 | PLUMBING [redacted] | | 1090 | 46 | | | | 23 | 56 | | | 82 |
| 23 | [redacted] 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 | | | 380 |
| 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.

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

AC-910 2-D
NAME J. C.
DATE 1 June 1956

SURFACE CONTROL GROUP
[redacted] *POWER CONTROLS



| | No. | Model | Capacity | Code No. | Hydraulic [redacted] | Hydraulic [redacted] | Utility | Pneumatic Emergency |
|---|---|---|---|---|---|---|---|---|
| PUMPS & COMPRESSORS | (4) | | | | 244 | | | |
| REMOTE PUMP DRIVES | | | | | | | | |
| RESERVOIRS | 2 | | 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 Os-45 ) | | | (29.5 GALS.) | | 219 | | | |
| SUPPORTS - WING | | | | | | | | |
| - TAIL | | | | | | | | |
| - BODY | | | | | | | | |
| TOTAL [redacted] | | | | | 1298 | | | |
| TOTALS FROM PAGE 13 & 14 | | | | | | | | 3698 |
| TOTAL [redacted] 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

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

**ENGINE SECTION** [redacted]

PAGE 22 of 51
MODEL Sym. 118F
REPORT NA-56-450

| | | Inboard | Center | Outboard | |
|---|---|---|---|---|---|
| | CODE NO. | | | | |
| | ENGINE MOUNT | | | | |
| | | | | | |
| | SUPPORT BAY | | | | |
| | VIBRATION ABSORPTION DEVICES | | | | |
| | | | | | |
| | | | | | |
| | NACELLE STRUCTURE | | | | |
| | BULKHEADS AND FRAMES | | | | |
| | COVERING & STIFFENERS | | | | |
| | FITTINGS | | | | |
| | LONGERONS | | | | |
| | ATTACHING ANGLES, ETC. | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | PYLONS & STRUTS | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| *23 | FIREWALL | | | | |
| | | | | | |
| | SHROUDS FOR FIRE PROTECTION | | | | |
| | | | | | |
| | COWLING | | | | |
| | ENGINE COWL | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | BAFFLES | | | | |
| | ACCESSORY COWL OR SKIRT | | | | |
| | COWL FLAPS | | | | |
| | COWL FLAP CONTROLS & OPERATING MECH. | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | FAIRING - NACELLE TO WING OR PYLON | | | | |
| | STEPS & GRIPS | | | | |
| | WORKING PLATFORM (BUILT IN) | | | | |
| | INTERNAL WALKWAYS | | | | |
| | | | | | |
| | | | | | |
| | INSTALLATION HARDWARE | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTALS - SECTIONS OR NACELLES | | | | |
| | TOTAL [redacted] ENGINE SECTION | | | | 306 |

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

SHEET 2 D M — PROPULSION GROUP — PAGE [illegible]
DATE 1 June 1956 — MODEL [illegible] — REPORT NA-56-456

| | | CODE NO. | Auxiliary | Main |
|---|---|---|---|---|
| 3 | ENGINE INSTALLATION (4) HATR 2010 (SCALED 103.1%) | | | 15660 |
| 4 | ENGINE (AS INSTALLED) | | | |
| 5 | ENGINE & AFTERBURNER (AS INSTALLED) | | | |
| 6 | REDUCTION GEAR BOX | | | |
| 7 | EXTENSION DRIVE SHAFT | | | |
| 10 | AFTERBURNERS (IF FURNISHED SEPARATELY) | | | |
| 11 | ACCESSORY GEAR BOXES & DRIVES | | | 1010 |
| 12 | COMPLETE GEAR BOXES (4) | | | 340 |
| 13 | - LUBRICATING SYSTEM | | | 380 |
| 14 | - SUPPORTS | | | 36 |
| 15 | -DRIVE SHAFTS & COUPLINGS | | | 164 |
| 16 | - PIPING | | | - |
| 17 | -CONSTANT SPEED DRIVES (2) | | | 90 |
| 19 | AIR INDUCTION SYSTEM | | | 25680 |
| 20 | INTERCOOLERS AND SUPPORTS | | | |
| 21 | AIR DUCTING [redacted] | | | 11500 |
| 22 | INTAKE DOORS [redacted], RAMPS | | | 7945 |
| 23 | [redacted] RAMP MECH & CONTROLS | | | 4105 |
| 24 | SCREENS & CONTROLS | | | |
| 25 | BY-PASS PROVISIONS | | | 1210 |
| 26 | RAMP BLEED PROVISIONS | | | 630 |
| 27 | FAIRING - ENGINE INLET | | | 290 |
| 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 |
| 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. | | | |
| 57 | TOTALS (TO BE BROUGHT FORWARD) | [redacted] | | 42970 |

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

**PROPULSION GROUP**
**LUBRICATING & FUEL SYSTEMS**

PAGE 24 of 51
MODEL Sya. 118P
REPORT NA-56-450

| | | | | | | Auxiliary | | Main | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Lubricating | Fuel | Lubricating | Fuel |
| | | | | | CODE NO. | | | | |
| TANKS | Type | Location | No. | Vol. Ea. (Gals.) | | | | | (686@) |
| 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 | | | | | 1353 |
| NO. 5 | METAL | FUSELAGE | 1 | 10650 | | | | | 713 |
| NO. 6 | METAL | FUSELAGE | 1 | 9360 | | | | | 631 |
| NO. 7 | METAL | FUSELAGE | 1 | 5340 | | | | | 364 |
| INTEGRAL TANK SEALS & SEALANT | | | | | | | | | |
| BACKING BOARD | | | | | | | | | |
| TANK SUPPORTS & PADDING | | | | | | | | | 212 |
| TANK BAY SEALING | | | | | | | | | |
| INSULATION PROVISIONS | | | | | | | | | 3617 |
| TANK RELEASE & CONTROLS | | | | | | | | | |
| OIL COOLING INSTALLATION | | | | | | | | | |
| COOLERS & SUPPORTS (SIZE ) (NO. ) | | | | | | | | | |
| DUCTS & SHUTTERS | | | | | | | | | |
| AUTOMATIC OIL TEMP. CONTROL VALVE | | | | | | | | | |
| SHUTTER CONTROLS | | | | | | | | | |
| FUEL VAPOR RECOVERY | | | | | | | | | |
| OIL DILUTION SYSTEM | | | | | | | | | |
| FUEL VAPOR INERTION SYSTEM - CYL. & SUPPORTS | | | | | | | | | |
| - GENERATOR | | | | | | | | | |
| - CONTROLS, ETC. | | | | | | | | | |
| PUMP INSTALLATION | No. | Type | | | | | | | |
| ENGINE DRIVEN | | | | | | | | | |
| BOOSTER | 4 | HYDRAULIC | | | | | | | 240 |
| HAND (INCL. CONTROLS) | | | | | | | | | |
| TRANSFER | | | | | | | | | |
| HYDRAULIC PLUMBING | | | | | | | | | 195 |
| FILLING SYSTEM - GROUND | | | | | | | | | 336 |
| - IN FLIGHT | | | | | | | | | |
| DISTRIBUTION SYSTEM | | | | | | | | | 581 |
| TRANSFER SYSTEM | | | | | | | | | 100 |
| VENT SYSTEM | | | | | | | | | 120 |
| PRESSURIZATION SYSTEM | | | | | | | | | |
| DUMP SYSTEM | | | | | | | | | 235 |
| ELECTRICAL PROVISIONS | | | | | | | | | 50 |
| TOTALS - LUBRICATING & FUEL SYSTEMS | | | | | | | | | 12755 |
| TOTALS (TO BE BROUGHT FORWARD) | | | | | | | | 12755 | |

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

PROPULSION GROUP [redacted]



| | | CODE NO. | Auxiliary | Main |
|---|---|---|---|---|
| 3 | WATER INJECTION SYSTEM | | | |
| 4 | TANKS (NO. ) (GAL/TANK ) | | | |
| 5 | PUMP | | | |
| 6 | METERING UNIT | | | |
| 7 | VALVES & PLUMBING | | | |
| 8 | CONTROLS | | | |
| 11 | ENGINE CONTROLS | | | 300 |
| 12 | IGNITION | | | |
| 13 | THROTTLE | | | 300 |
| 14 | MIXTURE | | | |
| 15 | SUPERCHARGER (SUP. INTEG. WITH ENG.) | | | |
| 16 | AFTERBURNER | | | |
| 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 | | | |
| 32 | PROPELLER INSTALLATION (DIA. ) (NO. ) | | | |
| 33 | PROPELLER | | | |
| 34 | CUFFS | | | |
| 35 | SPINNER | | | |
| 36 | CONTROLS | Type | *Aux. | *Main |
| 37 | SPEED | | | |
| 38 | PITCH | | | |
| 39 | FEATHERING | | | |
| 40 | REVERSING | | | |
| 47 | OIL ( GALS) | | | |
| 48 | TANK & PLUMBING | | | |
| 55 | TOTALS | | | 300 |
| 56 | TOTALS FROM PGS. 17 & 18 | | | 55725 |
| 57 | TOTAL - PROPULSION GROUP | | | 56025 |

*GTP Weight

**When separate oil system used.

[redacted]

| * FUNCTIONAL GROUPS & ITEMS | CODE NO. | Number | Indicator | Transmitter & Amplifier | Installation | Total |
|---|---|---|---|---|---|---|
| FLIGHT INSTRUMENTS | | | | | | |
| FLIGHT DISPLAY GROUP | | | | | | |
| SPEED SITUATION | | 1 | 5 | | 2 | 7 |
| ATTITUDE DISPLAY | | 1 | 7 | | 2 | 9 |
| HEADING DISPLAY | | 1 | 12 | | 4 | 16 |
| VERTICAL SITUATION | | 1 | 5 | | 2 | 7 |
| ACCELEROMETER | | 1 | 2 | | | 2 |
| CLOCK | | 1 | 1 | | | 1 |
| CABIN ALTITUDE | | 1 | 1 | | | 1 |
| PITOT SYSTEM | | | | 2 | 38 | 40 |
| AIR DATA COMPUTER SYSTEM | | | | 15 | 5 | 20 |
| WIRING AND MISCELLANEOUS | | | | | 11 | 11 |
| ENGINE INSTRUMENTS | | | | | | |
| INTEGRATED ENGINE DISPLAYS | | 4 | 20 | 50 | 55 | 125 |
| FUEL QUANTITY GUAGES | | 1 | 2 | 170 | 40 | 212 |
| FUEL FLOWMETER | | 1 | 3 | 30 | 20 | 53 |
| HYDRAULIC PRESSURE GAUGES | | 2 | 4 | 6 | 10 | 20 |
| WIRING AND MISCELLANEOUS | | | | | | 40 |
| | | | | | 3 | |
| INSTRUMENT POWER SYSTEM (TYPE | | | | | | |
| TOTAL - INSTRUMENTS [redacted] | | | | | | 564 |

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





UNCLASSIFIED

AN-910 2-D
NAME J. W. C
DATE 1 June 1956

*HYDRAULIC [redacted] GROUP

PAGE 27 of [illegible]
MODEL Jys. 11.1
REPORT NA-56-450

| | CODE NO. | Model | Hydraulic Utility | Hydraulic Emergency | Fuel Pump Power | Pneumatic Utility | Pneumatic Emergency | |
|---|---|---|---|---|---|---|---|---|
| PUMPS & COMPRESSORS | | | | | | | | |
| 6 | | | 510 | | | | | |
| 4 | | | | | 244 | | | |
| REMOTE PUMP DRIVES | | | | | | | | |
| | No. | Model | Capacity | | | | | |
| RESERVOIRS | 2 | | 20 Gals | 80 | | | | |
| RESERVOIRS | 2 | | 8 Gals | | 20 | | | |
| AIR BOTTLES | | | | | | | | |
| ACCUMULATORS | | | | | | | | |
| FILTERS | | | | | | | | |
| PRESSURE REGULATORS | | | | | | | | |
| VALVES- , FILTER, REGULATORS AND TEST | | | 350 | | 180 | | | |
| CONTROLS | | | | | | | | |
| PLUMBING & SUPPORTS | | | 2020 | | 666 | | | |
| FLUID IN SYSTEM (TYPE OS-45 ) (105 GALS.) | | | 776 | | | | | |
| (TYPE OS-45 ) (33.0 Gals) | | | | | 244 | | | |
| SUPPORTS - WING | | | | | | | | |
| - TAIL | | | | | | | | |
| - BODY | | | | | | | | |
| - NACELLE | | | | | | | | |
| TOTALS | | | 3736 | | 1354 | | | |
| TOTAL - HYDRAULIC [redacted] GROUP | | | | | | | | 5090 |
| FURNISHES POWER FOR - (ITEMS) | | | | | | | | |
| SYSTEM PRESSURE (PSI) | | | | | | | | |

*Includes system from sources of power to main distribution points

[redacted] UNCLASSIFIED

AN-9102-D
NAME J W C
DATE 1 June 1956

*ELECTRICAL GROUP [redacted]



| | | Driven By | KVA | CODE NO. Amp. | No. | AC | | DC | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | POWER SUPPLY EQUIPMENT | | | | | | 153 | | |
| 5 | GENERATORS - MAIN | ENG. CSD | 20 | | 2 | 110 | | | |
| 6 | GENERATOR - EMERG. | HYD | 3 | | 1 | 16 | | | |
| 7 | EXCITATION UNIT | | | | | 7 | | | |
| 8 | PROVISIONS | | | | | 10 | | | |
| 9 | | | | | | | | | |
| 10 | REMOTE GENERATOR DRIVES HYDRAULIC | | | | | 10 | | | |
| 11 | BATTERY (AN ) (NO. ) | | | | | | | | |
| 12 | BATTERY CONTAINER, OVERFLOW INST. & SUPPORTS | | | | | | | | |
| 13 | | | | | | | | | |
| 14 | POWER CONVERSION EQUIPMENT | Model | | | No. | | | | 30 |
| 15 | INVERTER (DC TO AC) | | | | | | | | |
| 16 | CONVERTER (AC TO DC) | | | | | | | | |
| 17 | TRANSFORMER | | | | | | | 30 | |
| 18 | RECTIFIER | | | | | | | | |
| 19 | MOTOR-GENERATOR | | | | | | | | |
| 20 | PHASE ADAPTER | | | | | | | | |
| 21 | FREQUENCY CONVERTER | | | | | | | | |
| 22 | | | | | | | | | |
| 23 | | | | | | | | | |
| 24 | POWER DISTRIBUTION & CONTROL | | | | | | 597 | | 5 |
| 25 | GENERATOR CONTROL BOXES & PARALLELING PROV. | | | | | 50 | | | |
| 26 | CUTOUTS & VOLTAGE REGULATORS | | | | | | | | |
| 27 | AMMETERS & VOLTMETERS | | | | | | | | |
| 28 | SWITCHES, RHEOSTATS, SWITCH PANELS OR BOXES | | | | | | | | |
| 29 | CIRCUIT BREAKERS & FUSES | | | | | | | | |
| 30 | JUNCTION, FUSE, DISTRIBUTION BOXES & PANELS | | | | | 185 | | 5 | |
| 31 | RECEPTACLES & CONNECTOR PLUGS | | | | | | | | |
| 32 | RELAYS | | | | | | | | |
| 33 | WIRING | | | | | 362 | | | |
| 34 | CONDUIT | | | | | | | | |
| 35 | | | | | | | | | |
| 36 | LIGHTS & SIGNAL DEVICES | | | | | | 30 | | |
| 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 | | | | | | 700 | | 35 |
| 51 | TOTAL - ELECTRICAL GROUP | | | | | | | | 815 |
| 52 | FURNISHES POWER FOR - (ITEMS) | | | | | | | | |
| 53 | | | | | | | | | |
| 54 | | | | | | | | | |
| 55 | | | | | | | | | |
| 56 | | | | | | | | | |
| 57 | | | | | | | | | |

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

AN-9102-D
NAME J W C
DATE 1 June 1956

ELECTRONICS GROUP

PAGE 29 of 51
MODEL Sys. 118P
REPORT NA-56-450

| 1 / 2 *FUNCTIONAL GROUP | *EQUIPMENT COMPONENTS & PART NUMBERS OR IDENTIFICATION | CODE NO. | Equipment GFP | Equipment CFE | Installation |
|---|---|---|---|---|---|
| 4 AN/ARC-52 | U H F COMMAND | | 54 | | 15 |
| 6 AN/ARA-37 | U H F/D F | | 9 | | 2 |
| 8 AN/ANH-5 | RECORDER | | 16 | | 2 |
| 10 AN/APX-19 | IFF A/G | | 39 | | 15 |
| 12 AN/APX-27 | IFF A/A | | 36 | | 6 |
| 14 AN/ART-27 | CRASH LOCATOR BEACON | | 6 | | 9 |
| 16 ASC | AUTOMATIC FLIGHT AND STABILIZATION SYSTEM | | | 155 | 135 |
| 18 | AUTO-NAVIGATOR | | | 44 | 81 |
| 20 | STANDBY PLATFORM | | | 25 | 15 |
| 22 | CONTROL AND DISPLAYS | | 15 | | 5 |
| 24 | RECOMM. PACKAGE PROVISIONS | | | | 250 |
| 47 ELECTRONIC INSTALLATION | | | | | |
| 48 TABLES | | | | | |
| 49 RACK, SHELVES & SUPPORTS | | | | | 80 |
| 50 LOCKERS | | | | | |
| 55 SUBTOTALS - EQUIPMENT GFP & CFE | | | 229 | 596 | 615 |
| 56 TOTALS | | | | | |
| 57 TOTAL - ELECTRONIC GROUP | | | | | 1438 |

*List components (incl. Radomes, Mts., Antennas, Switches, Relays, Filters, etc.) from main distribution point to unit operated, by functional groups (e.g., Comm., VHF, Search, Navig., Intercomm., etc.). Add supplementary pg. 25A if necessary.

[redacted] 25

AN-9102-D
NAME J W C
DATE 1 June 1956

FURNISHINGS & EQUIPMENT GROUP
ACCOMMODATIONS FOR PERSONNEL

PAGE 30 of 53
MODEL Syst. 1107
REPORT NA-56-430

| | CODE NO. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CREW SEATS & PASSENGER CHAIRS | | | | | | | | | |
| Location | No. | Cushions | Seat | Safety Belt | Harness & Inertia Reel | Adj. Mech. | Catapult or Eject. Mech. | Tracks & Supports | |
| PILOT | 1 | | | | | | | | 150 |
| ASST. PILOT | | | | | | | | | |
| HEAD REST (IF NOT INTEGRAL WITH SEAT) | | | | | | | | | |
| BUNKS (NO. ) & SUPPORTS | | | | | | | | | |
| PERISCOPE INSTALLATION | | | | | | | | | 125 |
| LITTER SUPPORTS | | | | | | | | | |
| BOMBERS & GUNNERS KNEELING PADS (NO. ) | | | | | | | | | |
| PARACHUTE STOWAGE PROVISIONS | | | | | | | | | |
| TOILETS & RELIEF TUBES | | | | | | | | | 4 |
| WASH BASIN & SHOWERS | | | | | | | | | |
| WATER TANKS & PIPING | | | | | | | | | |
| DRINKING WATER CONTAINERS & SUPPORTS | | | | | | | | | |
| LOCKERS FOR - FOOD | | | | | | | | | |
| - PERSONAL EFFECTS | | | | | | | | | |
| | | | | | | | | | |
| GALLEY STOVES & HOTPLATES | | | | | | | | | |
| REFRIGERATOR | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| ANTI-G SUIT PROVISIONS | | | | | | | | | |
| | | | | | | | | | |
| OXYGEN INSTALLATION | | | | | | | | | ( 45) |
| *BOTTLES - INCL. CHARGE (TYPE ) (SIZE ) (NO. ) | | | | | | | | | |
| | | | | | | | | | |
| CONVERTOR & LIQUID OXYGEN (SIZE 5 LITER) (NO. 1) | | | | | | | | | 27 |
| *REGULATORS (TYPE ) (NO. ) | | | | | | | | | |
| SUPPORTS - BOTTLES & REGULATORS | | | | | | | | | 2 |
| PLUMBING, ETC. | | | | | | | | | 18 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| TOTAL - ACCOMMODATIONS FOR PERSONNEL (TO BE BROUGHT FORWARD) | | | | | | | | | 324 |

*If not specified as useful load or special equipment.

[redacted]-9202-D
AME: J W C
ATE: 1 June 1956

**FURNISHINGS & EQUIPMENT GROUP**
**MISC. EQUIPMENT & FURNISHINGS**



| | CODE NO. | Misc. Equip. | Furnishings |
|---|---|---|---|
| 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 |

[redacted] Items specified as special equipment.

AN-9102-D
NAME J W C
DATE 1 June 1956

**FURNISHINGS & EQUIPMENT GROUP**
**EMERGENCY EQUIPMENT**



| | CODE NO. | Compartments: Engine | Baggage | Fuel | | | | |
|---|---|---|---|---|---|---|---|---|
| FIRE EXTINGUISHERS | | | | | | | | |
| BOTTLES | Type | DRY | | | | | | |
| | Size | 50 FOR 7 | AGENT EA | | | | | |
| | No. | 2 | | | | | | |
| | Weight | 150 | | | | | | |
| CONTROLS | | 40 | | | | | | |
| PLUMBING | | 185 | | | | | | |
| BOTTLE SUPPORTS | | 20 | | | | | | |
| TOTAL - COMPT. | | 395 | | | | | | 395 |
| PORTABLE (TYPE ) (SIZE ) (NO. ) | | | | | | | | |
| PORTABLE EXTINGUISHER SUPPORTS | | | | | | | | |
| FIRE DETECTION SYSTEM | | | | | | | | 70 |
| FIRE RESISTANT PAINT | | | | | | | | |
| FIRE CURTAINS | | | | | | | | |
| FIRST AID KITS (NO. ) & STOWAGE | | | | | | | | |
| FLASHLIGHTS (NO. ) | | | | | | | | |
| STOWAGE - EMERGENCY RATIONS & WATER | | | | | | | | |
| *LIFE RAFTS - (TYPE ) (NO. ) | | | | | | | | |
| - SUPPORTS OR CRADLES | | | | | | | | |
| DITCHING STATION EQUIPMENT | | | | | | | | |
| TOTAL - EMERGENCY EQUIPMENT | | | | | | | | 465 |
| TOTALS FROM PGS. 28 & 29 | | | | | | | | 776 |
| TOTAL - FURNISHINGS & EQUIPMENT GROUP | | | | | | | | 1241 |

*If not specified as useful load or special equipment.

N-91602-D
AMF J W C
ATE 1 June 1956

AIR CONDITIONING & ANTI-ICING EQUIPMENT GROUP
AIR CONDITIONING [redacted] Cooling and


MODEL Sye. 11BP
REPORT NA-56-450

| | CODE NO. | Pressurization System | Ventilating System | Heating System | Cooling System | | |
|---|---|---|---|---|---|---|---|
| HEAT EXCHANGERS (NO. 4 ) | | 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 & [redacted] | | 250 | | | | | |
| TOTALS | | | | | | | |
| TOTAL - AIR CONDITIONING (TO BE BROUGHT FORWARD) | | | | | | | 2080 |

*Item specified as special equipment.

AR-9 102-D
NAME J W C
DATE 1 June 1956

## AIR CONDITIONING & ANTI-ICING EQUIPMENT GROUP
### ANTI-ICING



| | CODE NO. | No. | BTU Capacity | Wing | Tail | Air Induction | Propeller | Canopy & Windshield | Fuel System | |
|---|---|---|---|---|---|---|---|---|---|---|
| * HEATERS | | | | | | | | | | |
| * HEAT EXCHANGERS (NO. ) | | | | | | 25 | | | | |
| BLOWER | | | | | | 30 | | | | |
| DUCTING | | | | | | 50 | | 85 | | |
| SHROUDING | | | | | | | | | | |
| * BOOTS | | | | | | | | | | |
| * ATTACHING STRIPS | | | | | | | | | | |
| OIL SEPARATORS | | | | | | | | | | |
| AIR PUMPS | | | | | | | | | | |
| AIR LINES & HOSES | | | | | | | | | | |
| TANKS | | | | | | | | | | |
| * FLUID ( GALS.) | | | | | | | | | | |
| PLUMBING | | | | | | | | | | |
| DISTRIBUTOR - VALVE | | | | | | | | | | |
| - CONTROLS | | | | | | | | | | |
| CONTROLS - MANUAL | | | | | | | | | | |
| - ELECTRICAL | | | | | | 5 | | 5 | | |
| - HYDRAULIC | | | | | | | | | | |
| - PNEUMATIC | | | | | | 6 | | 6 | | |
| ** WIRING, SWITCHES, RELAYS | | | | | | | | | | |
| SUPPORTS & BRACKETS - WING | | | | | | | | | | |
| - TAIL | | | | | | | | | | |
| - BODY | | | | | | | | | | |
| - NACELLE | | | | | | | | | | |
| TOTALS | | | | | | 116 | | 96 | | 212 |
| TOTAL - ANTI-ICING | | | | | | | | | | 212 |
| TOTAL FROM PG. 31 | | | | | | | | | | 2880 |
| TOTAL - AIR CONDITIONING & ANTI ICING EQUIPMENT GROUP | | | | | | | | | | 3092 |

*If not specified on special equipment.

**From main distribution point to actuating unit.

AN-9102 D
NAME J W C
DATE 1 June 1956

**AUXILIARY GEAR GROUP**

PAGE 35 of 51
MODEL Sys. 118P
REPORT NA-56-450

| | CODE NO. | Handling | Arrest. | Catapult | ATO |
|---|---|---|---|---|---|
| HANDLING GEAR | | | | | |
| ANCHOR | | | | | |
| ANCHOR LINE | | | | | |
| PENDANT & CLAMP FITTING | | | | | |
| LIZARD | | | | | |
| SHEAVES | | | | | |
| WINCH - COMPLETE | | | | | |
| WINCH CRANK | | | | | |
| ANCHOR HANDLING RIG OR DAVIT | | | | | |
| WINCH ENGINE OR MOTOR | | | | | |
| | | | | | |
| HOISTING SLING | | | | | |
| WING HANDLING LINES | | | | | |
| WATER RUDDER | | | | | |
| FITTINGS [redacted] HANDLING GEAR | | 210 | | | |
| - BEACHING GEAR ATTACHMENT | | | | | |
| - TIEDOWN | | | | | |
| - JACKING | | | | | |
| - TOWING | | | | | |
| - MOORING & SNUBBING | | | | | |
| - ANCHORAGE | | | | | |
| - LEVELING | | | | | |
| - HOISTING | | | | | |
| | | | | | |
| ARRESTING OR DECELERATION GEAR | | | | | |
| TRAILING HOOK | | | | | |
| HOOK POINT (TYPE ) | | | | | |
| EXTENSION GEAR | | | | | |
| RETRIEVING GEAR | | | | | |
| BUMPER | | | | | |
| SHOCK ABSORBER | | | | | |
| ATTACHMENT FITTINGS | | | | | |
| | | | | | |
| BARRIER CRASH FITTINGS | | | | | |
| | | | | | |
| DECELERATION - PARACHUTE | | | | | |
| - CONTAINER & FITTINGS | | | | | |
| - CONTROLS | | | | | |
| | | | | | |
| | | | | | |
| CATAPULTING GEAR | | | | | |
| CATAPULT FITTINGS | | | | | |
| CATAPULT HOOKS | | | | | |
| HOLDBACK FITTINGS | | | | | |
| | | | | | |
| ASSISTED TAKE OFF | | | | | |
| HOOKS | | | | | |
| | | | | | |
| CONTROLS - FIRING | | | | | |
| - BOTTLE RELEASE | | | | | |
| BOTTLE STOWAGE PROV. (NO. BOTTLES ) | | | | | |
| | | | | | |
| | | | | | |
| TOTALS | | 210 | | | |
| TOTAL - AUXILIARY GEAR GROUP | | | | | 210 |

*If not specified as special equipment.

[redacted]

| PREPARED BY: T A M | NORTH AMERICAN AVIATION, INC. | PAGE NO. 36 OF 51 |
|---|---|---|
| CHECKED BY: J H W | [redacted] | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | WEIGHT EMPTY SUMMARY | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. MOMENT |
|---|---|---|---|---|---|
| STRUCTURAL GROUPS | | | | | |
| Wing Group | | | | | |
| 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 | | 4113970 |
| Tail Group | | | | | |
| Stabilizer - Basic Structure | 1400 | 221 | 309400 | 200 | 280000 |
| Fin - Basic Structure | 1640 | 2002 | 3283280 | 290 | 475600 |
| Total - Tail Group | 3040 | | 3592680 | | 755600 |
| Body Group | | | | | |
| 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 | | 5515558 |
| Alighting Gear Group | | | | | |
| 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 | | 1077426 |
| [redacted] | | | | | |

| PREPARED BY: T A M | NORTH AMERICAN AVIATION, INC. | PAGE NO. 37 OF 51 |
|---|---|---|
| CHECKED BY: J H W | [redacted] | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | WEIGHT EMPTY SUMMARY | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. 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 [redacted] | 74367 | | 113659976 | | 12594323 |

| PREPARED BY: D D M | NORTH AMERICAN AVIATION, INC. [redacted] | PAGE NO 38 OF 51 |
|---|---|---|
| CHECKED BY: T M E | | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | WEIGHT EMPTY SUMMARY | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. MOMENT |
|---|---|---|---|---|---|
| PROPULSION GROUP | | | | | |
| Engine Installation | | | | | |
| Aerojet General Type HATR 2040 Scaled 103.1% (4) | 15660 | 2042 | 31977720 | 194 | 3038040 |
| Accessory Gear Boxes & Drives | | | | | |
| Gear Boxes (4) | 340 | 1950 | 663000 | 151 | 51340 |
| Drive Shafts & Couplings | 164 | 1990 | 326360 | 156 | 25584 |
| 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 |
| Air Induction System | | | | | |
| 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 |
| Fuel System | | | | | |
| 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 | 165 | 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 |
| | [redacted] | | | | |

| PREPARED BY: J W C | NORTH AMERICAN AVIATION, INC. | PAGE NO. 39 OF 51 |
|---|---|---|
| CHECKED BY: W H L | [redacted] | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | WEIGHT EMPTY SUMMARY | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. MOMENT |
|---|---|---|---|---|---|
| EQUIPMENT GROUPS | | | | | |
| Instruments | | | | | |
| Flight Instruments | 114 | 655 | 74670 | 195 | 22230 |
| Engine Instruments | 450 | 1213 | 545850 | 205 | 92250 |
| Total - Instruments | 564 | | 620520 | | 114480 |
| Hydraulic Group | | | | | |
| Utility System | ( 3736) | | (6599332) | | ( 728780) |
| 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) | | ( 242660) |
| 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 |
| Electrical Group | | | | | |
| 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 |



[redacted]

| PREPARED BY: J W C | NORTH AMERICAN AVIATION, INC. | PAGE NO. 40 OF 51 |
|---|---|---|
| CHECKED BY: W H L | [redacted] | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | WEIGHT EMPTY SUMMARY | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. MOMENT |
|---|---|---|---|---|---|
| EQUIPMENT GROUPS (CONT'D) | | | | | |
| Electronics Group | | | | | |
| 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 | | | | |
| | | The average arms for the Electronics Group have been assumed for the total installation. | | | |
| Total - Electronics Group | 1438 | 350 | 503300 | 210 | 301980 |
| Furnishings & Equipment Group | | | | | |
| 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 |
| Air Conditioning | | | | | |
| Pressurizing and Cooling System | ( 2880) | 1190 | (3427200) | 220 | ( 633600) |
| Heat Exchangers | 250 | | | | |
| Helium System | 850 | | | | |
| Scoops & Ducts | 1450 | | | | |
| Controls | 80 | | | | |
| Sealing & Test Provisions | 250 | | | | |

| PREPARED BY: J W C | NORTH AMERICAN AVIATION, INC. | PAGE NO. 41 OF 51 |
|---|---|---|
| CHECKED BY: W H L | [redacted] | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | WEIGHT EMPTY SUMMARY | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. MOMENT |
|---|---|---|---|---|---|
| EQUIPMENT GROUPS (CONT'D) | | | | | |
| Air Conditioning (Cont'd) | | | | | |
| Anti-Icing System | 212 | 785 | 166420 | 225 | 47700 |
| Total - Air Conditioning | 3092 | | 3593620 | | 681300 |
| Auxiliary Gear Group | | | | | |
| Handling Gear | 210 | 1566 | 328860 | 170 | 35700 |
| Total - Auxiliary Gear Group | 210 | | 328860 | | 35700 |
| TOTAL - EQUIPMENT GROUPS | 12450 | | 16169850 | | 2531415 |
| RECAPITULATION - WEIGHT EMPTY | | | | | |
| 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 = 55.3% M.A.C.

VERTICAL C.G. = 200.0 - 172.7 = 27.3 Inches Below F.R.L.

[redacted]

| PREPARED BY: D D M | NORTH AMERICAN AVIATION, INC. | PAGE NO. 42 OF 51 |
|---|---|---|
| CHECKED BY: T M E | [redacted] | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | USEFUL LOAD | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. MOMENT |
|---|---|---|---|---|---|
| **USEFUL LOAD** | | | | | |
| **Non Expendable Items** | | | | | |
| Crew | | | | | |
| Pilot | 270 | 273 | 73710 | 218 | 58860 |
| Reconnaissance Package | | | | | |
| Detail Photo Mission | (1958) | | ( 911044) | | ( 197965) |
| Structure | 660 | 473 | 312180 | 175 | 115500 |
| Cameras and Stab. Mounts | 700 | 487 | 340900 | 220 | 154000 |
| System Controls | 348 | 418 | 145464 | 215 | 74820 |
| Wire and Prov. | 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 |
| **Expendable Items** | | | | | |
| Fuel (101330 Gallons) | ( 59278) | | (7[illegible]) | | (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, 21800 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 | 19170 |
| Total - Expendable Items | 61483 | | 8123284[illegible] | | 12969983 |
| TOTAL - USEFUL LOAD | 63958 | | 8258402[illegible] | | 13470877 |



[redacted]

| PREPARED BY: T A M | NORTH AMERICAN AVIATION, INC. [redacted] | PAGE NO. 43 OF 51 |
|---|---|---|
| CHECKED BY: J H W | | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | LANDING GEAR AND WING TIP MOMENT CHANGE | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. MOMENT |
|---|---|---|---|---|---|
| LANDING GEAR MOMENT CHANGE DOWN POSITION | | | | | |
| Main | | | | | |
| Wheels, Brakes, Tires & Tubes | 2147 | 1603 | 3441641 | 58 | 124526 |
| Structure | 8044 | 1605 | 12910620 | 100 | 804400 |
| Controls | 825 | 1573 | 1297725 | 180 | 148500 |
| Nose | | | | | |
| 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 |
| RETRACTED POSITION | | | | | |
| Main | | | | | |
| Wheels, Brakes, Tires and Tubes | 2147 | 1483 | 3184001 | 182 | 390754 |
| Structure | 8044 | 1528 | 12291232 | 180 | 1447920 |
| Controls | 825 | 1573 | 1297725 | 175 | 144375 |
| Nose | | | | | |
| 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 |
| WING TIP MOMENT CHANGE | | | | | |
| 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 |

[redacted]

UNCLASSIFIED

| PREPARED BY: J W C | NORTH AMERICAN AVIATION, INC. | PAGE NO. 44 OF 51 |
|---|---|---|
| CHECKED BY: W H L | [redacted] | REPORT NO. NA-56-450 |
| DATE 1 June 1956 | TAKE-OFF GROSS WEIGHT DETAIL PHOTO MISSION | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. 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 | | | | | |

UNCLASSIFIED

[redacted]

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

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. 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% MAC | | | | | |
| VERTICAL C.G. = 200.0 - 184.2 = 15.8 inches below FRL | | | | | |
| Plus: Moment Change Landing Gear Up and Wing Tip Down | - | | - 901998 | | + 983603 |
| **TAKE-OFF GROSS WEIGHT - RADAR MAPPING MISSION - COHERENT DOPPLER RADAR - GEAR UP** | 206794 | 1481.81 | 306429313 | 188.70 | 39081648 |
| HORIZONTAL C.G. = $\frac{1481.81 - 834.19}{1335.81}$ = 48.5% MAC | | | | | |
| VERTICAL C.G. = 200.0 - 188.7 = 11.3 inches below FRL | | | | | |

| PREPARED BY: J W C | NORTH AMERICAN AVIATION, INC. | PAGE NO. 46 OF 51 |
|---|---|---|
| CHECKED BY: W H L | [redacted]-1 | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | TAKE-OFF GROSS WEIGHT - RADAR MAPPING MISSION - AZIMUTH RADAR | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. MOMENT |
|---|---|---|---|---|---|
| **TAKE-OFF GROSS WEIGHT - RADAR MAPPING MISSION - AZIMUTH RADAR - GEAR DOWN** | | | | | |
| Take-Off Gross Weight - Detail Photo Mission - Gear Down | 206800 | | 307258695 | | 38152170 |
| 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. = $\frac{1487.06 - 834.19}{1335.81}$ = 48.9% MAC | | | | | |
| VERTICAL C.G. = 200.0 - 184.3 - 15.7 inches below FRL | | | | | |
| 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. = $\frac{1482.70 - 834.19}{1335.81}$ = 48.5% MAC | | | | | |
| VERTICAL C.G. = 200.0 - 188.7 = 11.3 inches below FRL | | | | | |

[redacted]

| PREPARED BY: J W C | NORTH AMERICAN AVIATION, INC. | PAGE NO. 47 OF 51 |
|---|---|---|
| CHECKED BY: W H L | [redacted] ALTERNATE I-C | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | TAKE-OFF GROSS WEIGHT SEARCH PHOTO MISSION | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. 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% MAC | | | | | |
| VERTICAL C.G. = 200.0 - 184.3 = 15.7 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% MAC | | | | | |
| VERTICAL C.G. = 200.0 - 188.8 = 11.2 inches below FRL | | | | | |



[redacted]

| PREPARED BY: J W C | NORTH AMERICAN AVIATION, INC. [redacted] | PAGE NO. 48 OF 51 |
|---|---|---|
| CHECKED BY: W H L | ALTERNATE I-D | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | TAKE-OFF GROSS WEIGHT - FERRET MISSION | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. MOMENT |
|---|---|---|---|---|---|
| TAKE-OFF GROSS WEIGHT - FERRET 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 - 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/F | 152 | 425 | 64600 | 207 | 31464 |
| EHF | 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. = $\frac{1486.34}{1335.81} - 834.19$ = 48.8% MAC | | | | | |
| VERTICAL C.G. = 200.0 - 184.3 = 15.7 inches below FRL | | | | | |
| 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. = $\frac{1481.97}{1335.81} - 834.19$ = 48.5% MAC | | | | | |
| VERTICAL C.G. = 200.0 - 188.8 = 11.2 inches below FRL | | | | | |



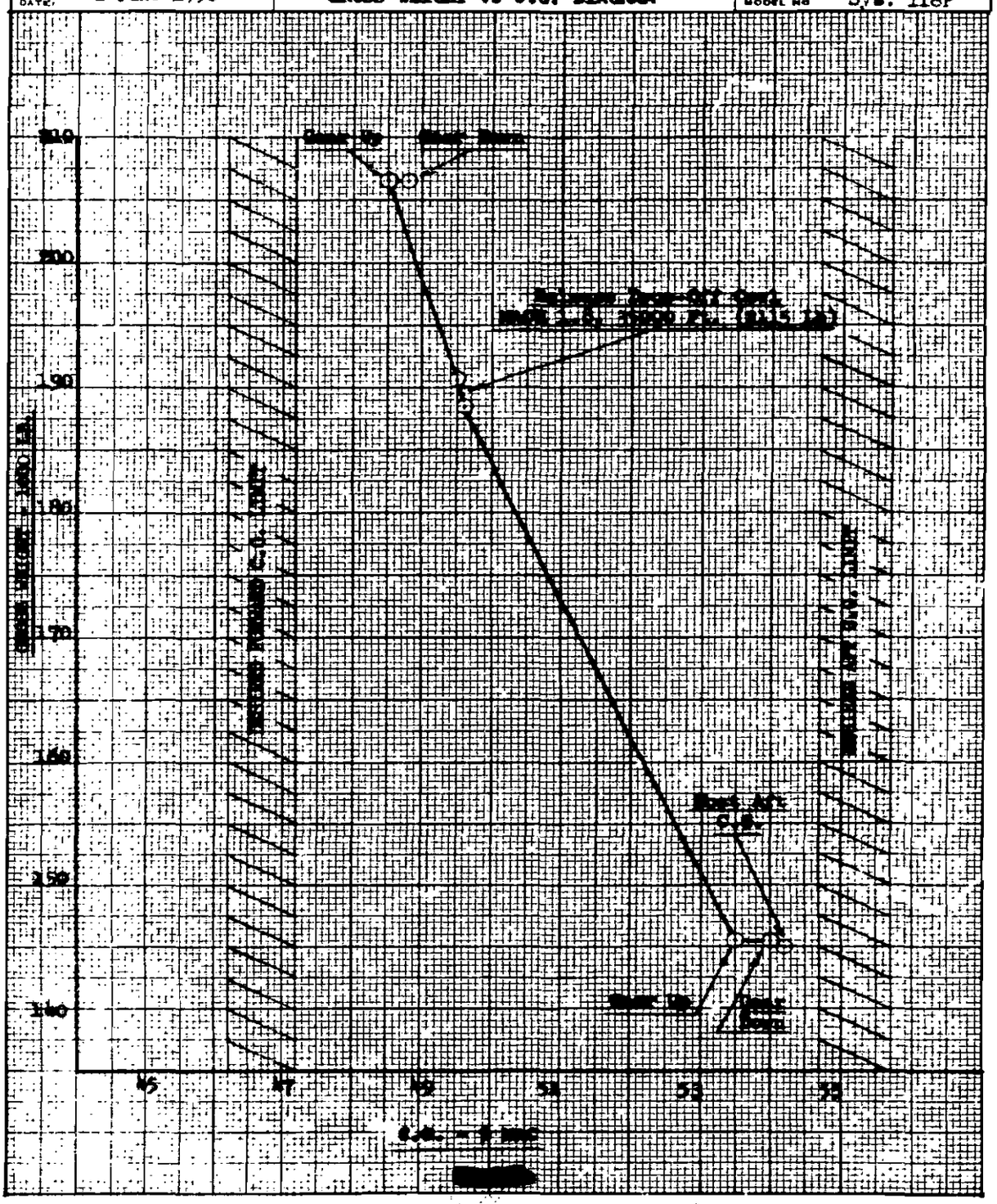
[redacted]

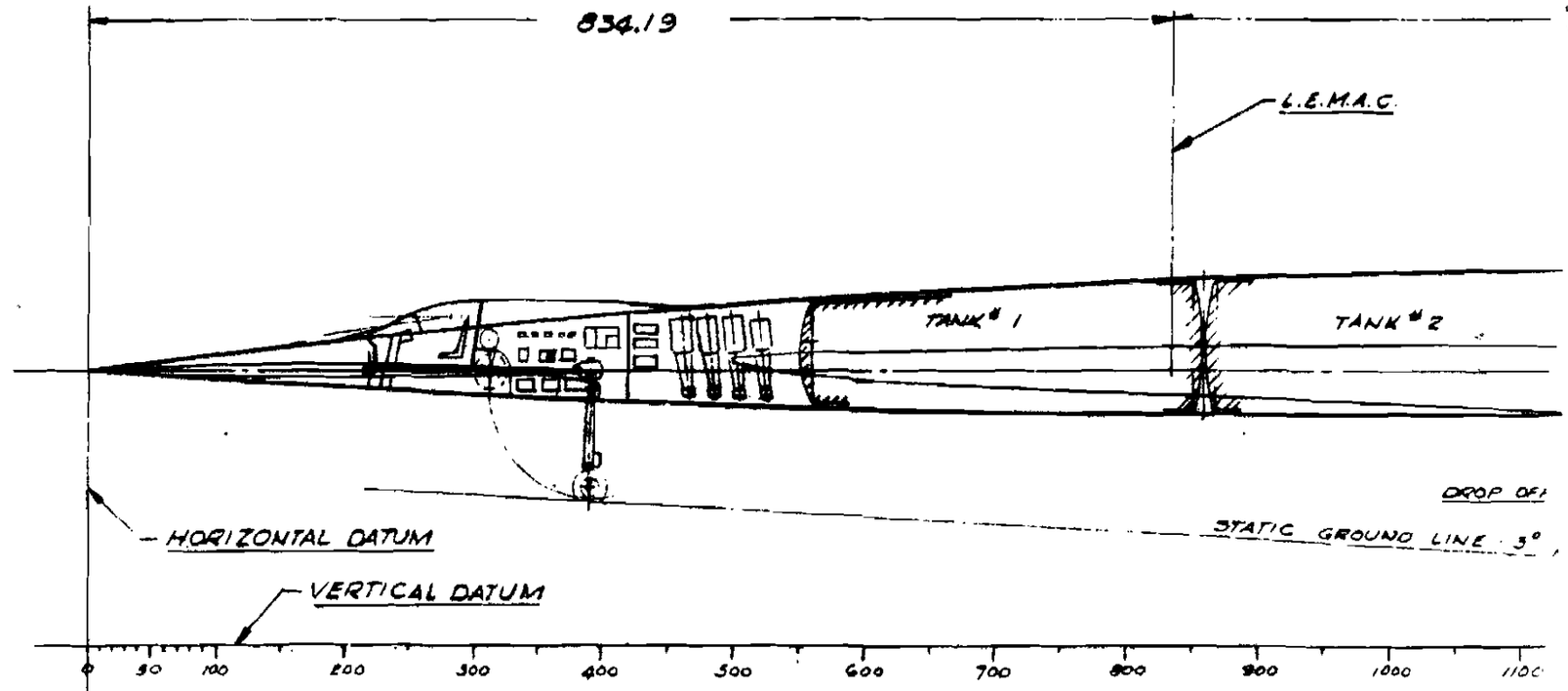
| PREPARED BY: J W C | NORTH AMERICAN AVIATION, INC. [redacted] | PAGE NO. 49 OF 51 |
|---|---|---|
| CHECKED BY: W H L | | REPORT NO. NA-56-450 |
| DATE: 1 June 1956 | EXTREME C.G. CONDITIONS | MODEL NO. Sys. 118P |

| ITEM | WEIGHT LBS. | HORIZONTAL C. G. ARM | HORIZONTAL C. G. MOMENT | VERTICAL C. G. ARM | VERTICAL C. G. MOMENT |
|---|---|---|---|---|---|
| MOST FORWARD C.G. CONDITION | | | | | |
| Take-Off Gross Weight - Detail Photo Mission - Gear Down | 206800 | | 307258695 | | 38132170 |
| Plus: Moment Change, Landing Gear Up and Wing Tip Down | - | | - 901998 | | + 923603 |
| MOST FORWARD C.G. CONDITION GEAR UP | 206800 | 1481.42 | 306356697 | 188.86 | 39055773 |
| HORIZONTAL C.G. = 1481.42 / 1335.61 - 834.19 = 48.5% MAC | | | | | |
| VERTICAL C.G. = 200.0 - 188.9 = 11.1 inches below FRL | | | | | |
| MOST AFT C.G. CONDITION | | | | | |
| Take-Off Gross Weight - Search Photo Mission - Gear Down | 206480 | | 307125211 | | 3804864O |
| Less: Total Fuel, 101330 Gals. | -59278 | | -78328407 | | -12703358 |
| Drop-Off Cowl | - 2115 | 1287 | - 2722005 | 117 | - 247455 |
| MOST AFT C.G. CONDITION GEAR DOWN | 145087 | 1558.20 | 226074799 | 172.98 | 25097827 |
| HORIZONTAL C.G. = 1558.20 / 1335.81 - 834.19 = 54.2% MAC | | | | | |
| VERTICAL C.G. = 200.0 - 173.0 = 27.0 inches below FRL | | | | | |

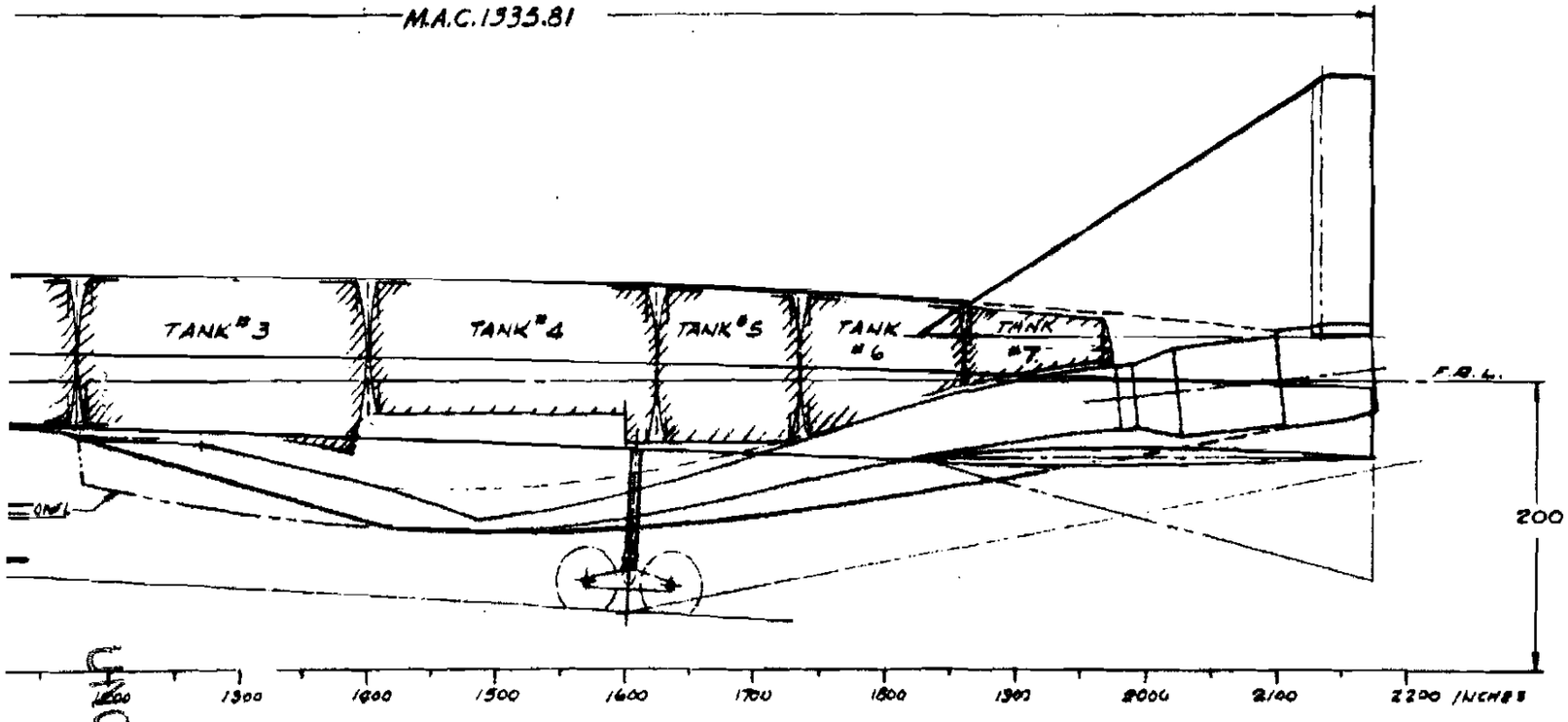
FORM ED-147

| | | |
|---|---|---|
| PREPARED BY J W C | NORTH AMERICAN AVIATION, INC. | PAGE NO 50 OF 51 |
| CHECKED BY W H L | [redacted] | REPORT NO NA-56-450 |
| DATE: 1 June 1956 | GROSS WEIGHT vs C.G. DIAGRAM | MODEL NO Sys. 116P |






1










NORTH AMERICAN AVIA...

AIRPLANE DIA...

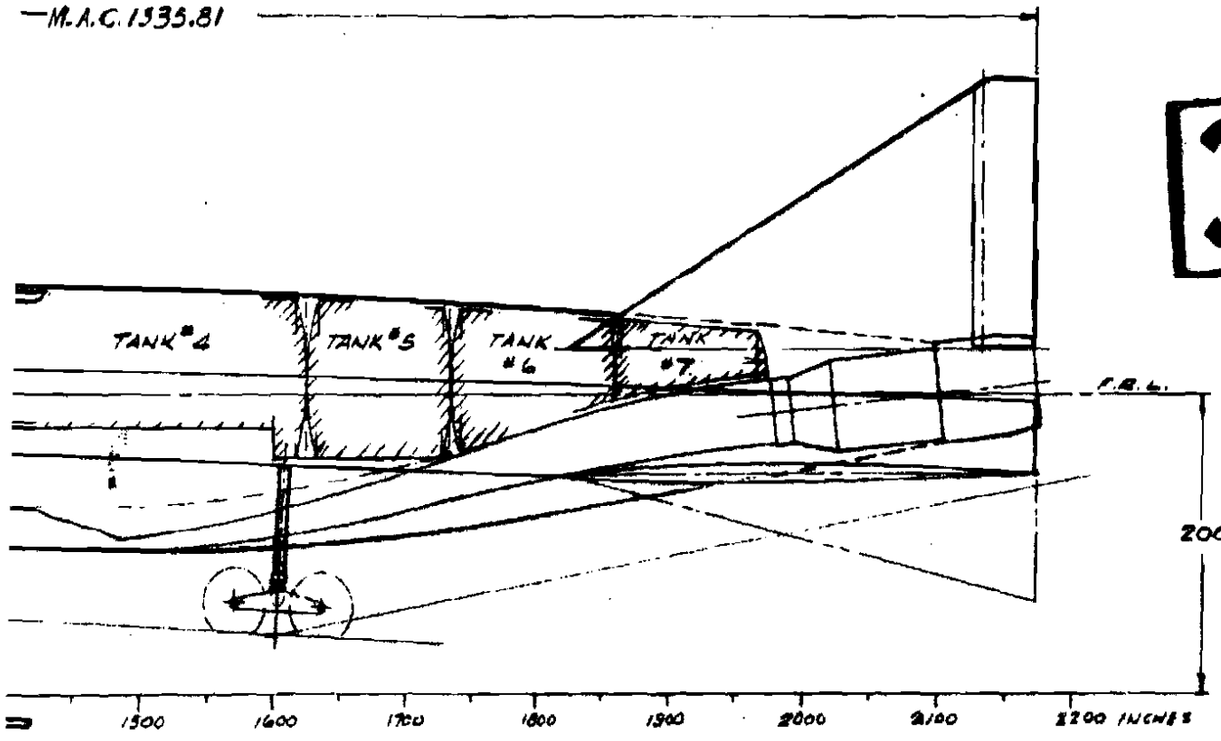
TA...

TO

UNCLASSIFIED

| | | |
|---|---|---|
| DLE | NORTH AMERICAN AVIATION, INC. | SHEET NO. 51 OF 51 |
| JNK | INTERNATIONAL AIRPORT LOS ANGELES 45, CALIFORNIA | DRAWING NO. NA 48F-1670 |
| DATE February 1956 | AIRPLANE DIAGRAM | MODEL NO. Spec. 118P |
| | | SCALE 1" = 60" |

3




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

UNCLASSIFIED

NORTH AMERICAN AVIATION, INC.
INTERNATIONAL AIRPORT
LOS ANGELES 45, CALIFORNIA



REPORT NA-56-450

# APPENDIX I

## SUPPORTING DATA

## RECONNAISSANCE

## WEAPONS SYSTEM 110P

## PHASE III



No. of Pages 47

Date: 1 June 1956

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.



[redacted]

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.

$$W_w = \delta_w \left\{ 41.5 C G^{1/4} S^{3/4} + \left[ \frac{A^{3/2} S^{1/2} N J}{10 K_f t \cos^2 \Lambda (1 - .25 \sin \Lambda)} \right] \times \left[ G - \frac{(\Omega + \omega)(1 + \lambda) \mathfrak{F} J''}{(\mathfrak{F} + \lambda) J} \right] \right\} q_w$$

2. Definitions of Symbols.

$W_w$ = Wing Group Weight in pounds.

$\delta_w$ = A quantity defined in conjunction with Table 1, page 6.

$C$ = Secondary Structure Factor.

$$= .036 - .0327\, e^{-.00247\sqrt{GN}}$$

$G$ = 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.

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

$\lambda$ = Planform Taper Ratio

$$= \frac{c_t}{c_r} = \frac{\text{Tip Chord in inches.}}{\text{Root Chord in inches.}}$$

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

$\beta$ = Any arbitrary point along the Wing Semi-Span.

$b$ = Wing Span in the same units of length as those used in expressing $\beta$.

$\sigma$ = 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.

$$K = .92 - \frac{AR^{1/2}(1+\lambda)}{S^{1/2}t(1+\lambda\sigma)}\left(.0338 + .000004P^{3/4}\right)$$

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

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

$$= \frac{AR^{3/2}(1+\lambda)NJ'}{22.08S^{1/2}tT\cos\Lambda}\left[G - \frac{(\Omega+\omega)(1+\lambda)\gamma J''}{(\gamma+\lambda)J'}\right]$$

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

$T$ = Structural Chord Factor.

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

$\Lambda$ = The angle of sweep of the 40% chord line of the wing.

$\gamma$ = The rate of taper of the wing.

$$= \frac{A(1-\lambda)}{AR(1+\lambda)}$$

[redacted]

$\Omega$ = The deadweight of the wing structure.

$\omega$ = The deadweight of the contents of the wing corresponding to

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

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

$$= \frac{P}{.500+(1.85\times10^{-6})P}$$

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

$\tau$ = A quantity which defines the slope of the Dead Weight Distribution.

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

$T$ = 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 $\delta_w$.

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

(a) An idealized model of wing structure was constructed.

(b) An idealized model was related to a set of physical data.

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** [redacted] | 4 | - .005 | |

Table 1 Continued Next Page

TABLE 1 (CONT'D)

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

$AR$ = .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.

$\omega$ = 2053 pounds.

$J''$ = .4910

$f$ = 20830 pounds per square inch.

$J$ = .48938

$\gamma$ = 3.0

$\rho_M$ = 1.0393

$T$ = 1963.5



PART III. HORIZONTAL TAIL WEIGHT.

1. Horizontal Tail Weight Equation.

$$W_H = \delta_H \left[ 41.5\, C\, n_L^{1/4} S^{3/4} + \frac{AR^{3/2} S^{1/2} n_L J}{8.00 K f t \cos^2 \Lambda (1 - .25 \sin \Lambda)} \right] \rho_M$$

2. Definitions of Symbols.

$W_H$ = Horizontal Tail Weight in pounds.

$\delta_H$ = A quantity defined in conjunction with Table 2 page 11.

$C$ = Secondary Structure Factor

$$= .035 - .0327\, e^{-.0025 f n_L}$$

* $n_L$ = 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.

$S$ = Horizontal Tail Area in square feet.

(a) If $S$ is Gross Horizontal Tail Area, then the value of $\delta_M$ for a Basic Slab Tail is 1.0

(b) If $S$ is Exposed Horizontal Tail Area, then the value of $\delta_M$ for a Basic Slab Tail is 1.1.

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

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



$\lambda$ = Planform Taper Ratio

$$= \frac{c_t}{c_r} = \frac{\text{Tip Chord in Inches}}{\text{Root Chord in Inches}}$$

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

$\beta$ = 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 $\beta$. The value of must correspond to $S$.

$\sigma$ = 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.

[redacted]

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

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

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

$$= \frac{AR^{3/2}(1+\lambda)\pi J'}{17.66 \, 5^{1/2} t \tau \cos\Lambda}$$

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

$\tau$ = Structural Chord Factor.

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

$\Lambda$ = The angle of sweep of the 40% chord line of the Horizontal Tail.

$r$ = The rate of taper of the Horizontal Tail.

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

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

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

$$\rho_N = \frac{11.797}{(T - 1900)^{.596}}$$

$T$ = 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 $\delta_H$.

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

TABLE 2

HORIZONTAL TAIL WEIGHT INCREMENTS

| | See Part I Paragraph | | |
|---|---|---|---|
| Basic | | | 1.100 |
| 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 $\delta_H$ | | | .620 |

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.

$\delta_H$ = .620

$C$ = .0209

$n$ = 93360 pounds.

$S$ = 435 square feet.

$AR$ = 1.439

$J$ = .5335

$\lambda$ = .2321

$b$ = 25.02 feet.

$\sigma$ = 1.0

$K$ = .8418

$t$ = .03

$D$ = 25158 pounds per foot.

$J'$ = .7262

$\tau$ = 1.0716

$\Lambda$ = 46.1 degrees.

$r$ = 1.7324

$f$ = 26060 pounds per square inch.

$\rho_H$ = .9933

$T$ = 1963.5

PART IV. VERTICAL TAIL WEIGHT

1. Vertical Tail Weight Equation.

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

2. Definitions of Symbols.

$W_v$ = Vertical Tail Weight in pounds.

$\delta_v$ = A quantity defined in conjunction with Table 3 page 16.

$C$ = Secondary Structure Factor

$$= .035 - .0327\, e^{-.00890 \sqrt{n_L}}$$

* $n_L$ = Limit critical Vertical Tail Load in pounds.

$S$ = Vertical Tail Area in square feet.

$R$ = The Aerodynamic Aspect Ratio of the Vertical Tail.

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

$\lambda$ = 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

$\beta$ = 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 $\beta$. This quantity is approximately twice the distance from the tip to the point of attachment to the fuselage.

$\sigma$ = 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.

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

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

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

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

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

$\tau$ = Structural Chord Factor. [redacted]

$$T = \frac{\text{Cos}\,\Lambda}{1-.2r\,\text{Sin}\,\Lambda\,\text{Cos}\,\Lambda\,[\,1+1.2r\,\text{Sin}\,\Lambda\,\text{Cos}\,\Lambda\,]}$$

$\Lambda$ = The angle of sweep of the 40% chord line of the Vertical Tail.

$r$ = The rate of taper of the Vertical Tail.

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

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

$$= \frac{P}{.500+(1.85\times10^{-5})P}$$

$$\rho_v = \frac{18.843}{(T-1900).886}$$

$T$ = 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 $\delta_v$.

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

TABLE 3

VERTICAL TAIL WEIGHT INCREMENTS

| | See Part X Paragraph | | |
|---|---|---|---|
| Basic | | | 1.000 |
| 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 $\delta_v$ | | | 1.310 |

NOTE: The value of $\delta_v$ 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

$T_L$ = 10660 pounds.

$S$ = 250 square feet.

$AR$ = .9064

$J$ = .4290

$\lambda$ = .1034

$b$ = 15.03 feet.

$\sigma$ = 1.0

$K$ = .8481

$t$ = .03

$P$ = 5830 pounds per foot.

$J$ = .6120

$T$ = 1.1066

$\Lambda$ = 45.97 degrees

$r$ = 1.7929

$f$ = 9590 pounds per square inch.

$\varphi_v$ = .4759

$T$ = 1963.5

PART V. FUSELAGE GROUP WEIGHT.

1. Fuselage Weight Equation.

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

2. Definitions of Symbols.

$W_F$ = Fuselage Group Weight in pounds.

$\delta_F$ = A quantity defined in conjunction with Table 4 page 19.

$\zeta$ = .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.

$\eta$ = .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.

$$q_r = \frac{2.307}{(T-1900)^{.234}}$$

* The Mean Diameter is defined as:

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

The Width and the Depth occur at the same section.

[redacted]

3. The Meaning of $\delta_F$.

The meaning of $\delta_F$ is essentially the same as that of $\delta_W$. 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 $\delta_F$ is computed as shown in Table 4.

TABLE 4

FUSELAGE WEIGHT INCREMENTS

| | See Part I Paragraph | | |
|---|---|---|---|
| Basic | | | 1.000 |
| Increments | | | |
| Wing Moment Carry thru Structure | 2 | + .133 | |
| Transfer of Empennage Ftgs 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 $\delta_F$ | | | 1.209 |

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.

$\delta_F$ = 1.209

$\xi$ = .010

$S_F$ = 7058 square feet.

$S_c$ = 75 square feet.

$G$ = 179196 pounds.

$V$ = 665 knots.

$N$ = 2.0

$E$ = 0

$\eta$ = .75

$L$ = 165 feet.

$D$ = 21.17 feet.

$T$ = 1963.5

$\varphi_F$ = .8779

PART VI. LANDING GEAR GROUP WEIGHT.

1. Landing Gear Weight Equation.

$$W_g = \left[\delta_g \varphi_g + \nu\right]\left[.14 e^{.07\mu/\mu} \Gamma^{7/8}\right] \varphi_g$$

2. Definitions of Symbols.

$W_g$ = Landing Gear Group Weight in pounds.

$\delta_g$ = A quantity defined in conjunction with Table 5, page 21.

$$\nu = \frac{135599}{(T-1900)^{.1304}}$$

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

$\mu$ = 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.

$\Gamma$ = 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.

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

3. The Meaning of $\delta_q$

The meaning of $\delta_q$ is essentially the same as that of $\delta_N$. 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 $\delta_q$ is computed as shown in Table 5.

TABLE 5

LANDING GEAR WEIGHT INCREMENTS

| | | | |
|---|---|---|---|
| Basic | | | 1.000 |
| | See Part X 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 $\delta_q$ | | | .960 |

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.

$\delta_q$ = .960

$\nu$ = .150

$\mu$ = 12.5 feet.

$\Gamma$ = 160227 pounds.

$\tau$ = 1963.5

$q_q$ = .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.

[redacted]

UNCLASSIFIED

PART 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.



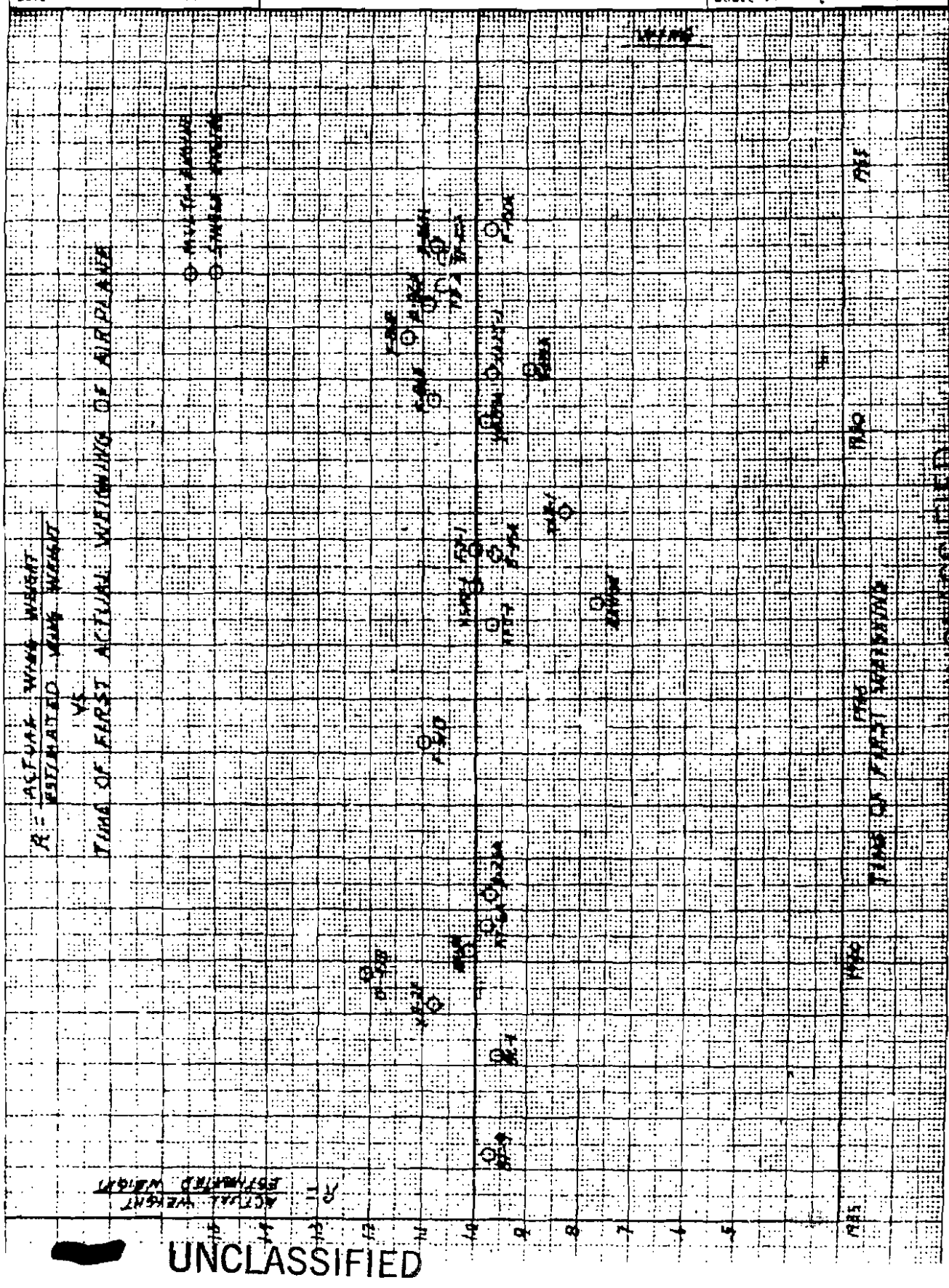


[redacted]

FORM 60-148

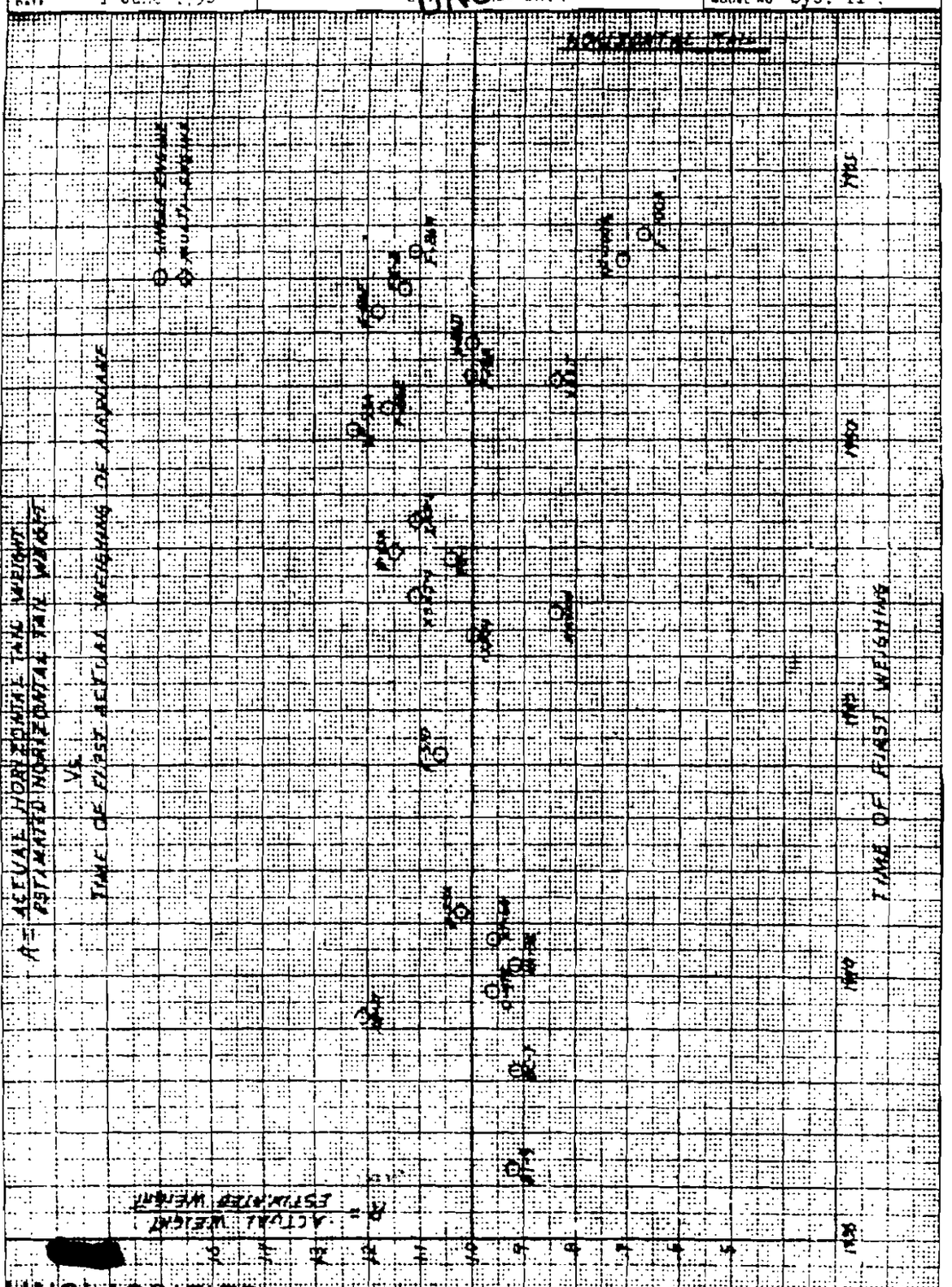
APPENDIX I

| | | |
|---|---|---|
| PREPARED BY: [redacted] A V | NORTH AMERICAN AVIATION, INC. | PAGE NO 24 OF 47 |
| CHECKED BY: S S P | UNCLASSIFIED | REPORT NO NA-58-450 |
| DATE: 1 June 1956 | SUPERSONIC MISSILE | MODEL NO Sys. 112P |



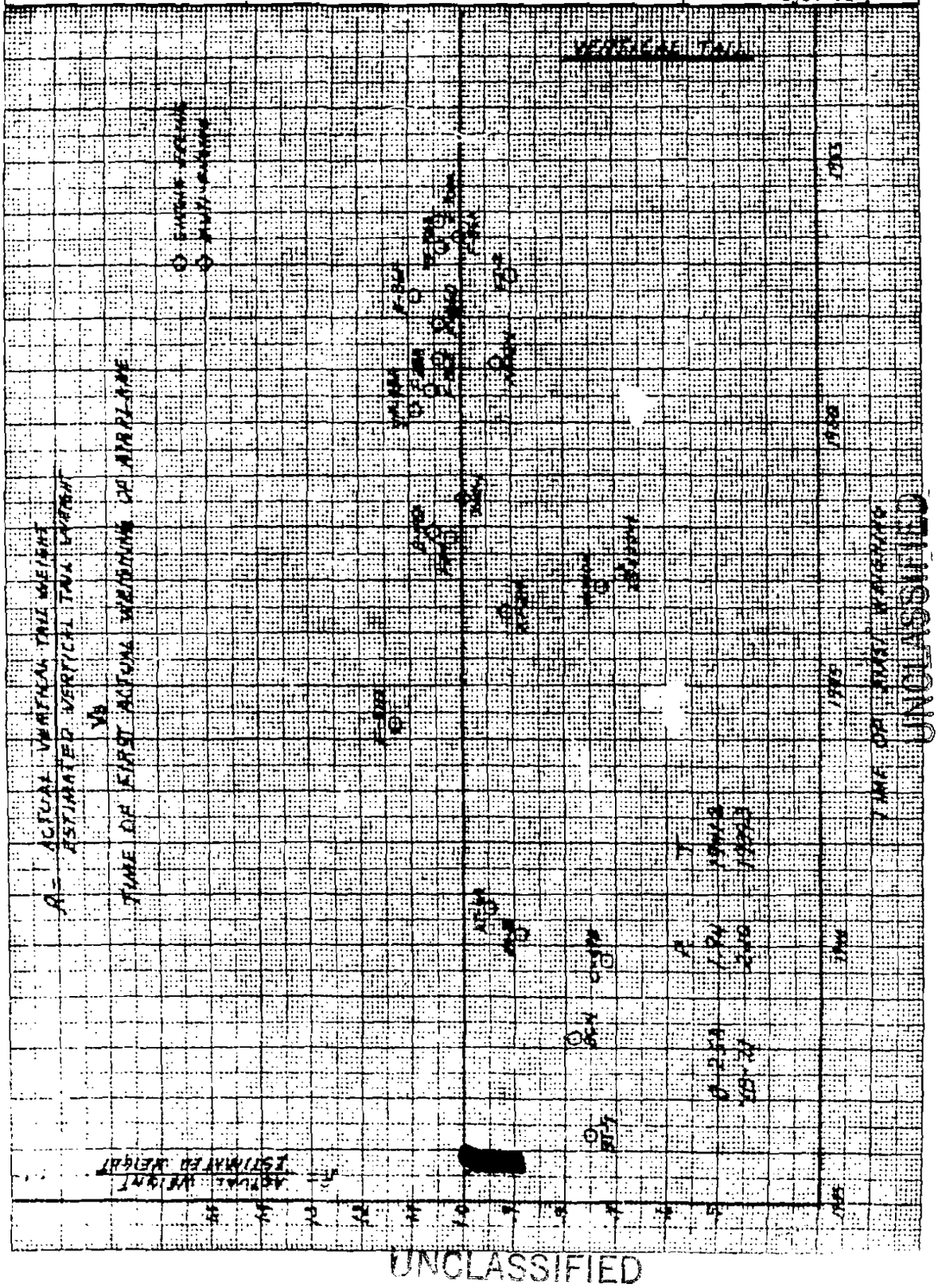
| | | |
|---|---|---|
| PREPARED BY W A N | NORTH AMERICAN AVIATION, INC. | PAGE NO 25 OF 47 |
| CHECKED BY S S B | [redacted] | REPORT NO NA-56-[illegible] |
| DATE 1 June 1956 | SUBJECT [illegible] | MODEL NO Sys. 118P |



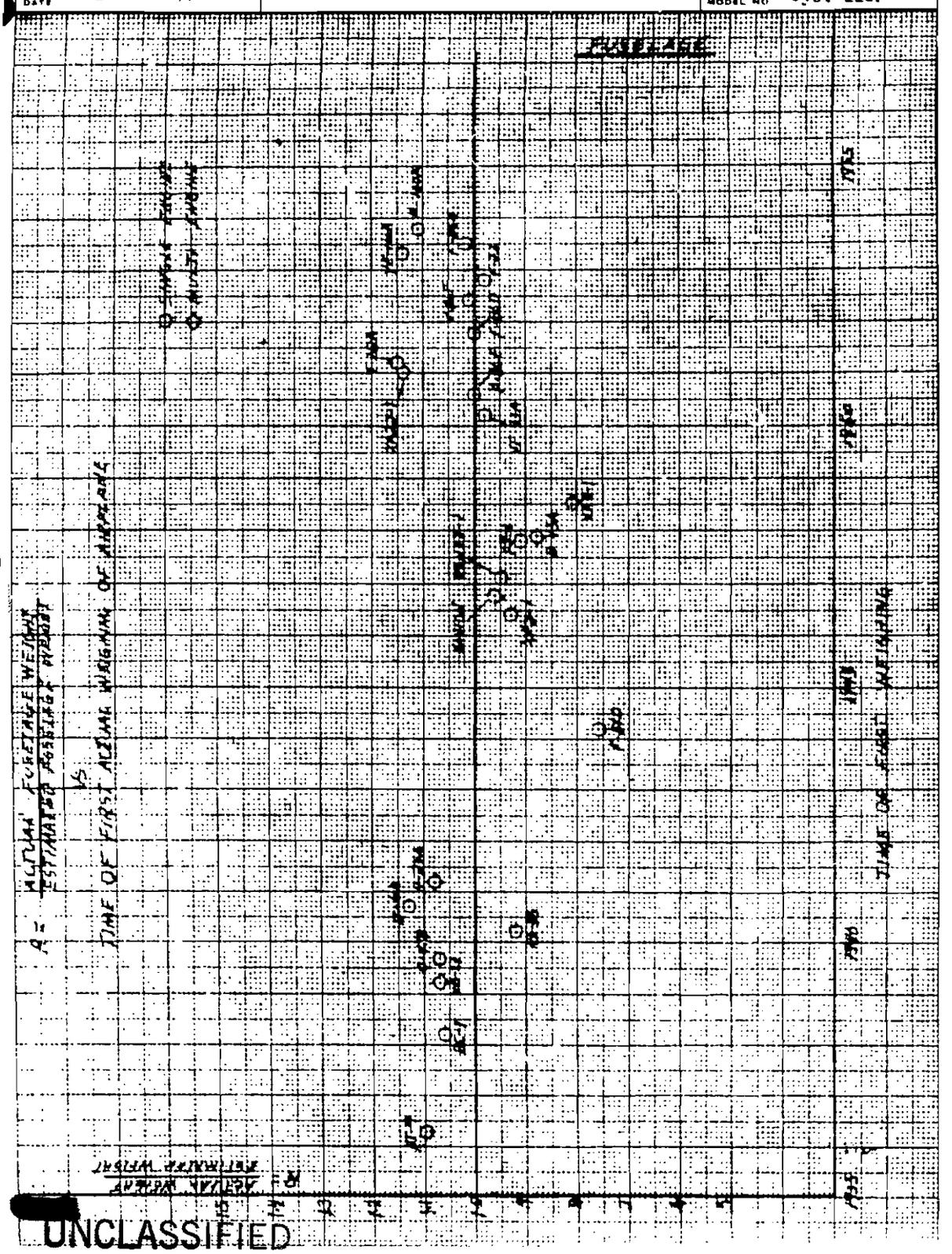


FORM ED-148

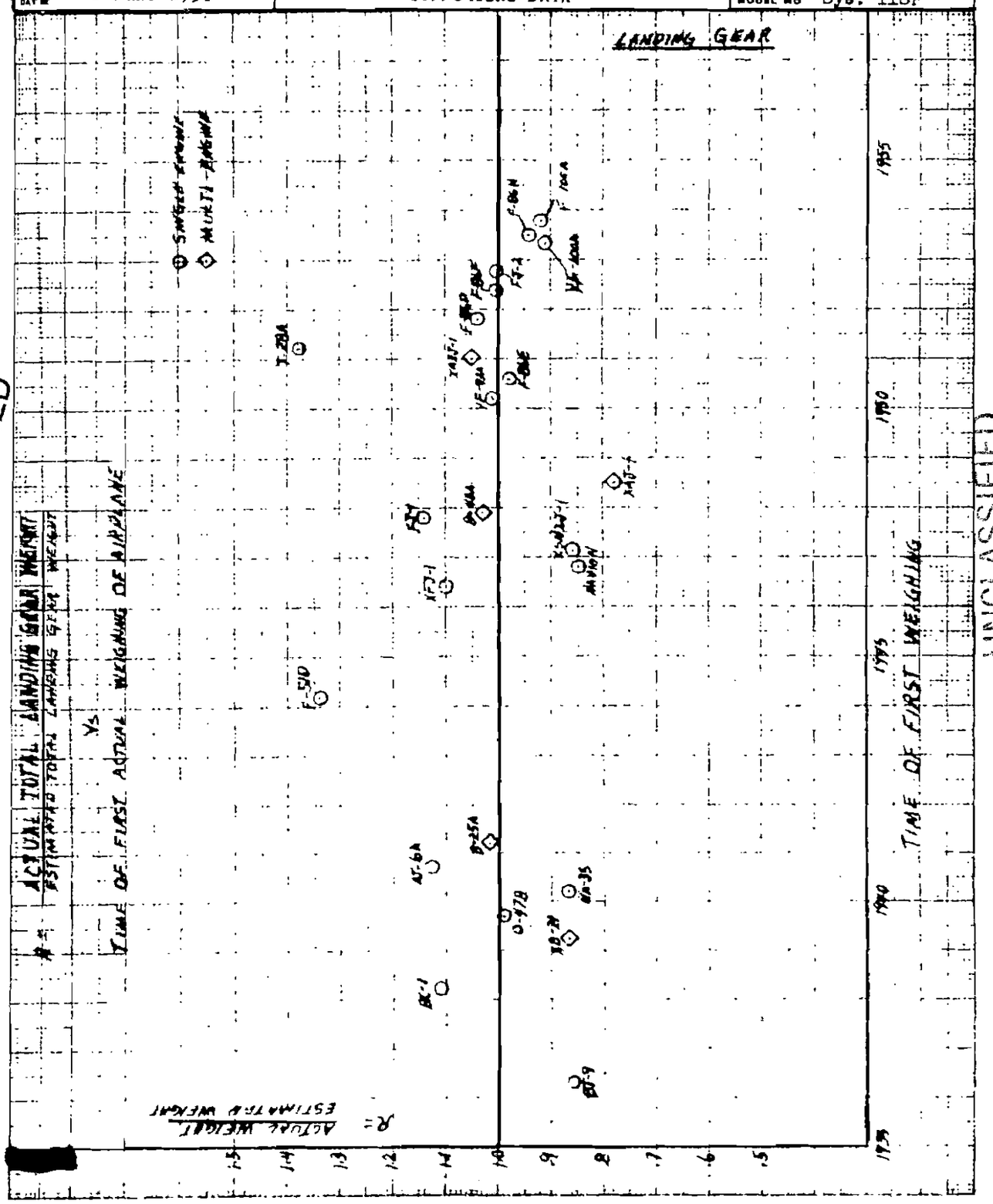
| | | |
|---|---|---|
| PREPARED BY: W A P | NORTH AMERICAN AVIATION, INC. | PAGE NO 26 OF 47 |
| CHECKED BY: S S P | [redacted] | REPORT NO NA-56-44 |
| DATE: 1 June 1956 | SUPPORTING DATA | MODEL NO Sys. 118P |



| PREPARED BY A K | NORTH AMERICAN AVIATION, INC. | PAGE NO 27 OF 47 |
|---|---|---|
| CHECKED BY S S B | UNCLASSIFIED | REPORT NO NA-56-450 |
| DATE 1 June 1956 | SUPPORTING DATA | MODEL NO Sys. 118P |

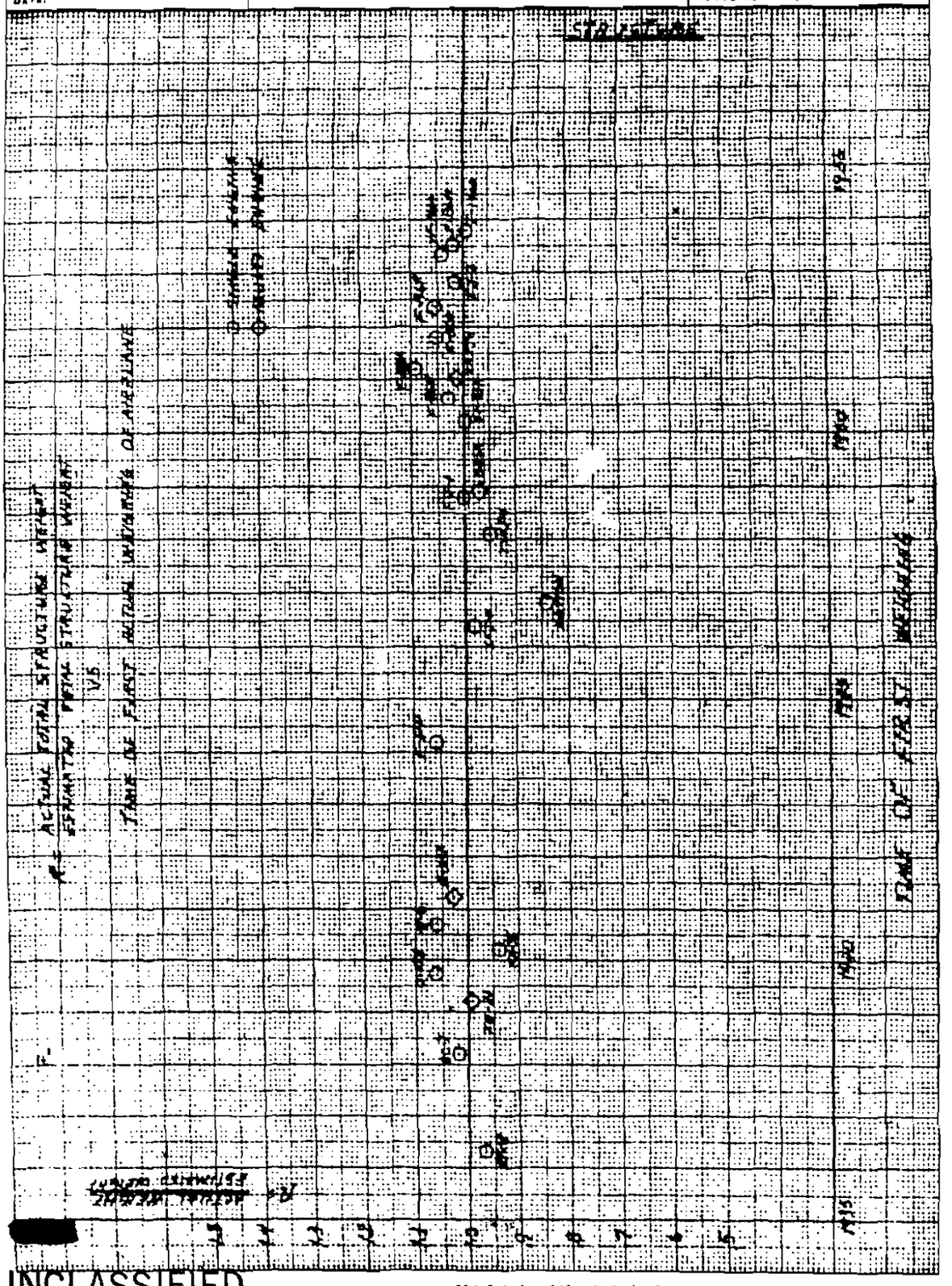


| | | |
|---|---|---|
| PREPARED BY: V A M | NORTH AMERICAN AVIATION, INC. | PAGE NO 28 OF 47 |
| CHECKED BY: S S B | [redacted] | REPORT NO NA-56-450 |
| DATE 1 June 1956 | SUPPORTING DATA | MODEL NO Sys. 118P |



FORM ED-146

| | | |
|---|---|---|
| PREPARED BY W A M | NORTH AMERICAN AVIATION, INC. | PAGE NO 29 OF 47 |
| CHECKED BY S S B | [redacted] | REPORT NO NA-56-450 |
| DATE 1 June 1956 | SUPPORTING DATA | MODEL NO Sys. 118P |



UNCLASSIFIED

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 $C_N \times 10^{-6}$

(b) $\Gamma$ vs $AR$

(c) $T$ vs $\Lambda$

(d) $f$ vs $P$

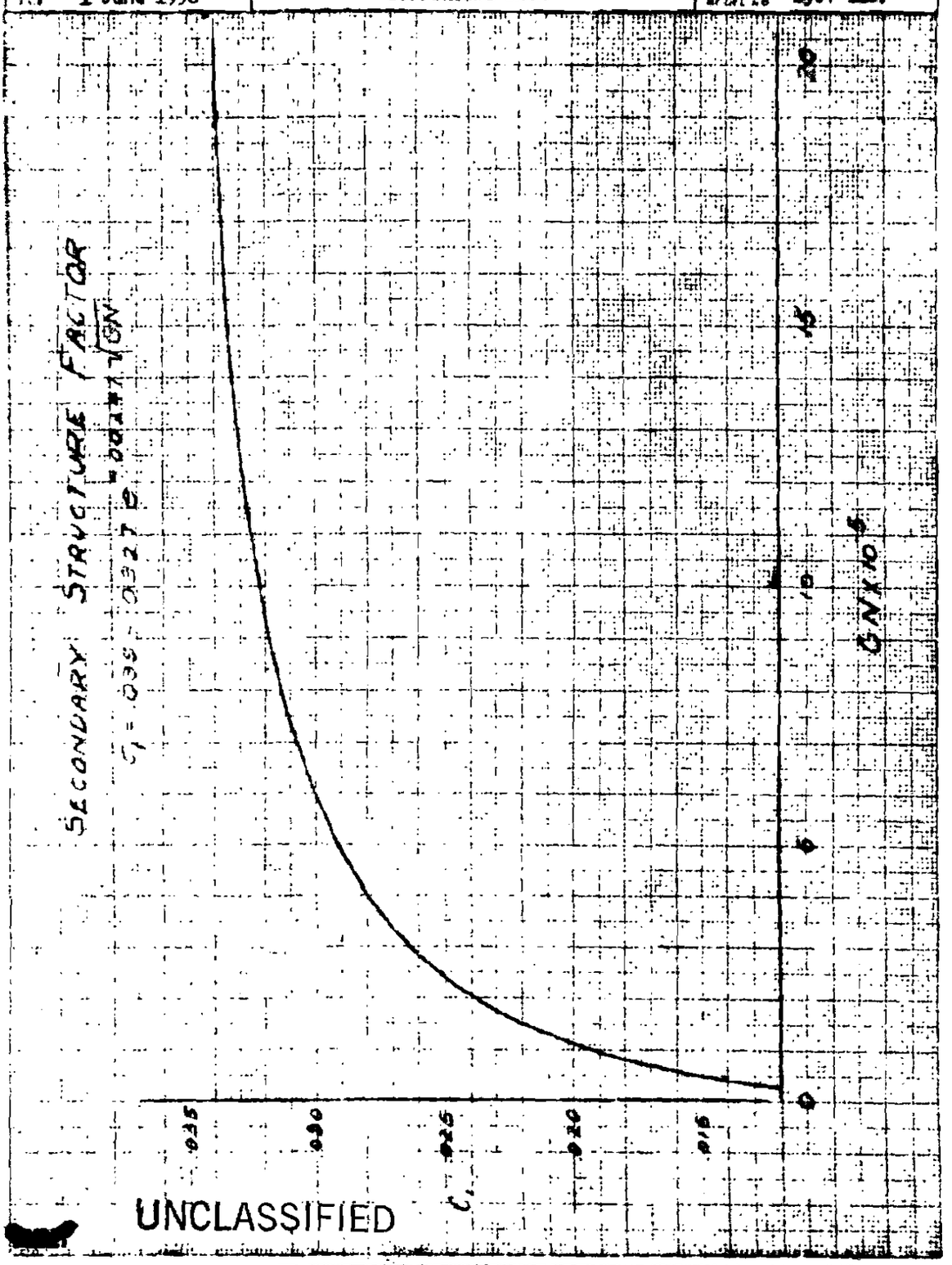
(e) $J$ vs $\lambda$

(f) $J'$ vs $\lambda$

(g) $J''$ vs $\lambda$

(h) $J'''$ vs $\lambda$

UNCLASSIFIED

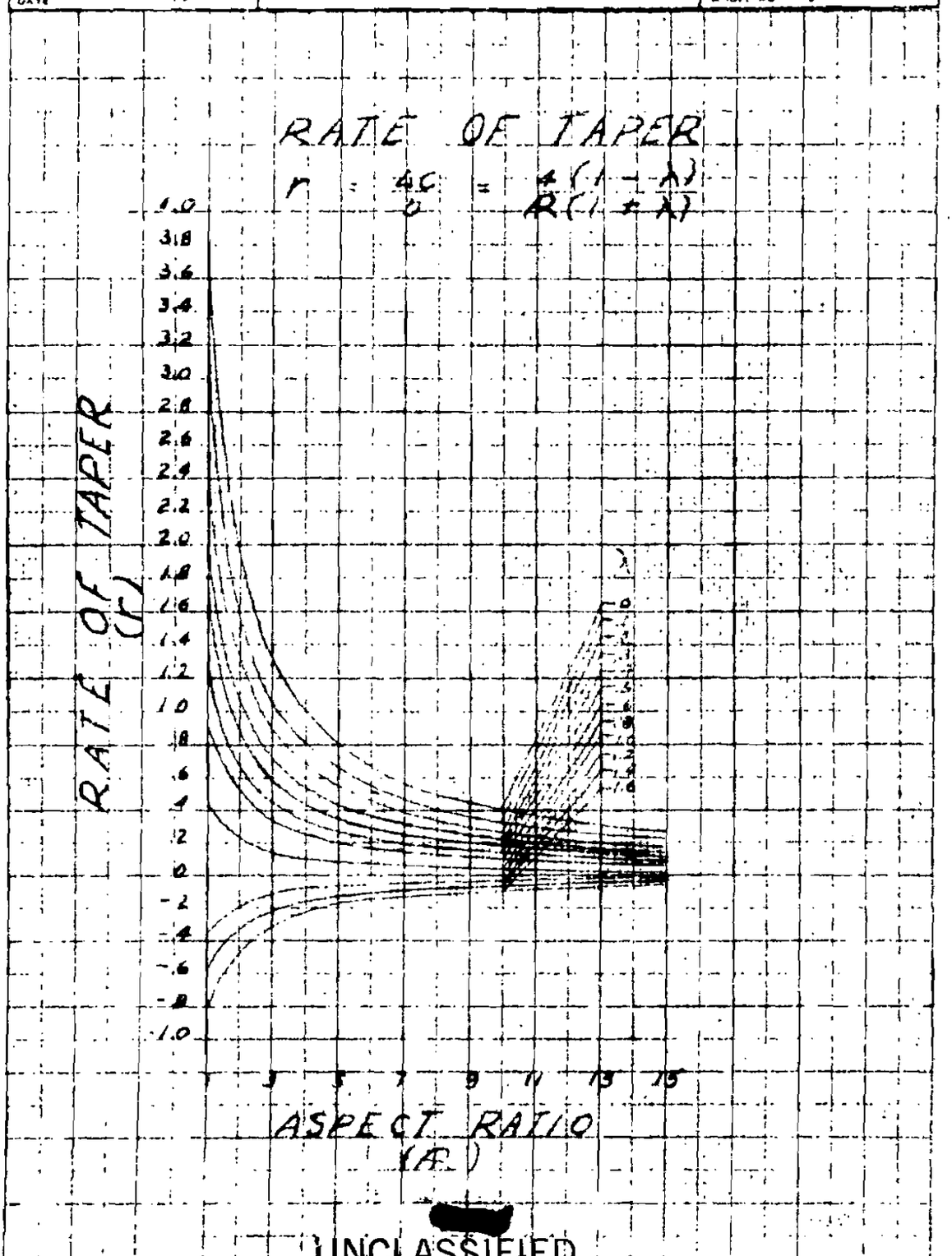





UNCLASSIFIED

APPENDIX I

| | | |
|---|---|---|
| PREPARED BY W A M | NORTH AMERICAN AVIATION, INC. | PAGE NO 38 OF 47 |
| CHECKED BY S S B | [redacted] | REPORT NO NA-56-450 |
| DATE 1 June 1956 | SUPPORTING DATA | MODEL NO Sys. 118P |



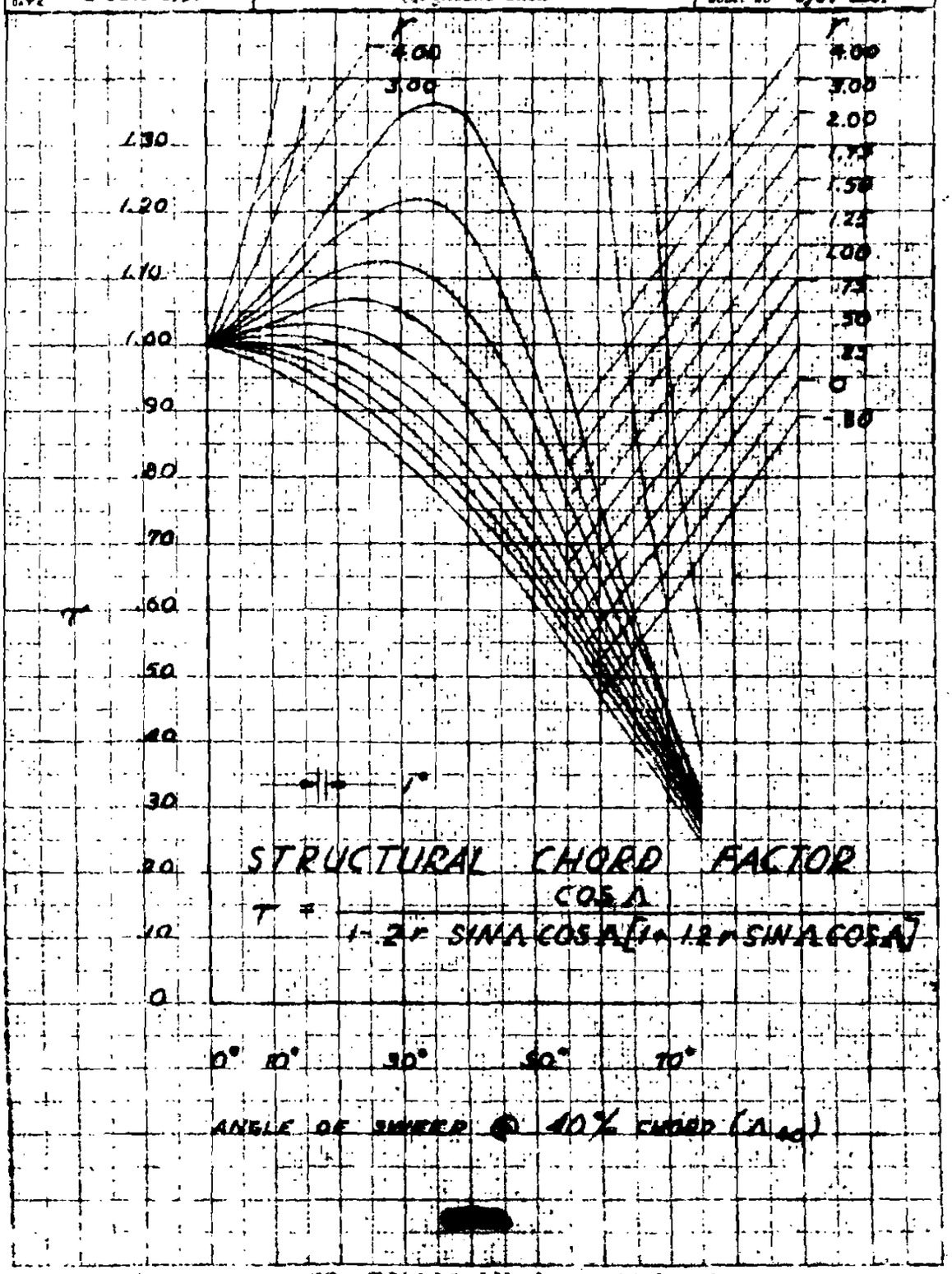

[redacted]



UNCLASSIFIED

APPENDIX I

| | | |
|---|---|---|
| PREPARED BY W A M | NORTH AMERICAN AVIATION, INC. | PAGE NO. 33 OF 47 |
| CHECKED BY S S B | [redacted] | REPORT NO. NA-56-450 |
| DATE 1 June 1956 | SUPPORTING DATA | MODEL NO. Sys. 116P |




[redacted]

PREPARED BY W A M

CHECKED BY S S B

DATE 1 June 1956

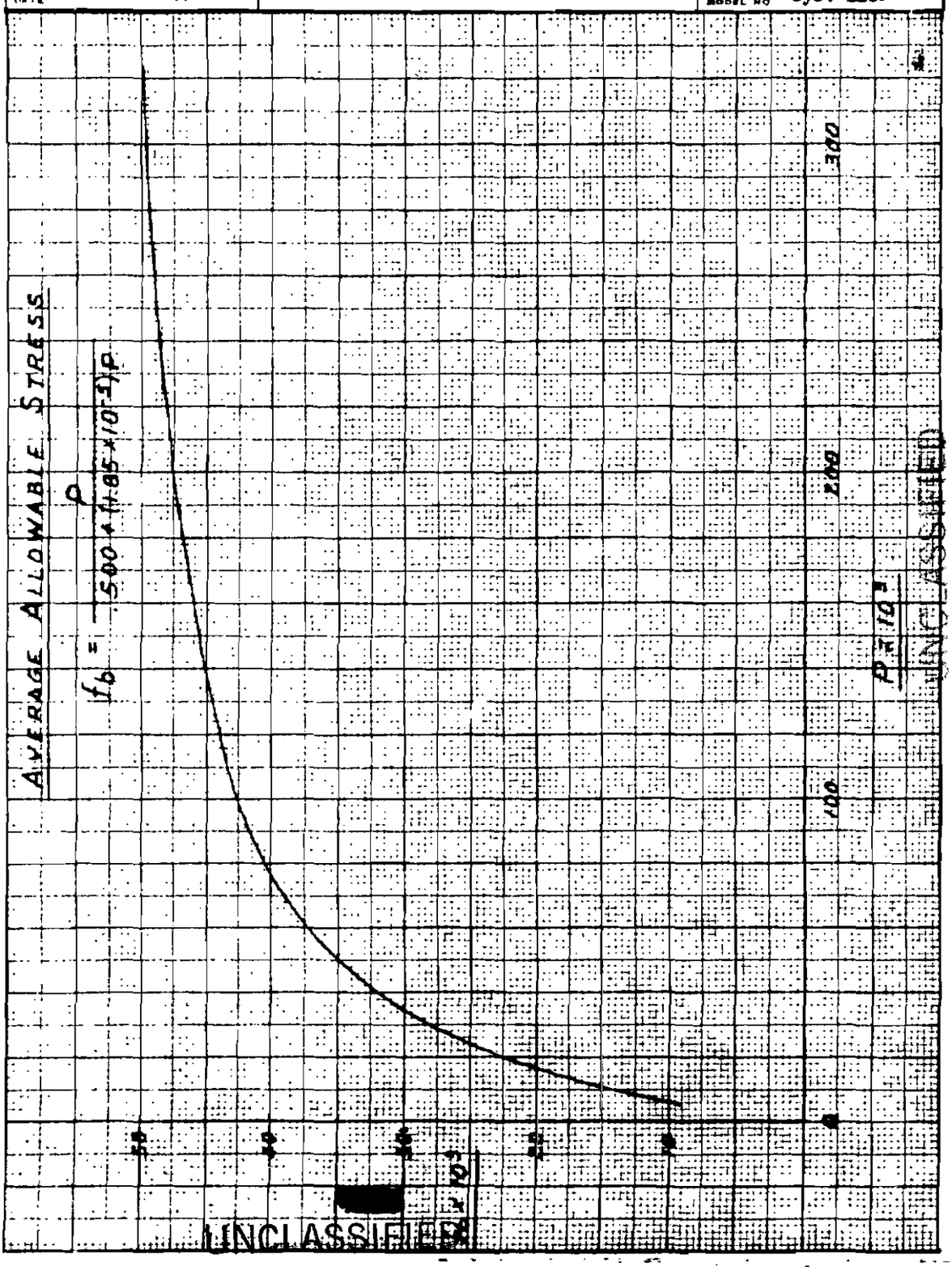
NORTH AMERICAN AVIATION, INC.

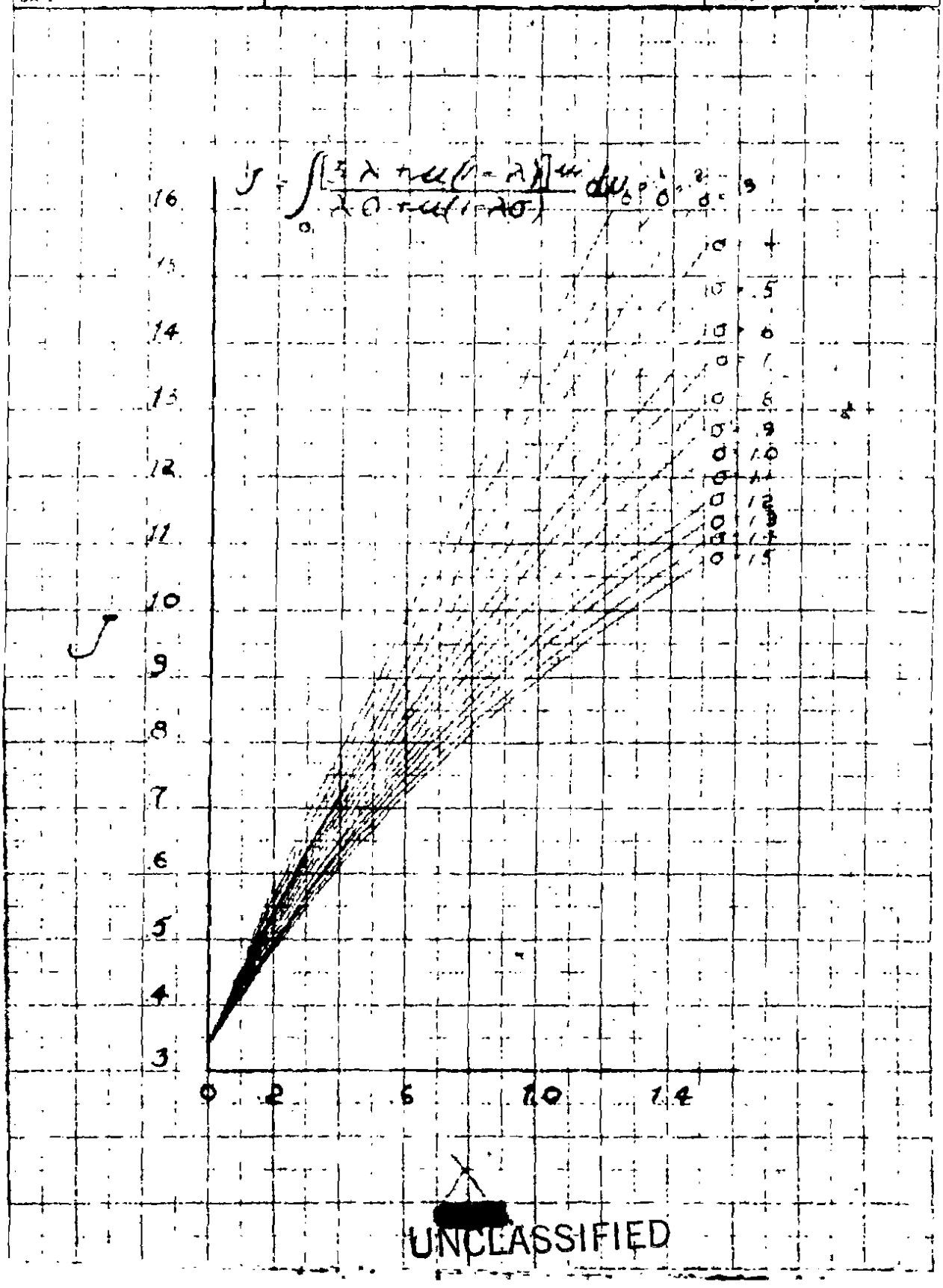
SUPPORTING DATA



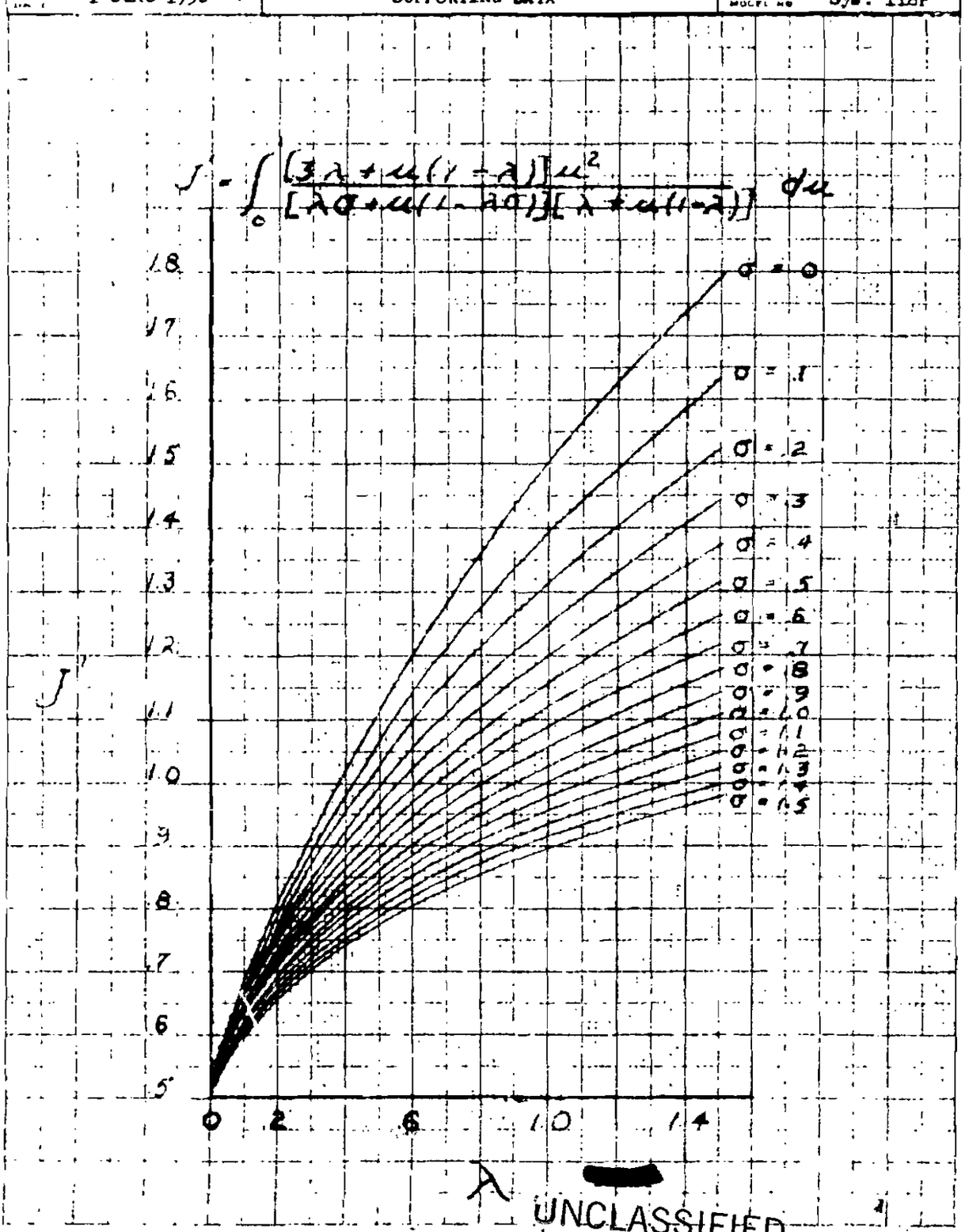
REPORT NO NA-56-450

MODEL NO Sys. 118P

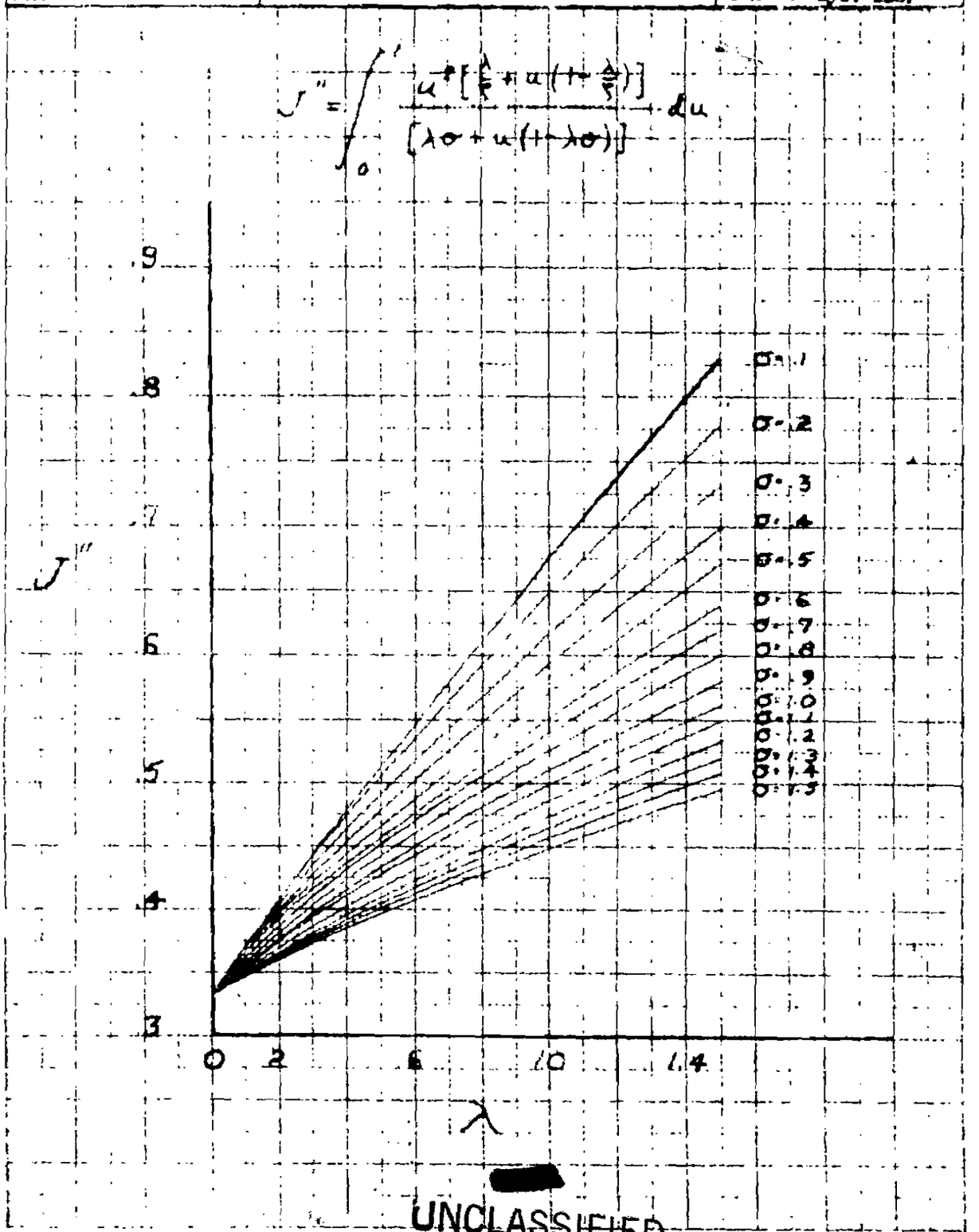


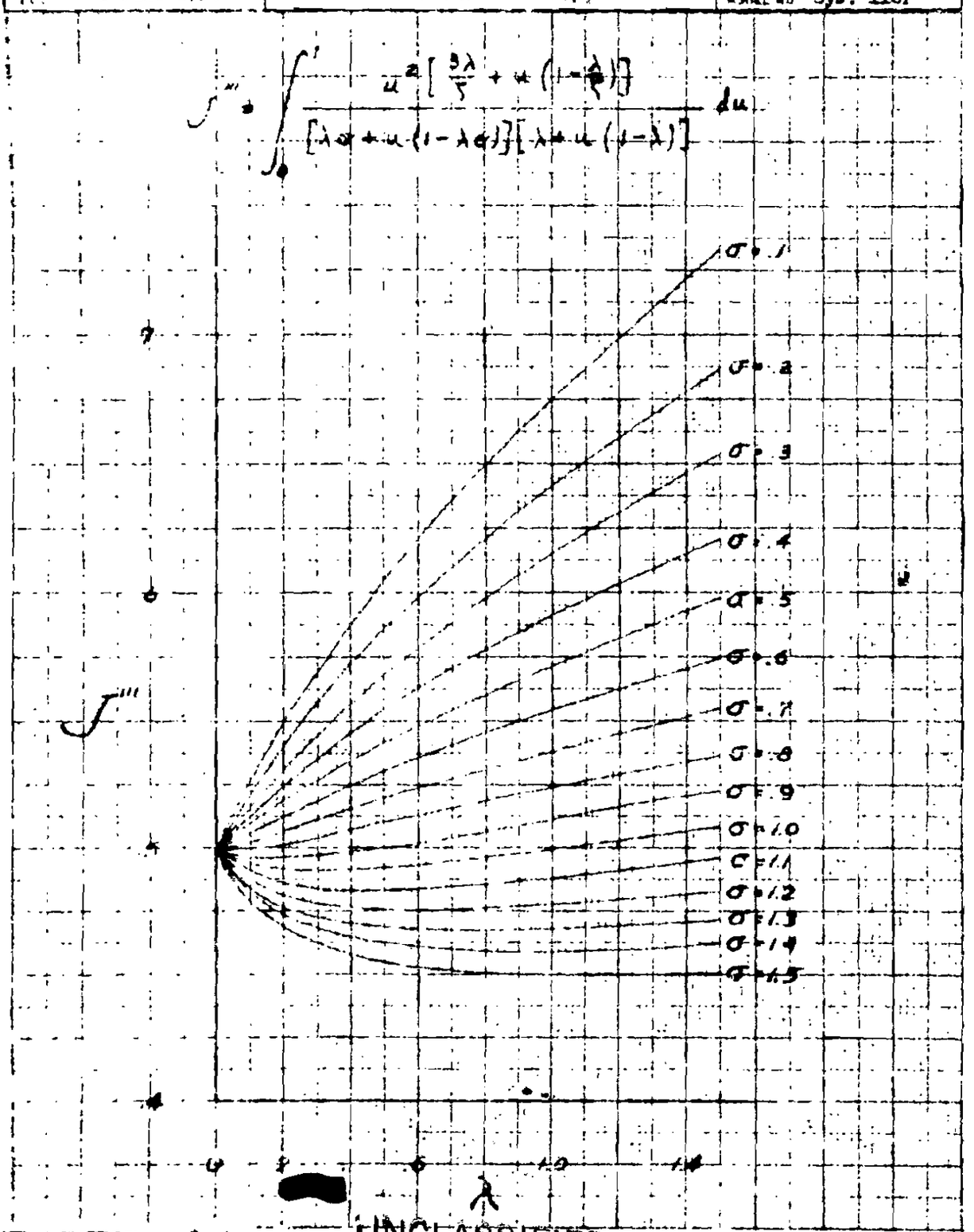

16
15
14
13
12
11
10
9
8
7
6
5
4
3
0
2
6
10
14

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



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








UNCLASSIFIED

UNCLASSIFIED

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.

UNCLASSIFIED
[redacted]

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 (750° F) at take-off less 43% fuel consumed. Weight estimates were made with loads, temperatures and material properties compatable 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 silicone 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.

[redacted]

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

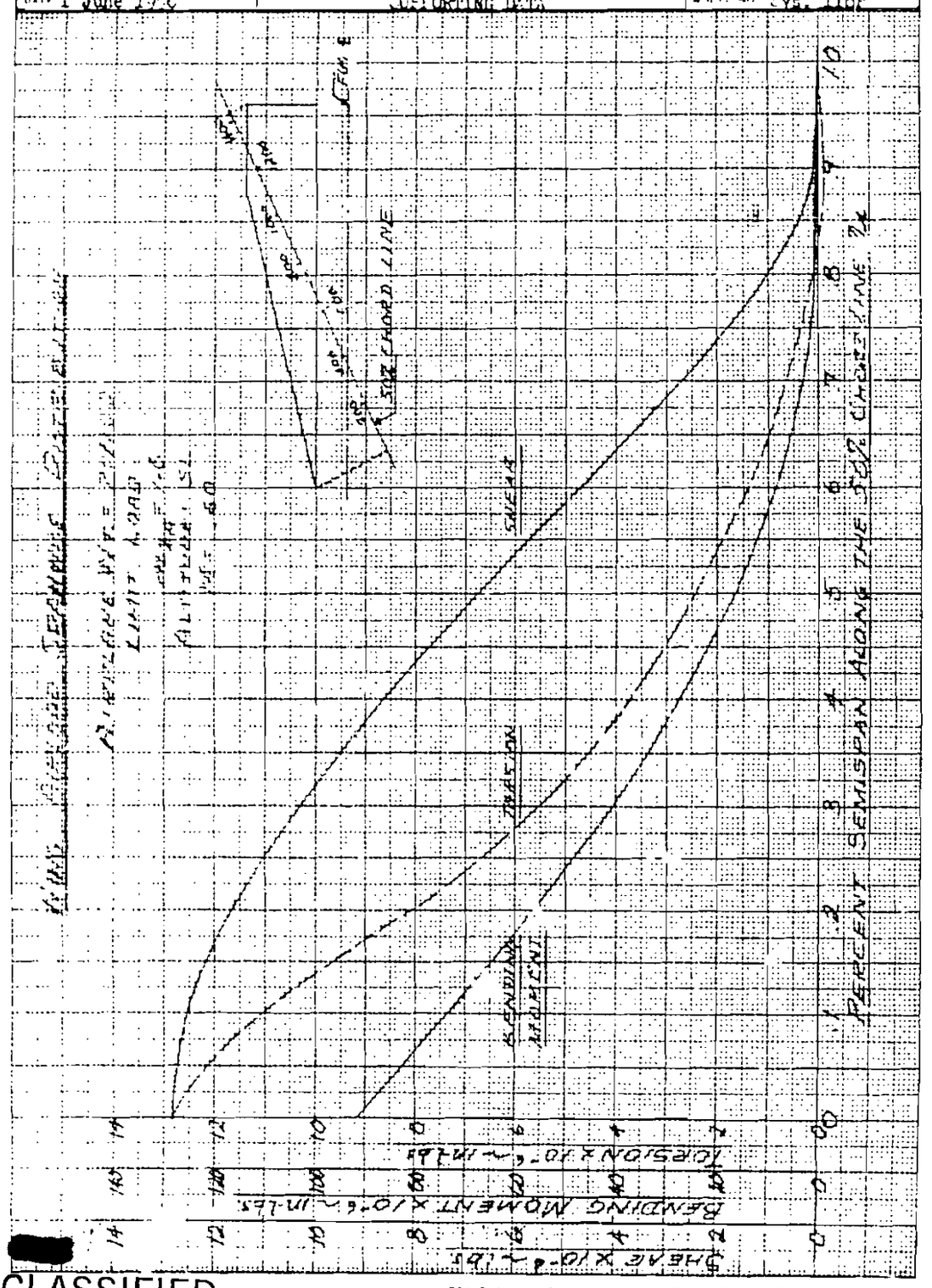
NORTH AMERICAN AVIATION, INC.

[redacted]

1 June 19[illegible]

REPORTING DATA

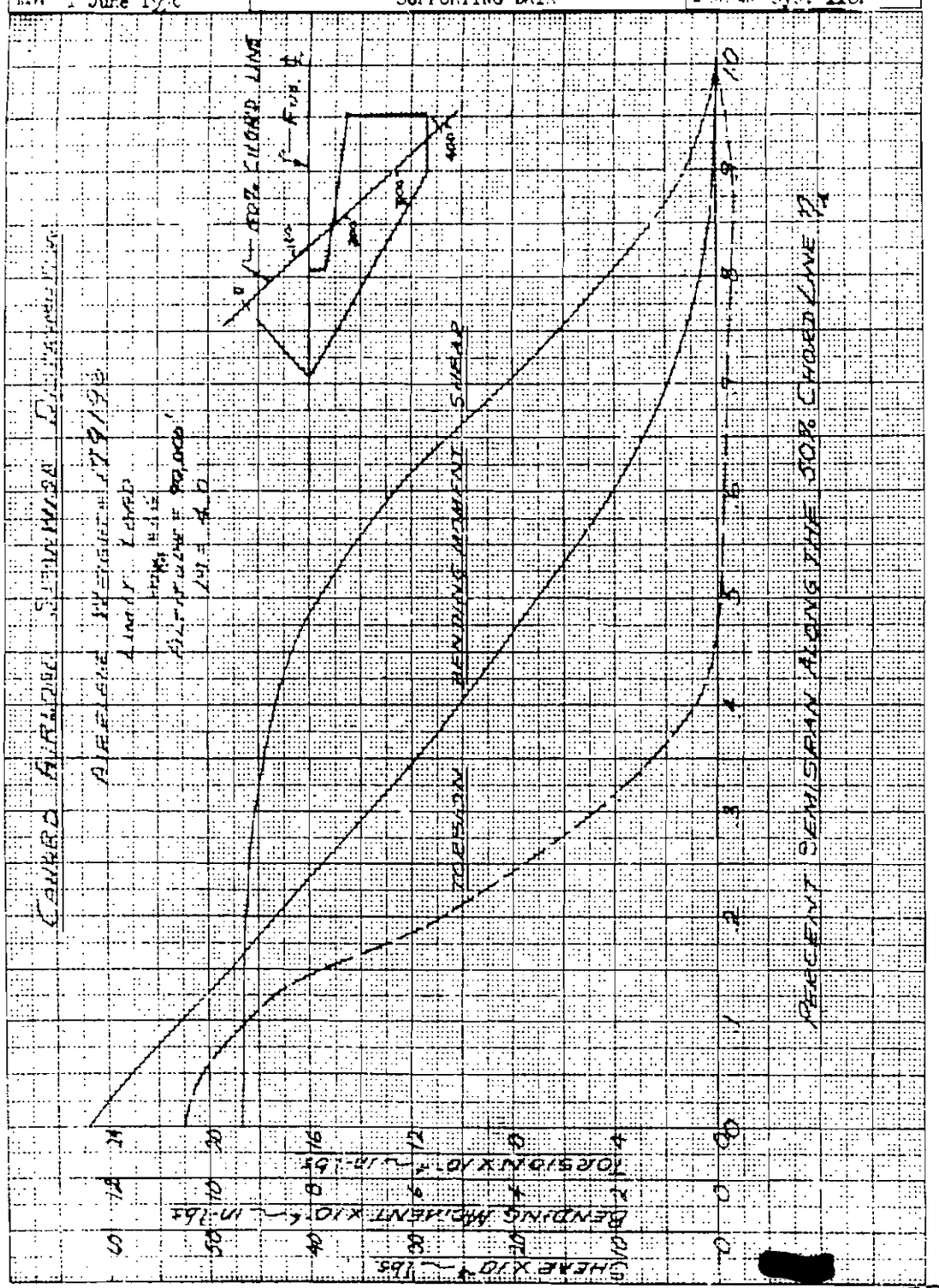
NA-56-450




[redacted]

APPENDIX I

| | | |
|---|---|---|
| W A M | NORTH AMERICAN AVIATION, INC. | 45 - 47 |
| S S B | [redacted] | NA-50-450 |
| 1 June 1946 | SUPPORTING DATA | Sys. 118P |




[redacted]

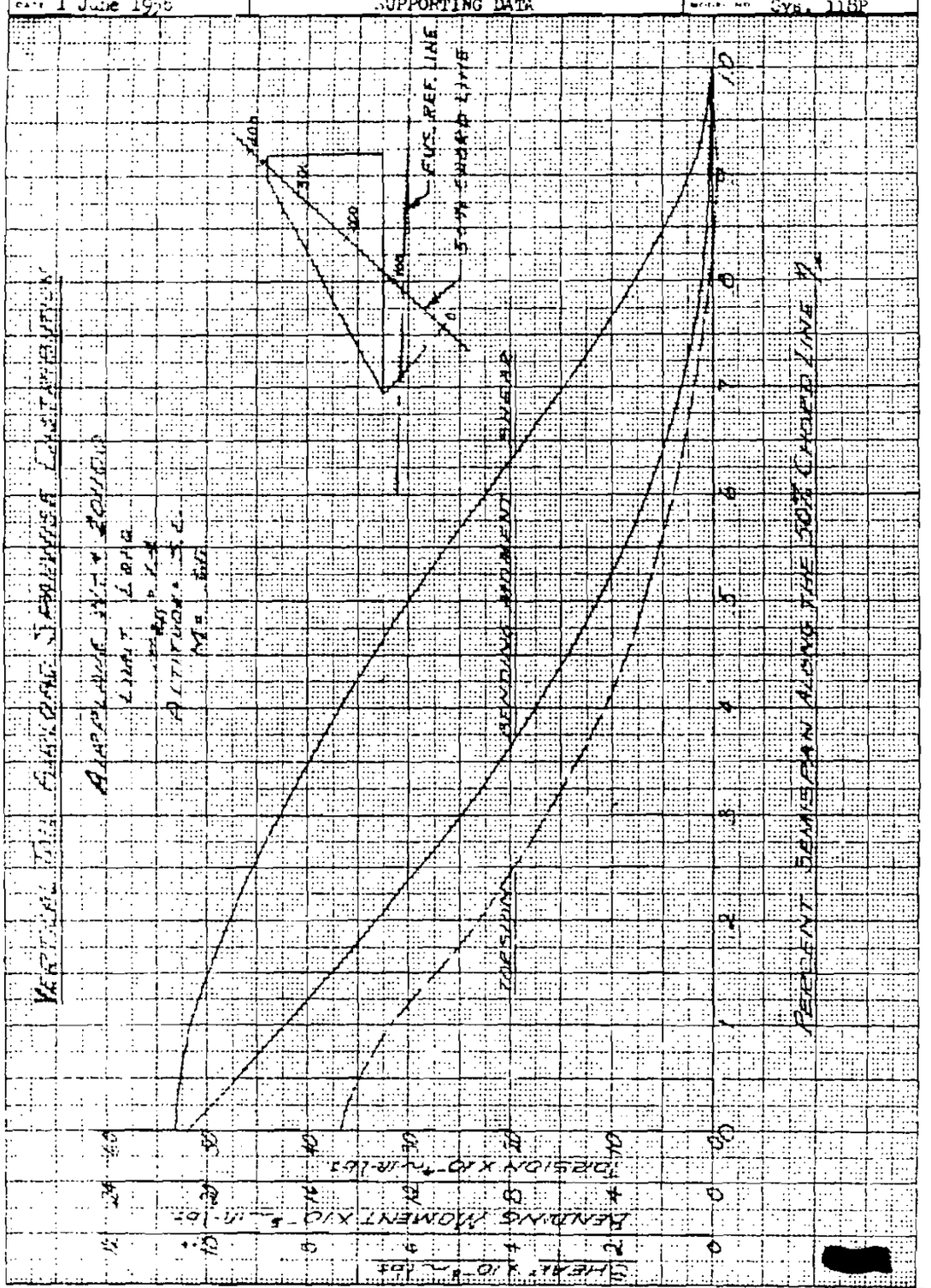
NORTH AMERICAN AVIATION, INC.

[redacted]

1 June 1956

SUPPORTING DATA

NA-56-450




[redacted]

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

# WING DEAD WEIGHT DISTRIBUTION
## TIP DOWN CONDITION

WEIGHT PER INCH - LB

0 4 8 12 16 20 24 28

50% CHORD LINE

SCALE: 1" = 200"

FUS. ℄

MAIN LANDING GEAR

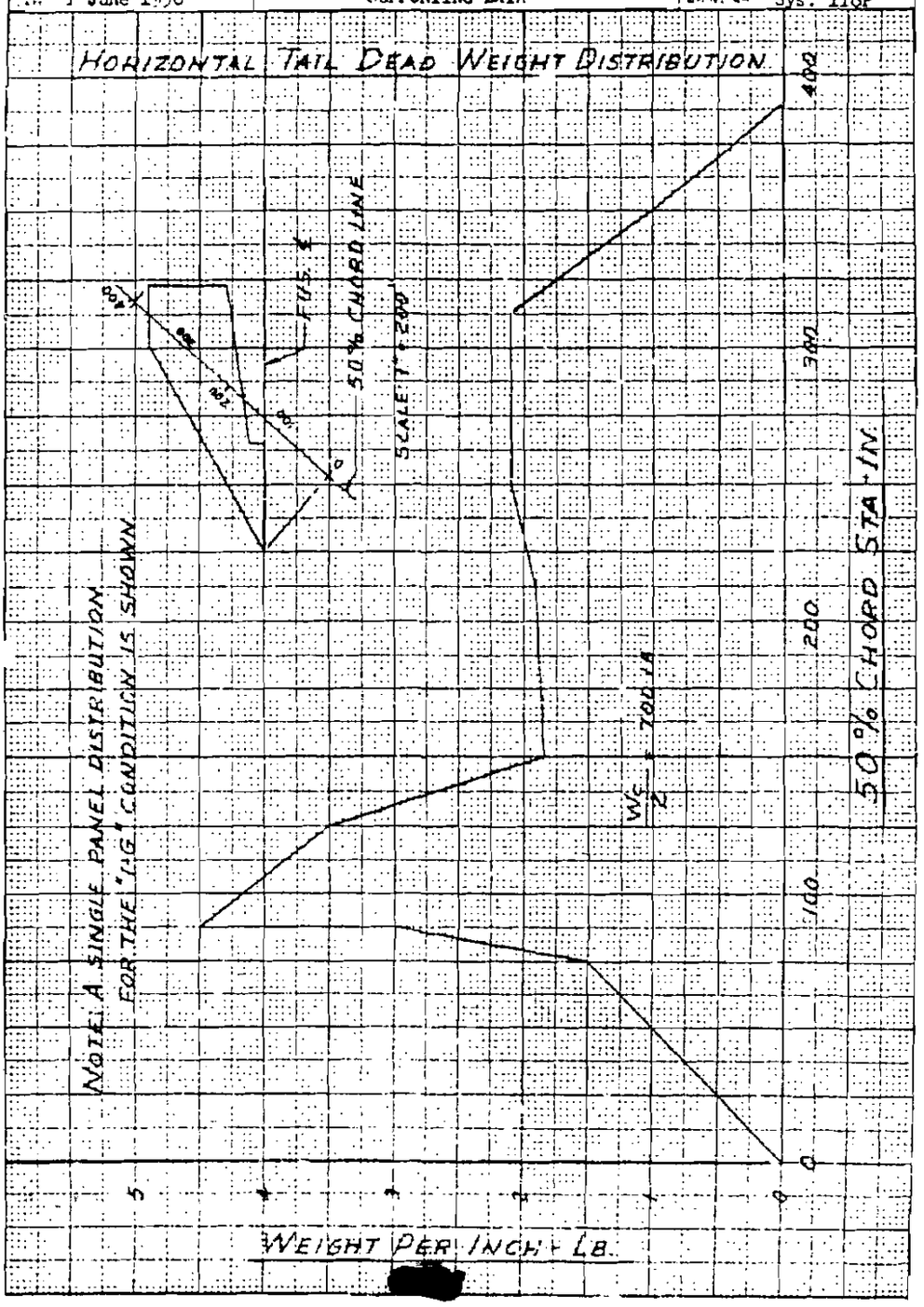
ROLLING TIP DOWN

DISTRIBUTED WEIGHT PER PANEL = 13895 LB

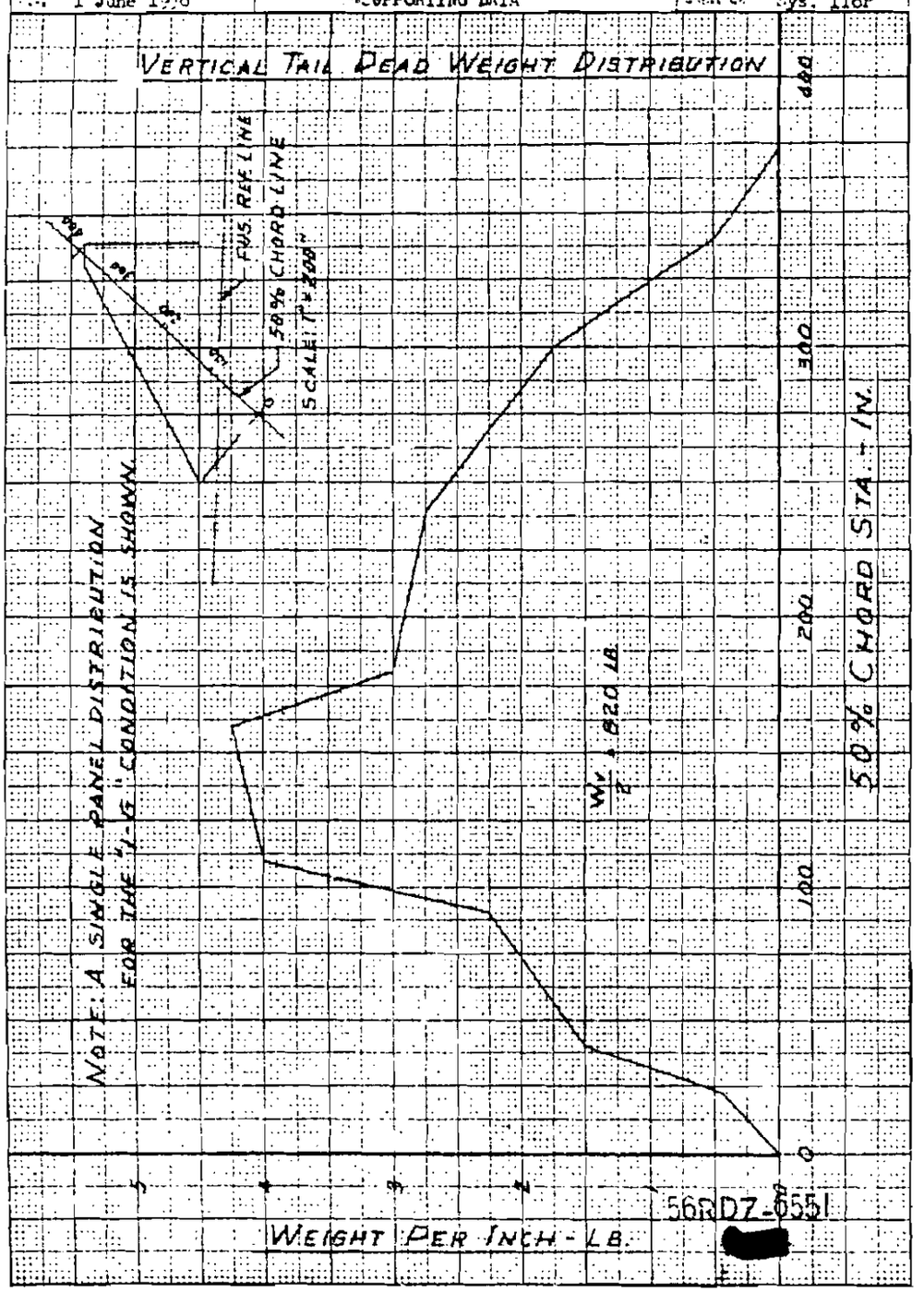
0 200 400 600 800 1000 1200 1400

50% CHORD STA. - IN.

[redacted]



| | | |
|---|---|---|
| [redacted] M | NORTH AMERICAN AVIATION, INC | [redacted] 47 47 |
| [redacted] B | [redacted] | [redacted] NA-56-450 |
| [redacted] 1 June 1956 | [redacted] SUPPORTING DATA | [redacted] Sys. 118P |



[ This page is intentionally left blank. ]