REPORT NUMBER 139

JANUARY 1964

# CALCULATED WEIGHT, BALANCE and MOMENTS of INERTIA

AD 654041

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Report Number 139

# CALCULATED WEIGHT, BALANCE AND MOMENTS OF INERTIA

## XV-5A LIFT FAN

## FLIGHT RESEARCH AIRCRAFT PROGRAM

JANUARY 1964

Advanced Engine and Technology Department
General Electric Company
Cincinnati, Ohio 45215

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19 MAY 1966

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# 1.0 INTRODUCTION

This is the calculated weights r port for the U.S. Army XV-5A Lift Fan Flight Research Aircraft.

The XV-5A was designed to evaluate the flight characteristics of the lift fan propulsion system and to demonstrate capability of the system with a high sub-sonic . The aircraft has an aspect ratio 3.4 mid-wing and provides side-by-side seating for pilot and observer. The total propulsion system consists of the General Electric X353-5B propulsion unit made up of two J85-5 turbojet engines, two wing fans, and two exhaust gas flow diverter valves. The General Electric X376 pitch fan is installed at the nose of the aircraft. A general arrangement and three-view of the aircraft are shown in Figures 1 and 2.

The report contains weight and balance and aircraft moment of inertia data in summary and in detail. The summary data is given for several fuel, flight test instrumentation combinations considered compatible with the Flight Test Program. Performance requirements were written for endurance missions of 20 and 45 minutes and therefore weights data are given for the aircraft with fuel to perform these missions with flight test instrumentation included. The design gross weight of the aircraft is 9200 lbs., and therefore data is given for this weight.

Although this is designated as a calculated report, approximately 85 percent of the aircraft weight was obtained from measurement of component and sub-assembly weights. In addition, the aircraft itself was weighed and this actual weight has been used to derive various gross weight loading conditions.

The Weight Empty given herein includes only those items required by the Aircraft Specification. It does not, for instance, include the auxiliary fuel tank nor instrumentation or other temporary items installed for initial flight test purposes.

Horizontal distances used in this report are measured from fuselage station zero. Vertical distances are measured from a theoretical plane 100 inches below the fuselage horizontal reference plane.

XV-5A GENERAL ARRANGEMENT

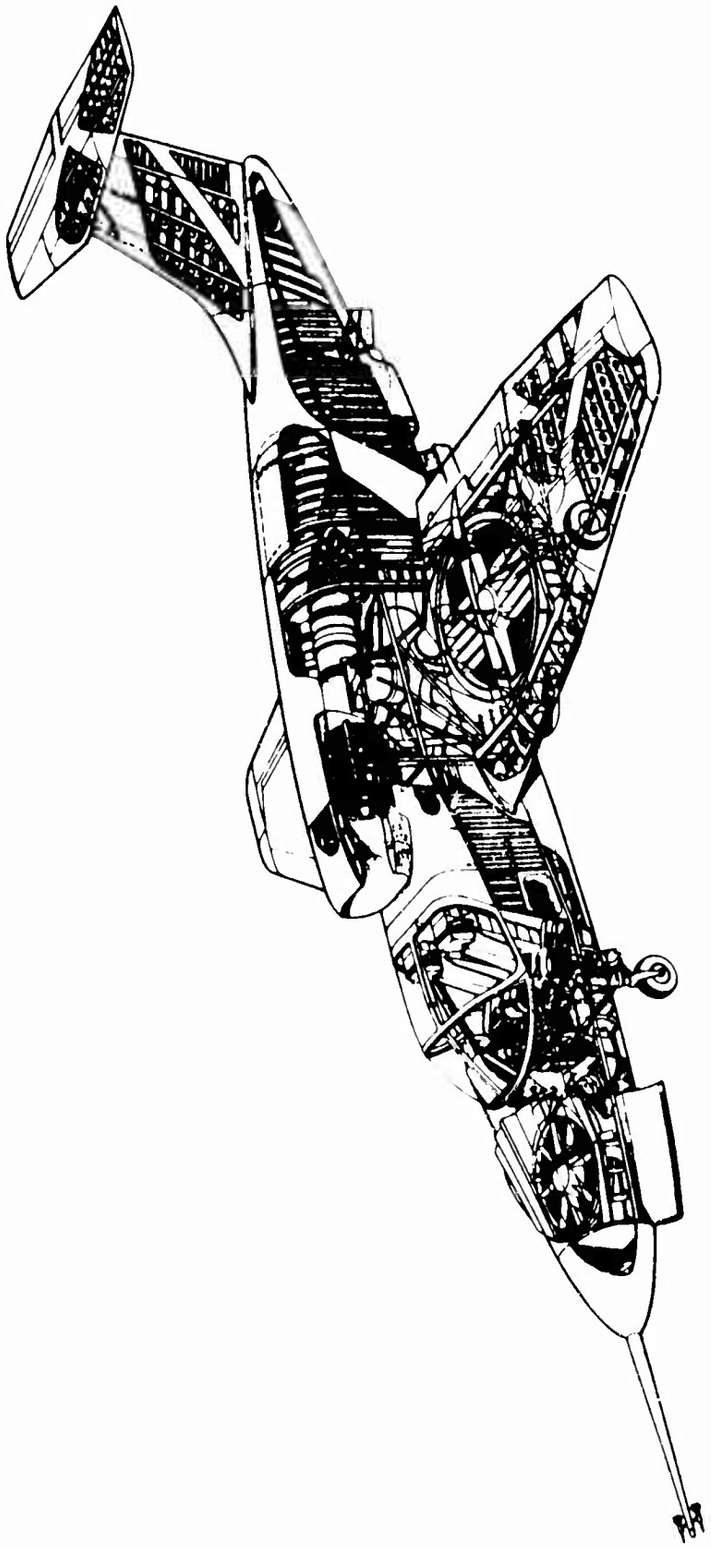


Figure 1

# 2.0 WEIGHT AND BALANCE

## 2.1 Weight and Center of Gravity Summary

XV-5A THREE VIEW

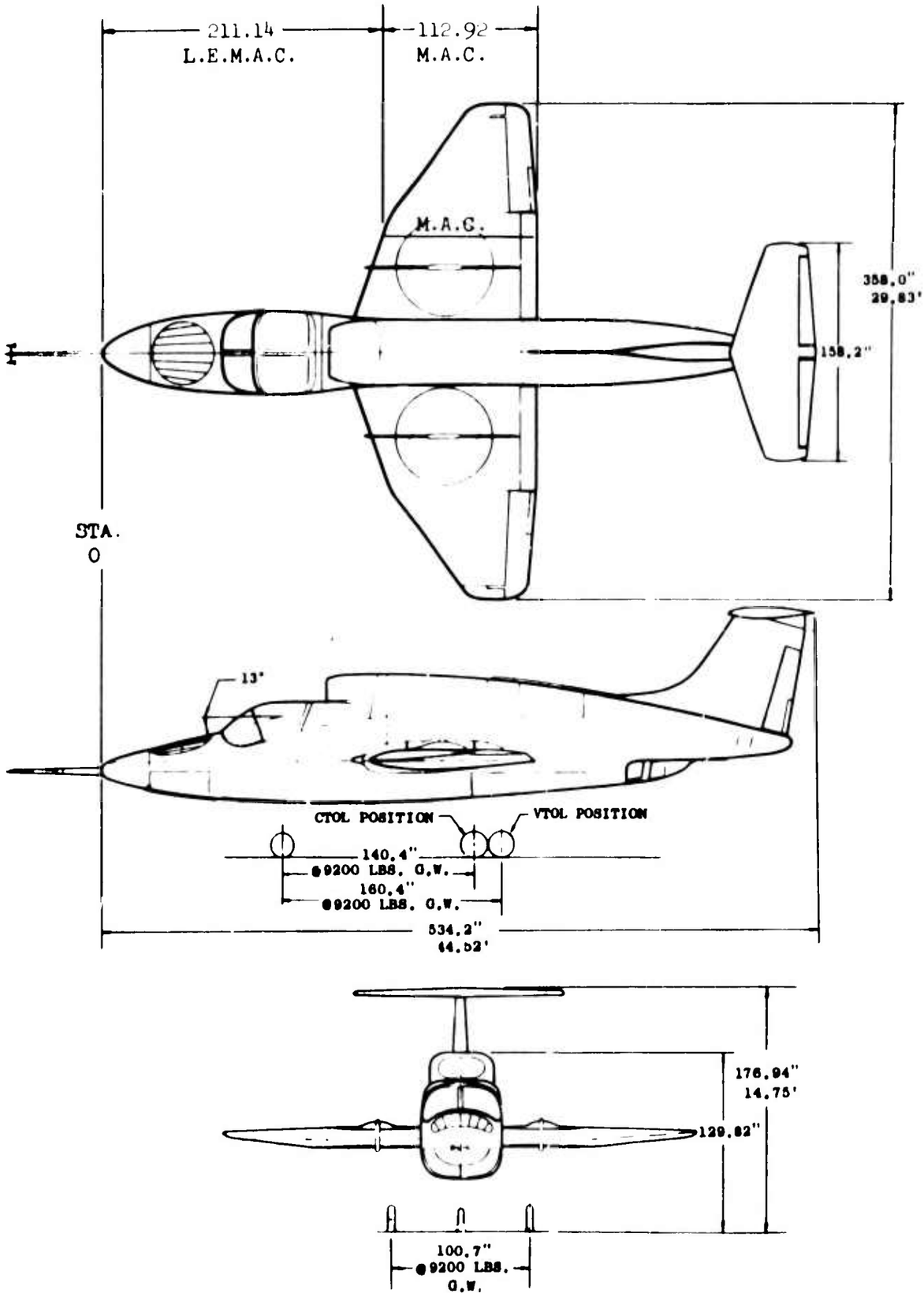



Figure 2

SUMMARY - WEIGHT AND CENTER OF GRAVITY

| CONFIGURATION | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT | % MAC |
|---|---|---|---|---|---|---|
| WEIGHT EMPTY - Gear Up | 7541 | 248.4 | 1873188 | 113 | 855867 | 33.0 |
| *GROSS WEIGHT CONDITIONS | | | | | | |
| (1) 30 Minute Mission | 9130 | 241.0 | 2200467 | 112 | 1024356 | 26.4 |
| (2) 45 Minute Mission | 9820 | 240.9 | 2366276 | 112 | 1104281 | 26.4 |
| (3) Design Gross Weight - 9200 Lbs. | 9200 | 241.0 | 2217309 | 112 | 1032219 | 26.4 |
| (4) Design Gross Weight - 9200 Lbs. (Less Instrumentation) | 9200 | 244.5 | 2249241 | 113 | 1037606 | 29.5 |
| (5) Full Fuel - Incl. Aux. Tank | 11622 | 245.3 | 2850534 | 113 | 1318439 | 30.3 |

*Note: All conditions include 404 lbs. of standard instrumentation equipment unless otherwise noted.

All conditions are with the landing gear retracted.

Forward Center of Gravity Limit - Sta. 240, 25.56% Mac

Aft Center of Gravity Limit - Sta. 246, 30.87% Mac

## 2.2 Group Weight Statement

U.S. ARMY
XV-5A

LIFT-FAN FLIGHT RESEARCH AIRCRAFT

## GROUP WEIGHT STATEMENT

- CALCULATED -
-CROSS OUT THOSE NOT APPLICABLE-

CONTRACT DA-44-177-TC-715

AIRPLANE-GOVERNMENT NUMBER 62-4505 and 62-4506

AIRPLANE-CONTRACTOR NUMBER

MANUFACTURED BY RYAN AERONAUTICAL COMPANY

| ENGINE | MAIN | AUXILIARY |
|---|---|---|
| MANUFACTURED BY | GENERAL ELECTRIC | GENERAL ELECTRIC |
| MODEL | J85-GE-5B | X353-5B |
| NUMBER | 2 | 2 |

| PROPELLER | MAIN | AUXILIARY |
|---|---|---|
| MANUFACTURED BY | | |
| MODEL | | |
| NUMBER | | |

# GROUP WEIGHT STATEMENT
## WEIGHT EMPTY



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | WING GROUP | | | | | | 1047.46 |
| 2 | CENTER SECTION-BASIC STRUCTURE | | | | | 423.12 | |
| 3 | INTERMEDIATE PANEL-BASIC STRUCTURE | | | | | | |
| 4 | OUTER PANEL-BASIC STRUCTURE - INCL TIPS | | | | LBS | 144.00 | |
| 5 | | | | | | | |
| 6 | SECONDARY STRUCTURE - INCL WINGFOLD MECH | | | | LBS | 343.53 | |
| 7 | AILERONS - INCL BALANCE WEIGHT | | | LBS | | 60.27 | |
| 8 | FLAPS-TRAILING EDGE | | | | | 76.54 | |
| 9 | -LEADING EDGE | | | | | | |
| 10 | SLATS | | | | | | |
| 11 | SPOILERS | | | | | | |
| 12 | SPEEDBRAKES | | | | | | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | TAIL GROUP | | | | | | 237.79 |
| 16 | STABILIZER-BASIC STRUCTURE | | | | | 69.65 | |
| 17 | FINS-BASIC STRUCTURE-INCL DORSAL | | 3.15 | LBS | | 83.52 | |
| 18 | SECONDARY STRUCTURE-STABILIZER & FINS | | | | | 8.87 | |
| 19 | ELEVATOR - INCL BALANCE WEIGHT | | 21.28 | LBS | | 43.32 | |
| 20 | RUDDERS - INCL BALANCE WEIGHT | | 12.21 | LBS | | 32.43 | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | BODY GROUP | | | | | | 1264.88 |
| 24 | FUSELAGE OR HULL-BASIC STRUCTURE | | | | | 794.54 | |
| 25 | BOOMS-BASIC STRUCTURE | | | | | | |
| 26 | SECONDARY STRUCTURE-FUSELAGE OR HULL | | | | | 148.50 | |
| 27 | -BOOMS | | | | | | |
| 28 | -SPEEDBRAKES | | | | | | |
| 29 | -DOORS, PANELS & MISC | | | | | 321.84 | |
| 30 | | | | | | | |
| 31 | ALIGHTING GEAR GROUP-LAND - TYPE | | | | | | 420.14 |
| 32 | LOCATION | *ROLLING | STRUCT | CONTROLS | | | |
| 33 | | ASSEMBLY | | | | | |
| 34 | MAIN | 73.70 | 221.07 | 59.56 | | 354.33 | |
| 35 | NOSE | 20.17 | 38.83 | 6.81 | | 65.81 | |
| 36 | | | | | | | |
| 37 | | | | | | | |
| 38 | | | | | | | |
| 39 | ALIGHTING GEAR GROUP-WATER | | | | | | |
| 40 | LOCATION | FLOATS | STRUTS | CONTROLS | | | |
| 41 | | | | | | | |
| 42 | | | | | | | |
| 43 | | | | | | | |
| 44 | | | | | | | |
| 45 | SURFACE CONTROLS GROUP | | | | | | 380.40 |
| 46 | COCKPIT CONTROLS | | | | | 22.49 | |
| 47 | AUTOMATIC STABILIZATION SYSTEM | | | | | 39.24 | |
| 48 | SYSTEM CONTROLS - INCL POWER & FEEL CONT | | | | LBS | 131.86 | |
| 49 | VERTICAL TAKE-OFF CONTROLS | | | | | 186.81 | |
| 50 | ENGINE SECTION OR NACELLE GROUP | | | | | | 44.39 |
| 51 | INBOARD | | | | | | |
| 52 | CENTER | | | | | 44.39 | |
| 53 | OUTBOARD | | | | | | |
| 54 | DOORS, PANELS & MISC | | | | | | |
| 55 | | | | | | | |
| 56 | PAGE TOTAL | | | | | | |
| 57 | | | | | | | 3395.06 |

* WHEELS, BRAKES, TIRES, TUBES AND AIR

AN 9103-D-TAB
NAME
DATE

GROUP WEIGHT STATEMENT
WEIGHT EMPTY

PAGE 13
MODEL
REPORT 63B123

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | PROPULSION GROUP | LIFT FAN | PITCH FAN | | | 3435.85 |
| 2 | | X | XX | MAIN | X | |
| 3 | ENGINE INSTALLATION | 1624.44 | 116.67 | | 923.00 | |
| 4 | AFTERBURNERS-IF FURN SEPARATELY | | | | | |
| 5 | ACCESSORY GEAR BOXES & DRIVES | | | | 28.24 | |
| 6 | SUPERCHARGER FOR TURBO TYPES | | | | | |
| 7 | AIR INDUCTION SYSTEM | 122.10 | 139.38 | | 57.73 | |
| 8 | EXHAUST SYSTEM | | 55.09 | | 212.88 | |
| 9 | COOLING SYSTEM | | | | | |
| 10 | LUBRICATING SYSTEM | | | | | |
| 11 | TANKS | | | | | |
| 12 | COOLING INSTALLATION | | | | | |
| 13 | DUCTS, PLUMBING, ETC | | | | | |
| 14 | FUEL SYSTEM | | | | | |
| 15 | TANKS-PROTECTED | | | | | |
| 16 | -UNPROTECTED | | | | 61.42 | |
| 17 | PLUMBING, ETC | | | | 50.71 | |
| 18 | WATER INJECTION SYSTEM | | | | | |
| 19 | ENGINE CONTROLS | | | | 38.11 | |
| 20 | STARTING SYSTEM | | | | 6.08 | |
| 21 | PROPELLER INSTALLATION | | | | | |
| 22 | | | | | | |
| 23 | SUB-TOTAL - PROPULSION | 1746.54 | 311.14 | | 1378.17 | |
| 24 | AUXILIARY POWER PLANT GROUP | | | | | |
| 25 | INSTRUMENTS & NAVIGATIONAL EQUIPMENT GROUP | | | | | 71.09 |
| 26 | HYDRAULIC & PNEUMATIC GROUP | | | | | 111.48 |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | ELECTRICAL GROUP | | | | | 194.05 |
| 30 | AC SYSTEM | | | | 5.80 | |
| 31 | DC SYSTEM | | | | 188.25 | |
| 32 | ELECTRONICS GROUP | | | | | 38.99 |
| 33 | EQUIPMENT | | | | 37.77 | |
| 34 | INSTALLATION | | | | 1.22 | |
| 35 | | | | | | |
| 36 | ARMAMENT GROUP - INCL GUNFIRE PROTECTION | | | LBS | | |
| 37 | FURNISHINGS & EQUIPMENT GROUP | | | | | 231.28 |
| 38 | ACCOMMODATIONS FOR PERSONNEL | | | | 188.51 | |
| 39 | MISCELLANEOUS EQUIPMENT | | | | 9.66 | |
| 40 | FURNISHINGS | | | | | |
| 41 | EMERGENCY EQUIPMENT | | | | 33.11 | |
| 42 | | | | | | |
| 43 | AIR CONDITIONING & ANTI-ICING EQUIPMENT GROUP | | | | | 30.94 |
| 44 | AIR CONDITIONING | | | | 29.82 | |
| 45 | ANTI-ICING | | | | 1.12 | |
| 46 | | | | | | |
| 47 | PHOTOGRAPHIC GROUP | | | | | |
| 48 | AUXILIARY GEAR GROUP | | | | | 27.20 |
| 49 | HANDLING GEAR | | | | .49 | |
| 50 | ARRESTING GEAR | | | | | |
| 51 | CATAPULTING GEAR | | | | | |
| 52 | ATO GEAR | | | | | |
| 53 | SPIN CHUTE | | | | 26.71 | |
| 54 | MANUFACTURING VARIATION | | | | | 5.06 |
| 55 | | | | | | |
| 56 | PAGE TOTAL | | | | | 4145.94 |
| 57 | TOTAL-WEIGHT EMPTY - PG 2-3 | | | | | 7541.00 |

AN 9103-D-TAB
NAME
DATE

GROUP WEIGHT STATEMENT
USEFUL LOAD & GROSS WEIGHT


MODEL
REPORT 63B123

| | | | | 20 Min. Mission | 45 Min. Mission | | Max. Fuel |
|---|---|---|---|---|---|---|---|
| 1 | LOAD CONDITION | | | | | | |
| 2 | | | | | | | |
| 3 | CREW - NO. (1) | | | 180 | 180 | | 180 |
| 4 | PASSENGERS - NO. | | | | | | |
| 5 | FUEL | TYPE | GALS | | | | |
| 6 | UNUSABLE | JP-4 | | 45 | 45 | | 55 |
| 7 | INTERNAL - MAIN FWD. | | | 472 | 817 | | 1703 |
| 8 | - MAIN AFT | | | 473 | 818 | | 870 |
| 9 | -, AUXILIARY AFT | | | | | | 819 |
| 10 | EXTERNAL | | | | | | 344 |
| 11 | | | | | | | |
| 12 | BOMB BAY | | | | | | |
| 13 | | | | | | | |
| 14 | OIL | | | | | | |
| 15 | TRAPPED | | | 3 | 3 | | 3 |
| 16 | ENGINE | | | 12 | 12 | | 12 |
| 17 | | | | | | | |
| 18 | FUEL TANKS-LOCATION -AUX. | | | | | | 35 |
| 19 | WATER INJECT. FLUID | | GALS | | | | |
| 20 | | | | | | | |
| 21 | BAGGAGE | | | | | | |
| 22 | CARGO | | | | | | |
| 23 | INSTRUMENTATION | | | 404 | 404 | | 404 |
| 24 | ARMAMENT | | | | | | |
| 25 | GUNS-LOCATION FIX/FLEX | QUANTITY | CALIBER | | | | |
| 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 | | | | | | | |
| 50 | * OXYGEN | | | | | | |
| 51 | | | | | | | |
| 52 | MISCELLANEOUS | | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | USEFUL LOAD | | | 1589 | 2279 | | 4081 |
| 56 | WEIGHT EMPTY | | | 7541 | 7541 | | 7541 |
| 57 | GROSS WEIGHTS - PG 2-4 | | | 9130 | 9820 | | 11622 |

*IF NOT SPECIFIED AS WEIGHT EMPTY

AN 9103-D-TAB
NAME
DATE

GROUP WEIGHT STATEMENT
DIMENSIONAL & STRUCTURAL DATA


MODEL
REPORT 63B123

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | LENGTH-OVERALL-FT 50.48 (Incl. Nose Boom) | | | HEIGHT-OVERALL STATIC-FT | | 14.75 | | |
| 2 | | MAIN | AUX | BOOMS | FUS | X | NACELLES | X |
| 3 | | FLOATS | FLOATS | | OR HULL | INBOARD | CENTER | OUTBOARD |
| 4 | LENGTH-MAX-FT | | | | 42.92 | | | |
| 5 | DEPTH-MAX-FT | | | | 7.66 | | | |
| 6 | WIDTH-MAX-FT | | | | 5.00 | | | |
| 7 | WETTED AREA-SQ FT (1216 TOTAL AIRPLANE) | | | | 627.00 | | | |
| 8 | *FLOAT/HULL DISPL MAX LBS | | | | | | | |
| 9 | FUSELAGE VOLUME-CU FT | PRESSURIZED | NONE | | | TOTAL | 735.0 | |
| 10 | | | | | | WING | H TAIL | V TAIL |
| 11 | GROSS AREA-SQ FT | | | | | 260.32 | 52.86 | 51.00 |
| 12 | WEIGHT/GROSS AREA-#/SQ FT | | | | | 4.02 | 2.21 | 2.37 |
| 13 | SPAN-FT | | | | | 29.83 | 13.18 | 7.75 Approx. |
| 14 | FOLDED SPAN-FT | | | | | | | |
| 15 | | | | | | | | |
| 16 | SWEEPBACK-AT 25% CHORD LINE-DEGREES | | | | | 15.0&28.3 | 13.70 | 30.00 |
| 17 | -AT % CHORD LINE-DEGREES | | | | | | | |
| 18 | **THEORETICAL ROOT CHORD | -LENGTH-INCHES | | | | 145.00 | 65.64 | 103.92 |
| 19 | | -MAX THICKNESS-INCHES | | | | 15.30 | 7.88 | 17.15 |
| 20 | ***CHORD AT PLANFORM BREAK | -LENGTH-INCHES | | | | 109.00 | | |
| 21 | | -MAX THICKNESS-INCHES | | | | 14.38 | | |
| 22 | ***THEORETICAL TIP CHORD | -LENGTH-INCHES | | | | 43.00 | 30.60 | 54.00 |
| 23 | | -MAX THICKNESS-INCHES | | | | 5.16 | 3.67 | 7.02 |
| 24 | DORSAL AREA | | | | -AREA-SQ FT | | | 2.40 |
| 25 | TAIL LENGTH-25% M.A.C. WING TO 25% M.A.C. | | | | H TAIL-FT | 22.20 | | |
| 26 | AREA-SQ FT/AIRPLANE FLAPS | L.E. | | | T.E. | 25.37 | | |
| 27 | LATERAL CONTROLS | SLATS | | | SPOILERS | | AILERONS | 20.11 |
| 28 | SPEED BRAKES | WING | | | FUS/HULL | | | |
| 29 | | | | | | | | |
| 30 | | | | | | | | |
| 31 | ALIGHTING GEAR | | | LOCATION | | | MAIN | NOSE |
| 32 | LENGTH-OLEO EXT-C.L. AXLE TO C.L. TRUNNION-INCHES | | | | | | 65.00 | 38.35 |
| 33 | OLEO TRAVEL-FULL EXT TO COLLAPSED-INCHES | | | | | | 9.20 | 8.0 |
| 34 | FLOAT OR SKI STRUT LENGTH-INCHES | | | | | | | |
| 35 | ARRESTING HOOK LENGTH-C.L. HOOK TRUNNION TO C.L. HOOK POINT-INCHES | | | | | | | |
| 36 | HYDRAULIC SYSTEM CAPACITY-GALS | | | 4.5 | | | | |
| 37 | FUEL & LUB SYST | NUMBER | | ****GALS | | NUMBER | ****GALS | |
| 38 | LOCATION | TANKS | | PROTECTED | | TANKS | UNPROTECTED | |
| 39 | FUEL-INTERNAL WING | | | | | | | |
| 40 | FUS/HULL | | | | | | 522 | |
| 41 | -EXTERNAL | | | | | | | |
| 42 | -BOMB BAY | | | | | | | |
| 43 | | | | | | | | |
| 44 | OIL | | | | | | | |
| 45 | | | | | | | | |
| 46 | STRUCTURAL DATA-CONDITION | | | WING | | STRESS | | ULT L.F. |
| 47 | | | | FUEL-LBS | | GROSS WT | | |
| 48 | FLIGHT | | | | | 9200 | | 6.0 |
| 49 | LANDING | | | | | 9200 | | 6.0 |
| 50 | MAX GROSS WT WITH ZERO WING FUEL | | | | | 9200 | | 6.0 |
| 51 | CATAPULTING | | | | | | | |
| 52 | MINIMUM FLYING WEIGHT | | | | | 7693 | | 6.0 |
| 53 | LIMIT AIRPLANE LANDING SINKING SPEED-FT/SEC | | | | | 9200 | | 10 |
| 54 | WING LIFT ASSUMED FOR LANDING DESIGN CONDITION-%W | | | | | | | |
| 55 | STALL SPEED-LANDING CONFIGURATION-POWER OFF-KNOTS | | | | | | | |
| 56 | PRESSURIZED CABIN-ULT DESIGN PRESSURE DIFFERENTIAL-FLIGHT P.S.I. | | | | | | | NONE |
| 57 | AIRFRAME WEIGHT-AS DEFINED IN AN-W-11 -LBS | | | | | | | |

* LBS OF SEA WATER @ 64 LBS/CU FT
** PARALLEL TO & AT CENTERLINE AIRPL
*** PARALLEL TO CENTERLINE AIRPL
**** TOTAL USABLE CAPACITY

## 2.3 Detail Weight Statement

U.S. ARMY
XV-5A

LIFT-FAN FLIGHT RESEARCH AIRCRAFT

# DETAIL WEIGHT STATEMENT

- CALCULATED -
-CROSS OUT THOSE NOT APPLICABLE-

CONTRACT DA-44-177-TC-715

AIRPLANE-GOVERNMENT NUMBER 62-4505 & 62-4506

AIRPLANE-CONTRACTOR NUMBER

MANUFACTURED BY RYAN AERONAUTICAL COMPANY

| ENGINE | MAIN | LIFT-FAN |
|---|---|---|
| MANUFACTURED BY | General Electric | General Electric |
| MODEL | J85-GE-5B | X353-5B |
| NUMBER | 2 | 2 |

| PROPELLER | MAIN | AUXILIARY |
|---|---|---|
| MANUFACTURED BY | | |
| MODEL | | |
| NUMBER | | |

AN 9102-D-TAB
NAME
DATE

WING GROUP
BASIC STRUCTURE

PAGE 23
MODEL
REPORT 63B123

| | | | | | CENTER SECTION | INTERM PANEL | OUTER PANEL |
|---|---|---|---|---|---|---|---|
| 4 | UPPER-FRONT SPAR CAP | | | | | | |
| 5 | -INTERMEDIATE SPAR CAP | | | | | | |
| 6 | -REAR SPAR CAP | | | | | | |
| 7 | -AUXILIARY SPAR CAP | | | | | | |
| 8 | -INTERSPAR COVER | | | | 17.29 | | 56.04 |
| 9 | -SPANWISE STIFFENERS | | | | | | |
| 10 | -JOINTS, SPLICES & FAST. | | | | 8.81 | | |
| 11 | - BRACKETS-SKIN-SUPPORTING | | | | 5.18 | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| 14 | LOWER-FRONT SPAR CAP | | | | | | |
| 15 | -INTERMEDIATE SPAR CAP | | | | | | |
| 16 | -REAR SPAR CAP | | | | | | |
| 17 | -AUXILIARY SPAR CAP | | | | | | |
| 18 | -INTERSPAR COVER | | | | 25.07 | | |
| 19 | -SPANWISE STIFFENERS | | | | | | |
| 20 | -JOINTS, SPLICES & FAST. | | | | 4.44 | | |
| 21 | -BRACKETS-SKIN SUPPORTING | | | | 6.90 | | |
| 22 | FRONT SPAR | | | | 94.34 | | 14.79 |
| 23 | REAR SPAR | | | | 88.50 | | 13.55 |
| 24 | SPAR WEB & STIFF.-FRONT | | | | | | |
| 25 | -INTERMEDIATE | | | | | | |
| 26 | -REAR | | | | | | |
| 27 | -AUXILIARY | | | | | | |
| 28 | -JOINTS, SPLICES & FAST. | | | | | | |
| 29 | DOUBLERS- SKIN | | | | | | 3.90 |
| 30 | | | | | | | |
| 31 | INTERSPAR-RIBS | | | | 4.42 | | 29.82 |
| 32 | -BULKHEADS | | | | 23.09 | | |
| 33 | -CHORDWISE STIFFENERS | | | | | | |
| 34 | -JOINTS, SPLICES & FAST. | | | | 5.83 | | 1.77 |
| 35 | FAN RING | | | | 25.95 | | |
| 36 | LEADING EDGE-COVER | | | | 36.00 | | 10.80 |
| 37 | -STIFFENERS | | | | | | |
| 38 | -RIBS | | | | 22.09 | | 2.48 |
| 39 | -AUXILIARY SPARS | | | | | | |
| 40 | -JOINTS, SPLICES & FAST. | | | | 5.28 | | 1.20 |
| 41 | | | | | | | |
| 42 | | | | | | | |
| 43 | TRAILING EDGE-COVER | | | | 16.95 | | 3.48 |
| 44 | -STIFFENERS | | | | | | |
| 45 | -RIBS | | | | 3.75 | | 1.27 |
| 46 | -AUXILIARY SPARS | | | | 1.58 | | |
| 47 | -JOINTS, SPLICES & FAST. | | | | 1.32 | | .15 |
| 48 | | | | | | | |
| 49 | | | | | | | |
| 50 | TIPS | | | | | | 4.04 |
| 51 | . | | | | | | |
| 52 | FIREWALL-STRUCTURAL | | | | | | |
| 53 | ATTACH FTGS.-WING TO FUS. | | | | 26.33 | | |
| 54 | | | | | | | |
| 55 | COLUMN TOTALS | | | | 423.12 | | 144.00 |
| 56 | TOTAL-BASIC STRUCTURE | | | | | | 567.12 |
| 57 | | | | | | | |

| | ** * | X XX OPERATING MECHANISM X | | | | | |
|---|---|---|---|---|---|---|---|
| | LO P AREA SQ FT | STRUCT | MECH & CONTROLS | POWER TRANS | ACTUATOR | LOCK MECH | EMERG |
| WING FOLD | | | | | | | |
| DOORS & FRAMES | | | | | | | |
| -LANDING | | | | | | | |
| -BOMB | | | | | | | |
| -GUN | | | | | | | |
| -AMMUNITION | | | | | | | |
| -ROCKET | | | | | | | |
| -LIFE RAFT | | | | | | | |
| -ESCAPE | | | | | | | |
| -ACCESS | | 15.78 | | | | | |
| -FAN C.S.-H- 56.5 | | 126.46 | 27.16 | 17.47 | 68.41 | 19.97 | |
| PANELS-NON STRUCTURAL | | | | | | | |
| SEAL - FAN | | 12.70 | | | | | |
| SEAL - TE TO FLAP | | 1.64 | | | | | |
| INSULATION - EXTERNAL | | 28.99 | | | | | |
| WALKWAYS, STEPS & GRIPS | | | | | | | |
| FAIRING AND FILLETS | | 24.95 | | | | | |
| EXTERIOR FINISH | | | | | | | |
| COLUMN TOTALS | | 210.52 | 27.16 | 17.47 | 68.41 | 19.97 | |
| TOTAL-SECONDARY STRUCTURE | | | | | | | 343.53 |

* TYPE OF POWER- H-HYD, E-ELEC, P-PNEU, POWER TRANSMISSION FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT

** INDICATE LOCATION OF MAJOR DOORS- CS, OP, IP, ETC

AN 9102-D-TAB
NAME
DATE

WING GROUP
CONTROL SURFACES

PAGE 27
MODEL
REPORT 63B123

| | X AILERONS | | XX T.E. FLAPS | | XX L.E. FLAPS | X |
|---|---|---|---|---|---|---|
| | INBOARD | OUTBOARD | INBOARD | OUTBOARD | INBOARD | OUTBOARD |
| SPARS | | 5.60 | 8.95 | | | |
| STRINGERS | | | 1.48 | | | |
| RIBS | | 8.81 | 14.00 | | | |
| COVER AND STIFFENERS | | 9.77 | 34.35 | | | |
| T.E. STRIPS | | .42 | 1.80 | | | |
| FABRIC AND DOPE | | | | | | |
| RIBS | | 1.80 | | | | |
| TABS - STRUCTURE | | 8.11 | | | | |
| TABS - BALANCE WEIGHTS | | 3.58 | | | | |
| TORQUE TUBES | | | | | | |
| BALANCE WEIGHTS & SUPPORTS | | | | | | |
| AERODYNAMIC SEALS | | 1.66 | | | | |
| CONTROL HORNS | | | | | | |
| ACTUATOR ATTACH STRUCT. | | | 2.48 | | | |
| ACCESS DOORS-NON STRUCT | | .69 | | | | |
| HINGES AND PINS | | 1.38 | 7.23 | | | |
| EXTERIOR FINISH | | | | | | |
| TOTALS-SURFACE | | | | | | |
| CONTROL SURFACE SUPPORTS | | | | | | |
| HINGES | | 14.12 | 4.85 | | | |
| BRACKETS | | 4.33 | 1.40 | | | |
| TRACKS | | | | | | |
| CARRIAGES | | | | | | |
| TOTALS-SUPPORTS | | | | | | |
| COLUMN TOTALS | | 60.27 | 76.54 | | | |
| PAGE TOTAL | | | | | | 136.81 |
| | | | | | | 1047.46 |

| | | X STABILIZER XX | | | FINS | X |
|---|---|---|---|---|---|---|
| | | CENTER | OUTER | CENTER | OUTER | DORSAL |
| UPPER-FRONT SPAR CAP | | | | | | |
| -INTERMEDIATE SPAR CAP | | | | | | |
| -REAR SPAR CAP | | | | | | |
| -AUXILIARY SPAR CAP | | | | | | |
| -INTERSPAR COVER | | 20.24 | | 25.76 | | 1.54 |
| -SPANWISE STIFFENERS | | | | | | |
| -JOINTS, SPLICES & FAST. | | | | | | .63 |
| | | | | | | |
| FRAMES | | | | | | .88 |
| | | | | | | |
| LOWER-FRONT SPAR CAP | | | | | | |
| -INTERMEDIATE SPAR CAP | | | | | | |
| -REAR SPAR CAP | | | | | | |
| -AUXILIARY SPAR CAP | | | | | | |
| -INTERSPAR COVER | | | | | | |
| -SPANWISE STIFFENERS | | | | | | |
| -JOINTS, SPLICES & FAST. | | | | | | |
| FRONT SPAR | | 2.73 | | 4.07 | | |
| CENTER SPAR | | 8.43 | | 10.23 | | |
| REAR SPAR | | 3.44 | | 3.01 | | |
| SPAR WEB & STIFF.-FRONT | | | | | | |
| -INTERMEDIATE | | | | | | |
| -REAR | | | | | | |
| -AUXILIARY | | | | | | |
| -JOINTS, SPLICES & FAST. | | | | | | |
| | | | | | | |
| | | | | | | |
| INTERSPAR-RIBS | | 13.30 | | 20.71 | | |
| -BULKHEADS | | | | | | |
| -CHORDWISE STIFFENERS | | | | | | |
| -JOINTS, SPLICES & FAST. | | 2.15 | | | | |
| | | | | | | |
| LEADING EDGE-COVER | | 6.24 | | 4.67 | | |
| -STIFFENERS | | | | | | |
| -RIBS | | 2.48 | | 2.99 | | |
| -AUXILIARY SPARS | | | | | | |
| -JOINTS, SPLICES & FAST. | | | | | | |
| | | | | | | |
| | | | | | | |
| TRAILING EDGE-COVER | | | | | | |
| -STIFFENERS | | .05 | | .68 | | |
| -RIBS | | .66 | | .28 | | |
| -AUXILIARY SPARS | | | | | | |
| -JOINTS, SPLICES & FAST. | | | | | | |
| | | | | | | |
| FIBERGLASS FAIRING | | 3.99 | | 4.96 | | |
| TIPS | | 4.26 | | | | |
| ACTUATOR FITTING | | .29 | | .42 | | |
| MISCELLANEOUS | | | | | | |
| PIVOT FITTING | | 1.39 | | 2.59 | | |
| EXTERIOR FINISH | | | | | | .10 |
| COLUMN TOTALS | | 69.65 | | 80.37 | | 3.15 |
| TOTAL-BASIC STRUCTURE | | | | | | 153.17 |
| | | | | | | |

| | ** # | X | XX | OPERATING MECHANISM | | | X |
|---|---|---|---|---|---|---|---|
| | LO P AREA SQ FT | STRUCT | MECH & CONTROLS | POWER TRANS | ACTUATOR | LOCK MECH | EMERG |
| DOORS & FRAMES | | | | | | | |
| -LANDING | | | | | | | |
| -ACCESS | | | | | | | |
| - VERTICAL | | 2.60 | | | | | |
| PANELS-NON STRUCTURAL | | | | | | | |
| AERO SEAL ATTACH - HORIZ. | | .91 | | | | | |
| AERO SEAL ATTACH - VERT. | | .41 | | | | | |
| WALKWAYS, STEPS & GRIPS | | | | | | | |
| FAIRING AND FILLETS | | | | | | | |
| EXTERIOR FINISH -HORIZ. | | 2.96 | | | | | |
| " " -VERT. | | 1.99 | | | | | |
| COLUMN TOTALS | | 8.87 | | | | | |
| TOTAL-SECONDARY STRUCTURE | | | | | | | 8.87 |

* TYPE OF POWER- H-HYD, E-ELEC, P-PNEU, POWER TRANSMISSION FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT

** INDICATE LOCATION OF MAJOR DOORS- CS, OP, IP, ETC

AN 9102-D-TAB
NAME
DATE

# TAIL GROUP
# CONTROL SURFACES

PAGE 33
MODEL
REPORT 63B123

| | | | | | X ELEVATOR | XX RUDDERS CENTER | RUDDERS OUTER |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | SPARS | | | | 2.14 | 4.55 | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | RIBS | | | | 2.44 | 1.83 | |
| 9 | RIB ATTACH ANGLES | | | | | .11 | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | COVER AND STIFFENERS | | | | 8.70 | 4.02 | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | T.E. STRIPS | | | | .60 | .24 | |
| 16 | | | | | | | |
| 17 | FABRIC AND DOPE | | | | | | |
| 18 | | | | | | | |
| 19 | | | | | | | |
| 20 | | | | | | | |
| 21 | TABS | | | | | 1.88 | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | TORQUE TUBES | | | | 3.15 | 3.48 | |
| 26 | | | | | | | |
| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | BALANCE WEIGHTS & SUPPORTS | | | | 21.28 | 12.21 | |
| 30 | | | | | | | |
| 31 | AERODYNAMIC SEALS | | | | 1.23 | .84 | |
| 32 | | | | | | | |
| 33 | | | | | | | |
| 34 | CONTROL HORNS | | | | | | |
| 35 | | | | | | | |
| 36 | | | | | | | |
| 37 | ACCESS DOORS-NON STRUCT | | | | .38 | .53 | |
| 38 | | | | | | | |
| 39 | HINGES AND PINS | | | | 1.50 | .96 | |
| 40 | EXTERIOR FINISH | | | | | | |
| 41 | | | | | | | |
| 42 | TOTALS-SURFACE | | | | | | |
| 43 | | | | | | | |
| 44 | CONTROL SURFACE SUPPORTS | | | | | | |
| 45 | HINGES | | | | 1.90 | .69 | |
| 46 | BRACKETS | | | | | .77 | |
| 47 | ACTUATOR | | | | | .32 | |
| 48 | | | | | | | |
| 49 | | | | | | | |
| 50 | | | | | | | |
| 51 | | | | | | | |
| 52 | | | | | | | |
| 53 | | | | | | | |
| 54 | TOTALS-SUPPORTS | | | | | | |
| 55 | COLUMN TOTALS | | | | 43.32 | 32.43 | |
| 56 | PAGE TOTAL | | | | | | 75.75 |
| 57 | TOTAL-TAIL GROUP - PG 6-8 | | | | | | 237.79 |

BODY GROUP
BASIC STRUCTURE



| | X | FUSELAGE OR HULL | | | | XX BOOMS |
|---|---|---|---|---|---|---|
| STATION | | | | | | |
| #BULKHEADS & FRAMES | | | | | | |
| FRONT HINGE FRAME | | 3.92 | | | | |
| REAR HINGE FRAME | | 12.30 | | | | |
| | | | | | | |
| FRAME - STA. 91 | | 12.48 | | | | |
| BULKHEAD - STA. 214 | | 47.13 | | | | |
| CANTED BULKHEAD - STA. 146 | | 27.74 | | | | |
| BULKHEAD - STA. 165.2 | | 14.46 | | | | |
| FRAME - ENGINE SUPT+ 214 | | 13.65 | | | | |
| BULKHEAD - M.L.G. DRAG STRUT | | 20.25 | | | | |
| | | | | | | |
| BULKHEAD - M.L.G. STA. 287 | | 20.06 | | | | |
| BULKHEAD - WING SPAR - 296 | | 39.49 | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| BULKHEAD - STAB FRONT SPAR | | 5.12 | | | | |
| - STAB CTR SPAR | | 6.30 | | | | |
| - STAB REAR SPAR | | 3.44 | | | | |
| TRUSS STRUCTURE | | 108.80 | | | | |
| MINOR FRAMES | | 97.99 | | | | |
| JOINTS, SPLICES, FASTENERS | | 19.51 | | | | |
| OVERTURN STRUCTURE | | | | | | |
| VERTICAL STIFFENERS | | 2.59 | | | | |
| COVER-UPPER BETWEEN LONGN | | 25.33 | | | | |
| -SIDE BETWEEN LONGERONS | | 50.31 | | | | |
| -LOWER BETWEEN LONGERONS | | 21.30 | | | | |
| HORIZONTAL STIFFENERS | | 4.51 | | | | |
| COVER LONGL STIFF.-UPPER | | | | | | |
| -SIDE | | 8.76 | | | | |
| -LOWER | | | | | | |
| WING L.E. ATTACH FTGS. | | .78 | | | | |
| DRAG ANGLE - FUS. TO FIN | | 4.99 | | | | |
| LONGERONS-UPPER | | 36.55 | | | | |
| LONGERONS-LOWER | | 40.43 | | | | |
| LONGERON - UPPER EXTERNAL | | 8.04 | | | | |
| HORIZ. SHEAR WEBS | | 65.02 | | | | |
| LONGITUDINAL PARTITIONS | | | | | | |
| | | | | | | |
| FLOORING AND SUPPORTS | | 21.21 | | | | |
| NOSE WHEEL WELL | | 12.89 | | | | |
| MAIN GEAR DOOR SUPPORT | | 21.18 | | | | |
| | | | | | | |
| FIREWALL-STRUCTURAL | | | | | | |
| PITCH FAN MOUNT STRUCTURE | | 15.63 | | | | |
| KEELSONS | | 1.32 | | | | |
| KEEL | | | | | | |
| MISCELLANEOUS | | 1.08 | | | | |
| CHINE AND SPRAY STRIPS | | | | | | |
| STEP ASSEMBLY | | | | | | |
| STAIRWAYS-STRUCTURAL | | | | | | |
| COLUMN TOTALS | | 794.54 | | | | |
| TOTAL-BASIC STRUCTURE | | | | | | 794.54 |

* LIST ALL MAIN & WATERTIGHT BULKHEADS & FRAMES INDIVIDUALLY. MINOR FRAMES MAY BE COMBINED.

| | | X | FUSELAGE OR HULL | | | XX BOOMS | XX SPEED BRAKES | X |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | ENCLOSURE-EXCL TURRET ENC | | | | | | | |
| 5 | CANOPY | | 61.87 | | | | | |
| 6 | CANOPY-OPERATING MECH | | | | | | | |
| 7 | -RAILS | | | | | | | |
| 8 | * -CYLINDERS & PLUMBING | | | | | | | |
| 9 | -FLUID | | | | | | | |
| 10 | -HINGE STRUCTURE | | 4.25 | | | | | |
| 11 | -LATCH STRUCTURE | | .78 | | | | | |
| 12 | | | | | | | | |
| 13 | GUNNER-TAIL | | | | | | | |
| 14 | | | | | | | | |
| 15 | BOMBARDIER | | | | | | | |
| 16 | SIGHTING BLISTERS | | | | | | | |
| 17 | | | | | | | | |
| 18 | WINDSHLD-EXCL BULLET PROT | | 53.94 | | | | | |
| 19 | | | | | | | | |
| 20 | WINDOWS, PORTS-INCL FRAMES | | | | | | | |
| 21 | | | | | | | | |
| 22 | HEAT SHIELDING | | 2.21 | | | | | |
| 23 | | | | | | | | |
| 24 | | | | | | | | |
| 25 | | | | | | | | |
| 26 | | | | | | | | |
| 27 | | | | | | | | |
| 28 | FLOORING AND SUPPORTS | | | | | | | |
| 29 | | | | | | | | |
| 30 | | | | | | | | |
| 31 | STAIRWAYS & LADDERS-FIXED | | | | | | | |
| 32 | | | | | | | | |
| 33 | JACK PAD PROVISIONS | | 1.07 | | | | | |
| 34 | STERNPOST AND FITTINGS | | | | | | | |
| 35 | NOSE BUMPER-HULL | | | | | | | |
| 36 | RUBBING STRIPS | | | | | | | |
| 37 | | | | | | | | |
| 38 | NOSE CONE | | 14.85 | | | | | |
| 39 | | | | | | | | |
| 40 | TAIL CONE | | 8.06 | | | | | |
| 41 | TAIL BUMPER | | 1.47 | | | | | |
| 42 | | | | | | | | |
| 43 | SPEED BRAKES-STRUCTURE | | | | | | | |
| 44 | -SUPPORTS | | | | | | | |
| 45 | | | | | | | | |
| 46 | | | | | | | | |
| 47 | | | | | | | | |
| 48 | | | | | | | | |
| 49 | | | | | | | | |
| 50 | | | | | | | | |
| 51 | | | | | | | | |
| 52 | | | | | | | | |
| 53 | | | | | | | | |
| 54 | | | | | | | | |
| 55 | COLUMN TOTALS | | 148.50 | | | | | |
| 56 | PAGE TOTAL | | | | | | | 148.50 |
| 57 | | | | | | | | |

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

AN 9102-D-TAB
NAME
DATE

BODY GROUP
SECONDARY STRUCTURE
DOORS, PANELS AND MISCELLANEOUS


MODEL
REPORT 63B123

| | ** # | X | XX | OPERATING MECHANISM | | | X |
|---|---|---|---|---|---|---|---|
| | LO P AREA SQ FT | STRUCT | MECH & CONTROLS | POWER TRANS | ACTUATOR | LOCK MECH | EMERG |
| DOORS & FRAMES | | | | | | | |
| -LANDING - NOSE F-Ø-5.66 | | 6.22 | 4.00 | | | | |
| -LANDING - MAIN F-H-28.1 | | 50.23 | 4.85 | 3.71 | 32.96 | | |
| -BOMB | | | | | | | |
| -GUN | | | | | | | |
| -AMMUNITION | | | | | | | |
| -ROCKET | | | | | | | |
| -LIFE RAFT | | | | | | | |
| -ESCAPE | | | | | | | |
| -WATERTIGHT | | | | | | | |
| -COMPARTMENT | | | | | | | |
| -ENTRANCE | | | | | | | |
| -ACCESS | | 6.26 | | | | | |
| -ACCESS - STA. 100 TO 133 | | 7.36 | | | | | |
| -SPIN CHUTE | | 2.31 | | | | | |
| ACCESS - ELECT. COMPT. | | 5.34 | | | | | |
| -ENGINE | | | | | | | |
| -CAMERA | | | | | | | |
| PANELS-NON STRUCTURAL | | | | | | | |
| -ENGINE ACCESS | | 47.52 | | | | | |
| -SIDE 214 TO 287 | | 36.30 | | | | | |
| -LOWER 165 TO 276 | | 60.14 | | | | | |
| -M.L.G. WHEEL WELL | | 3.28 | | | | | |
| -SEAL FUS. TO CANOE | | 2.65 | | | | | |
| -CLOSURE - PITCH FAN | | 2.81 | | | | | |
| WALKWAYS, STEPS & GRIPS | | | | | | | |
| FAIRING - TAILPIPE EXIT | | 16.04 | | | | | |
| FAIRING AND FILLETS | | | | | | | |
| EXTERIOR FINISH | | 5.59 | | | | | |
| INSULATION - EXTERNAL | | 24.27 | | | | | |
| COLUMN TOTALS | | 276.32 | 8.85 | 3.71 | 32.96 | | |
| PAGE TOTAL | | | | | | | 321.84 |
| TOTAL-BODY GROUP - PG 9-11 | | | | | | | 1264.88 |

* TYPE OF POWER- H-HYD, E-ELEC, P-PNEU, POWER TRANSMISSION FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT

** INDICATE LOCATION OF MAJOR DOORS- B-BOOM, F-FUSELAGE, H-HULL.

Ø MECHANICAL LINKAGE TO GEAR

AN 9102-D-TAB
NAME
DATE

# ALIGHTING GEAR GROUP


MODEL
REPORT 63B123

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | TYPE | MAIN | | NOSE | | | |
| 2 | | | | | | | |
| 3 | LOCATION | | | | | | |
| 4 | | | | | | | |
| 5 | QUANTITY | | | | | | |
| 6 | WHEELS | 28.90 | | 9.22 | | | |
| 7 | TIRES | 23.70 | | 10.95 | | | |
| 8 | TUBES | | | | | | |
| 9 | AIR | | | | | | |
| 10 | BRAKES | 21.10 | | | | | |
| 11 | | | | | | | |
| 12 | | | | | | | |
| 13 | ANTI-SKID DEVICE | | | | | | |
| 14 | | | | | | | |
| 15 | FLOATS-BULKHEADS | | | | | | |
| 16 | -FRAMES | | | | | | |
| 17 | -COVER | | | | | | |
| 18 | -COVER STIFF.-LONGL | | | | | | |
| 19 | -KEELSONS | | | | | | |
| 20 | -KEEL | | | | | | |
| 21 | -LONGITUDINAL PARTITIONS | | | | | | |
| 22 | -CHINE, SPRAY STRIP | | | | | | |
| 23 | -STEP ASSEMBLY | | | | | | |
| 24 | -POST ASSEMBLY | | | | | | |
| 25 | -NOSE BUMPER | | | | | | |
| 26 | INSPECTION DOORS | | | | | | |
| 27 | WALKWAYS | | | | | | |
| 28 | EXTERIOR FINISH | | | | | | |
| 29 | SKIDS OR BUMPERS | | | | | | |
| 30 | SKIS | | | | | | |
| 31 | | | | | | | |
| 32 | TOTALS-RUNNING GEAR | (73.70) | | (20.17) | | | |
| 33 | SHOCK STRUT-OIL-DAMPER | | | 27.75 | | | |
| 34 | STRUTS-DRAG | 34.83 | | 7.14 | | | |
| 35 | -SIDE | 10.10 | | | | | |
| 36 | -VEE BRACE | 15.09 | | | | | |
| 37 | PYLON | | | | | | |
| 38 | SHOCK STRUT-STRUT | 79.14 | | | | | |
| 39 | -STRUT OIL | 3.40 | | | | | |
| 40 | -FORK | | | | | | |
| 41 | -AXLE | | | | | | |
| 42 | -TORQUE ARMS | 5.66 | | | | | |
| 43 | -TRUNNIONS | | | | | | |
| 44 | SHIMMY DAMPER OR SNUBBER | | | | | | |
| 45 | TWO POSITION LINKAGE | 25.86 | | | | | |
| 46 | FITTINGS-MAIN ATTACH-WING | | | | | | |
| 47 | -TAIL | | | | | | |
| 48 | -BODY | 45.22 | | 3.94 | | | |
| 49 | -NACELLE | | | | | | |
| 50 | | | | | | | |
| 51 | FAIRING | | | | | | |
| 52 | GROUND FEELER PROBE | .62 | | | | | |
| 53 | MISCELLANEOUS | | | | | | |
| 54 | PINS, BOLTS, NUTS, ETC | 1.15 | | | | | |
| 55 | COLUMN TOTALS | 294.77 | | 59.00 | | | |
| 56 | PAGE TOTAL | | | | | | 353.77 |
| 57 | | | | | | | |

TIRE SIZE: MAIN; 20 X 4.4 NOSE: 18 X 4.4
BRK ENERGY FT#/1000/AIRPL 2,800 NORMAL 3,900 RTO
BRAKE TYPE: SINGLE DISK

AN 9102-D-TAB
NAME
DATE

# ALIGHTING GEAR GROUP
## CONTROLS
MAIN GEAR


MODEL
REPORT 63B123

| | LOCATION | X | | | XX | | Two X |
|---|---|---|---|---|---|---|---|
| | | | BRAKE | EMERG | | EMERG | Position- |
| | | RETRACT | OPER | EXTEN | RETRACT | EXTEN | ing Con- |
| | | | | | | | trols |
| | MECHANICAL OPERATING MECH | | | | | | |
| | CONTROLS | | 4.92 | | | | |
| | ACTUATORS | | | | | | |
| | ELECTRICAL OPERATING MECH | | | | | | |
| | CONTROLS | 1.04 | | | | | |
| * | CIRCUITRY | 3.37 | | .24 | | | 1.13 |
| | OPERATING MOTORS | | | | | | |
| | MECHANISM | | | | | | |
| | HYDRAULIC OPERATING MECH | | | | | | |
| | CONTROLS | | | | | | |
| * | PLUMBING | 3.97 | 6.19 | | | | .47 |
| | SELECTOR VALVES | 1.36 | | | | | 1.34 |
| | SEQUENCE VALVES | .68 | | | | | |
| | ACCUMULATORS | | | | | | |
| | ACTUATORS | 7.06 | | | | | 7.40 |
| | MECHANISM | | | | | | |
| * | FLUID | .04 | .24 | | | | .08 |
| | PNEUMATIC OPERATING MECH | | | | | | |
| | CONTROLS | | | 1.65 | | | |
| * | PLUMBING | | | 3.69 | | | |
| | PUMPS | | | | | | |
| | BOTTLES-AIR | | | | | | |
| | ACTUATORS | | | | | | |
| | MECHANISM | | | | | | |
| | UPLATCH OPER. MECH. | | | | | | |
| | ACTUATOR | .97 | | | | | |
| | MECHANISM & PLUMBING | 7.82 | | | | | |
| | LOCKING MECHANISM | | | | | | |
| | BRACES | | | | | | |
| | LINKS | | | | | | |
| | PARKING BRAKE CONTROL | | | | | | |
| | POSITION INDICATING MECH | 3.88 | | | | | |
| | SUPTS, GUIDES, ETC-WING | | | | | | |
| | -TAIL | | | | | | |
| | -BODY | .17 | 1.30 | .40 | | | .15 |
| | -NACELLE | | | | | | |
| | COLUMN TOTALS | 30.36 | 12.65 | 5.98 | | | 10.57 |
| | PAGE TOTAL | | | | | | 59.56 |

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

# ALIGHTING GEAR GROUP
## CONTROLS
## CONTD
NOSE GEAR



| | LOCATION | X | | | XX | | X |
|---|---|---|---|---|---|---|---|
| | | | | BRAKE | EMERG | | EMERG |
| | | STEERING | RETRACT | OPER | EXTEN | RETRACT | EXTEN |
| 6 | MECHANICAL OPERATING MECH | | | | | | |
| 7 | CONTROLS | | | | | | |
| 8 | ACTUATORS | | | | | | |
| 12 | ELECTRICAL OPERATING MECH | | | | | | |
| 13 | CONTROLS | | | | | | |
| 14 | * CIRCUITRY | | .77 | | .26 | | |
| 15 | OPERATING MOTORS | | | | | | |
| 16 | MECHANISM | | | | | | |
| 20 | HYDRAULIC OPERATING MECH | | | | | | |
| 21 | CONTROLS | | | | | | |
| 22 | * PLUMBING | | 2.81 | | | | |
| 23 | PUMPS | | | | | | |
| 24 | RESERVOIRS | | | | | | |
| 25 | ACCUMULATORS | | | | | | |
| 26 | ACTUATORS | | 2.18 | | | | |
| 27 | MECHANISM | | | | | | |
| 28 | * FLUID | | .10 | | | | |
| 31 | PNEUMATIC OPERATING MECH | | | | | | |
| 32 | CONTROLS | | | | | | |
| 33 | * PLUMBING | | | | .28 | | |
| 34 | PUMPS | | | | | | |
| 35 | BOTTLES-AIR | | | | | | |
| 36 | ACTUATORS | | | | | | |
| 37 | MECHANISM | | | | | | |
| 41 | LOCKING MECHANISM | | | | | | |
| 42 | BRACES | | | | | | |
| 43 | LINKS | | | | | | |
| 44 | PARKING BRAKE CONTROL | | | | | | |
| 45 | POSITION INDICATING MECH | | .32 | | | | |
| 48 | SUPTS, GUIDES, ETC-WING | | | | | | |
| 49 | -TAIL | | | | | | |
| 50 | -BODY | | .09 | | | | |
| 51 | -NACELLE | | | | | | |
| 55 | COLUMN TOTALS | | 6.27 | | .54 | | |
| 56 | PAGE TOTAL | | | | | | 6.81 |
| 57 | TOTAL-ALIGHTING GEAR GROUP - PG 12-14 | | | | | | 420.14 |

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

| | | | | | | COCKPIT CONTROLS | AUTO-PILOT |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | CONTROL COLUMN OR STICK | | | | | | |
| 5 | -PILOT | | | | | 3.67 | |
| 6 | -ASSISTANT PILOT | | | | | | |
| 7 | -CONNECTING MEMBERS | | | | | 5.62 | |
| 8 | -SUPPORTS | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | | | | | | | |
| 13 | RUDDER PEDALS & BRK TREAD | | | | | | |
| 14 | -PILOT | | | | | 6.26 | |
| 15 | -ASSISTANT PILOT | | | | | | |
| 16 | -CONNECTING MEMBERS | | | | | | |
| 17 | -SUPPORTS | | | | | .12 | |
| 18 | -ADJUSTING MECHANISM | | | | | 1.40 | |
| 19 | LIFT STICK | | | | | 5.04 | |
| 20 | LIFT STICK MECHANISM | | | | | .38 | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | INTEGRAL PARKING LOCK | | | | | | |
| 24 | CONTROL STICK | | | | | | |
| 25 | RUDDER PEDALS | | | | | | |
| 26 | SURFACES | | | | | | |
| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | | | | | | | |
| 30 | | | | | | | |
| 31 | | | | | | | |
| 32 | | | | | | | |
| 33 | AUTOPILOT-TYPE- | | | | | | |
| 34 | CONTROLLER | | | | | | |
| 35 | TRANSMITTER | | | | | | |
| 36 | SERVO AMPLIFIER | | | | | | |
| 37 | SERVO MOTORS | | | | | | |
| 38 | GYROS | | | | | | |
| 39 | | | | | | | |
| 40 | AUTO STABILIZATION SYSTEM | | | | | | |
| 41 | CONTROLLER | | | | | | 29.19 |
| 42 | ELECTRICAL CIRCUITRY | | | | | | 10.05 |
| 43 | | | | | | | |
| 44 | | | | | | | |
| 45 | | | | | | | |
| 46 | SUPPORTS AND BRACKETS | | | | | | |
| 47 | | | | | | | |
| 48 | * PLUMBING | | | | | | |
| 49 | * FLUID | | | | | | |
| 50 | * ELEC PANELS & CIRCUITRY | | | | | | |
| 51 | PULLEYS, SPROCKETS, ETC | | | | | | |
| 52 | | | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | COLUMN TOTALS | | | | | 22.49 | 39.24 |
| 56 | TOTAL-COCKPIT CONTROLS & AUTOPILOT | | | | | | 61.73 |
| 57 | | | | | | | |

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

SURFACE CONTROLS GROUP
SYSTEM CONTROLS
CONVENTIONAL



| | AILERON | ELEVATOR | RUDDER | T.E. FLAPS | HORIZONTAL STABILIZER | SPEED BRAKES |
|---|---|---|---|---|---|---|
| MECHANICAL OPERATING MECH | 16.93 | 5.25 | 3.42 | | | |
| CONTROLS | | 7.61 | 6.74 | | | |
| TENSION REGULATORS | | 4.20 | 4.12 | | | |
| ACTUATORS | | | | | | |
| TRIM CONTROLS | | | | | | |
| ELECTRICAL OPERATING MECH | | | | | | |
| **TYPE | | | | | | |
| CONTROLS | | | | | | |
| * CIRCUITRY | .40 | | .75 | 2.52 | 5.18 | |
| OPERATING MOTORS | | | | 15.22 | | |
| MECHANISM | | | | | | |
| TRIM CONTROLS | 1.58 | | 1.57 | | .05 | |
| HYDRAULIC OPERATING MECH | | | | | | |
| **TYPE | "B" | | | | "P" | |
| CONTROLS | | | | | | |
| * PLUMBING | 3.29 | | | | 14.77 | |
| PUMPS | | | | | | |
| RESERVOIRS | | | | | | |
| ACCUMULATORS | | | | | | |
| ACTUATORS | 6.30 | | | | 12.60 | |
| MECHANISM | | | | | | |
| TRIM CONTROLS | | | | | | |
| * FLUID | .39 | | | | 1.63 | |
| PNEUMATIC OPERATING MECH | | | | | | |
| **TYPE | | | | | | |
| CONTROLS | | | | | | |
| * PLUMBING | | | | | | |
| PUMPS | | | | | | |
| BOTTLES-AIR | | | | | | |
| ACTUATORS | | | | | | |
| MECHANISM | | | | | | |
| TRIM CONTROLS | | | | | | |
| ARTIFICIAL FEEL | | | | | | |
| BUNGEE | | | | | | |
| BOB WEIGHT | | | | | | |
| AILERON DROOP SYSTEM | | | | | | |
| MECHANICAL COMPONENTS | 3.37 | | | | | |
| ELECTRICAL ACTUATOR | 1.24 | | | | | |
| CIRCUITRY | .32 | | | | | |
| SUPPORTS, GUIDES, ETC-WING | 2.73 | | | | | |
| -TAIL | | | | | .29 | |
| -BODY | 1.32 | 3.84 | 2.24 | 1.17 | .12 | |
| -NACELLE | | | | | | |
| COLUMN TOTALS | 37.87 | 20.90 | 19.54 | 18.91 | 34.64 | |
| PAGE TOTAL | | | | | | 131.86 |

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.
** TYPE- ADD P-POWERED OR B-BOOST.

SURFACE CONTROLS GROUP
SYSTEM CONTROLS
CONTD
V.T.O.L.



| | PITCH | YAW | ROLL | LIFT | L.E. SLATS | COMMON |
|---|---|---|---|---|---|---|
| MECHANICAL OPERATING MECH | 10.83 | 1.26 | .40 | 19.65 | | 34.94 |
| CONTROLS | | | | | | |
| TENSION REGULATORS | | | | | | |
| ACTUATORS | | | | | | |
| TRIM CONTROLS | | | | | | |
| ELECTRICAL OPERATING MECH | | | | | | |
| **TYPE | | | | | | |
| CONTROLS | 3.70 | | | | | |
| * CIRCUITRY | .35 | .32 | .26 | .58 | | 6.64 |
| OPERATING MOTORS | | | | 2.74 | | |
| MECHANISM | | | | | | |
| TRIM CONTROLS | .81 | .97 | .86 | | | |
| CIRCUITRY-INTERLOCK | | | | | | 14.68 |
| HYDRAULIC OPERATING MECH | | | | | | |
| **TYPE | | | | | | |
| CONTROLS | | | | | | |
| * PLUMBING | 5.91 | | | 8.36 | | |
| PUMPS | | | | | | |
| RESERVOIRS | | | | | | |
| ACCUMULATORS | | | | | | |
| ACTUATORS | 9.60 | | | 24.54 | | |
| MECHANISM | | | | | | |
| TRIM CONTROLS | | | | | | |
| * FLUID | .81 | | | .87 | | |
| | | | | | | |
| PNEUMATIC OPERATING MECH | | | | | | |
| **TYPE | | | | | | |
| CONTROLS | | | | | | |
| * PLUMBING | | | | | | |
| PUMPS | | | | | | |
| BOTTLES-AIR | | | | | | |
| ACTUATORS | | | | | | |
| MECHANISM | | | | | | |
| TRIM CONTROLS | | | | | | |
| | | | | | | |
| ARTIFICIAL FEEL | | | | | | |
| BUNGEE | | | | | | |
| BOB WEIGHT | | | | | | |
| ELECTRICAL MIXER | | | | | | 27.04 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| SUPPORTS, GUIDES, ETC-WING | | | | 6.80 | | |
| -TAIL | | | | | | |
| -BODY | 3.37 | | | .08 | | .44 |
| -NACELLE | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| COLUMN TOTALS | 35.38 | 2.55 | 1.52 | 63.62 | | 83.74 |
| PAGE TOTAL | | | | | | 186.81 |
| TOTAL-SURFACE CONTROLS GROUP - PG 15-17 | | | | | | 380.40 |

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.
** TYPE- ADD P-POWERED OR B-BOOST.

AN 9102-D-TAB
NAME
DATE

ENGINE SECTION
OR
NACELLE GROUP


MODEL
REPORT 63B123

| | | | | | | INBOARD | CENTER | OUTBOARD |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | 14.34 | |
| 4 | ENGINE MOUNT | | | | | | | |
| 5 | | | | | | | | |
| 6 | SUPPORT BAY | | | | | | | |
| 7 | VIBRATION ABSORBERS | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | NACELLE STRUCTURE | | | | | | | |
| 11 | BULKHEADS AND FRAMES | | | | | | | |
| 12 | COVER AND STIFFENERS | | | | | | | |
| 13 | FITTINGS | | | | | | | |
| 14 | LONGERONS | | | | | | | |
| 15 | ATTACHING ANGLES, ETC | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | PYLON AND STRUTS | | | | | | | |
| 20 | | | | | | | | |
| 21 | | | | | | | | |
| 22 | | | | | | | | |
| 23 | *FIREWALL | | | | | | 30.05 | |
| 24 | | | | | | | | |
| 25 | FIRE PROTECTION SHROUDS | | | | | | | |
| 26 | | | | | | | | |
| 27 | COWLING | | | | | | | |
| 28 | ENGINE COWL | | | | | | | |
| 29 | | | | | | | | |
| 30 | | | | | | | | |
| 31 | | | | | | | | |
| 32 | | | | | | | | |
| 33 | | | | | | | | |
| 34 | | | | | | | | |
| 35 | BAFFLES | | | | | | | |
| 36 | ACCESSORY COWL OR SKIRT | | | | | | | |
| 37 | COWL FLAPS | | | | | | | |
| 38 | COWL FLAP CONT & MECH | | | | | | | |
| 39 | | | | | | | | |
| 40 | | | | | | | | |
| 41 | | | | | | | | |
| 42 | | | | | | | | |
| 43 | | | | | | | | |
| 44 | | | | | | | | |
| 45 | FAIRING-NAC TO WING-PYLON | | | | | | | |
| 46 | STEPS AND GRIPS | | | | | | | |
| 47 | WORKING PLATFORMS-BUILT IN | | | | | | | |
| 48 | INTERNAL WALKWAYS | | | | | | | |
| 49 | | | | | | | | |
| 50 | | | | | | | | |
| 51 | INSTALLATION HARDWARE | | | | | | | |
| 52 | | | | | | | | |
| 53 | | | | | | | | |
| 54 | | | | | | | | |
| 55 | COLUMN TOTALS | | | | | | 44.39 | |
| 56 | PAGE TOTAL | | | | | | | 44.39 |
| 57 | | | | | | | | |

* IF IN NACELLE OR NON STRUCTURAL IN WING OR BODY

| | ENGINE INSTL | GEAR BOX & DRIVES | SUPER-CHARGER | AIR INDUCT. | EXHAUST SYSTEM | COOLIN SYSTEM |
|---|---|---|---|---|---|---|
| ENGINE INSTALLATION | | | | | | |
| * ENGINE & DIVERTER VALVE | 923.00 | | | | | |
| AFTERBURNER | | | | | | |
| * ENGINE AND AFTERBURNER | | | | | | |
| REDUCTION GEAR BOX | | | | | | |
| EXTENSION DRIVE SHAFT | | | | | | |
| | | | | | | |
| ACCESS. GEAR BOX & DRIVES | | 19.60 | | | | |
| DRIVE SHAFT | | 8.64 | | | | |
| SUPERCHARGER-FOR TURBOS | | | | | | |
| LUBRICATING SYSTEM | | | | | | |
| SUPPORTS | | | | | | |
| CONTROLS | | | | | | |
| PIPING-EXH TO SUPCHGR | | | | | | |
| | | | | | | |
| AIR INDUCTION SYSTEM | | | | | | |
| INTERCOOLERS & SUPPORTS | | | | | | |
| AIR DUCTS AND SHROUDING | | | | 56.28 | | |
| INTAKE DOORS & CONTROLS | | | | | | |
| AIR FILTERS | | | | | | |
| SCREENS AND CONTROLS | | | | | | |
| COMPRESSOR BLEED DUCT | | | | 1.45 | | |
| | | | | | | |
| | | | | | | |
| EXHAUST SYSTEM | | | | | | |
| EXHAUST STACKS | | | | | | |
| EXHAUST COLLECTORS | | | | | | |
| COLLECTOR OR ENG SHROUD | | | | | | |
| TAILPIPE | | | | | 148.90 | |
| TAILPIPE SHROUD & INSUL | | | | | 50.67 | |
| TAIL CONE | | | | | | |
| SILENCING DEVICES | | | | | | |
| SUPPORTS, BRACKETS, ETC | | | | | .30 | |
| THRUST SPOILER DOORS | | | | | 7.57 | |
| THRUST SPOILER LINKAGE | | | | | 5.44 | |
| COOLING SYSTEM | | | | | | |
| RADIATOR AND SUPPORTS | | | | | | |
| SHUTTERS, SCOOPS, DUCTS | | | | | | |
| EXPANSION TANK & SUPTS | | | | | | |
| LIQ IN SYSTEM- GAL | | | | | | |
| PIPING, VENTS, CLAMPS, ETC | | | | | | |
| | | | | | | |
| | | | | | | |
| FANS | | | | | | |
| CONTRAVANES | | | | | | |
| FAN DRIVES | | | | | | |
| CONTROLS & OPER MECH | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| COLUMN TOTALS | 923.00 | 28.24 | | 57.73 | 212.98 | |
| PAGE TOTAL | | | | | | 1221.85 |
| | | | | | | |

* AS INSTALLED WEIGHT

| | ENGINE INSTL | GEAR BOX & DRIVES | SUPER-CHARGER | AIR INDUCT'g | EXHAUST SYSTEM | COOLING SYSTEM |
|---|---|---|---|---|---|---|
| ENGINE INSTALLATION | | | | | | |
| * FAN-X353-5B (2) | 1616.38 | | | | | |
| AFTERBURNER | | | | | | |
| * ENGINE AND AFTERBURNER | | | | | | |
| REDUCTION GEAR BOX | | | | | | |
| EXTENSION DRIVE SHAFT | | | | | | |
| FAN MOUNTS | 8.06 | | | | | |
| ACCESS. GEAR BOX & DRIVES | | | | | | |
| | | | | | | |
| SUPERCHARGER-FOR TURBOS | | | | | | |
| LUBRICATING SYSTEM | | | | | | |
| SUPPORTS | | | | | | |
| CONTROLS | | | | | | |
| PIPING-EXH TO SUPCHGR | | | | | | |
| | | | | | | |
| AIR INDUCTION SYSTEM | | | | | | |
| INTERCOOLERS & SUPPORTS | | | | | | |
| AIR DUCTS | | | | 100.28 | | |
| INTAKE DOORS & CONTROLS | | | | | | |
| AIR FILTERS | | | | | | |
| SCREENS AND CONTROLS | | | | | | |
| INSULATION | | | | 6.79 | | |
| DUCT SUPPORTS | | | | 15.03 | | |
| | | | | | | |
| EXHAUST SYSTEM | | | | | | |
| EXHAUST STACKS | | | | | | |
| EXHAUST COLLECTORS | | | | | | |
| COLLECTOR OR ENG SHROUD | | | | | | |
| TAILPIPE | | | | | | |
| TAILPIPE SHROUD & INSUL | | | | | | |
| TAIL CONE | | | | | | |
| SILENCING DEVICES | | | | | | |
| SUPPORTS, BRACKETS, ETC | | | | | | |
| | | | | | | |
| | | | | | | |
| COOLING SYSTEM | | | | | | |
| RADIATOR AND SUPPORTS | | | | | | |
| SHUTTERS, SCOOPS, DUCTS | | | | | | |
| EXPANSION TANK & SUPTS | | | | | | |
| LIQ IN SYSTEM- GAL | | | | | | |
| PIPING, VENTS, CLAMPS, ETC | | | | | | |
| | | | | | | |
| | | | | | | |
| FANS | | | | | | |
| CONTRAVANES | | | | | | |
| FAN DRIVES | | | | | | |
| CONTROLS & OPER MECH | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| COLUMN TOTALS | 1624.44 | | | 122.10 | | |
| PAGE TOTAL | | | | | | 1746.54 |
| | | | | | | |

* AS INSTALLED WEIGHT

PITCH FAN

| | | ENGINE INSTL | GEAR BOX & DRIVES | SUPER-CHARGER | AIR INDUCT. | EXHAUST SYSTEM | COOLING SYSTEM |
|---|---|---|---|---|---|---|---|
| 4 | ENGINE INSTALLATION | | | | | | |
| 5 | * FAN - X376 (1) | 114.40 | | | | | |
| 6 | AFTERBURNER | | | | | | |
| 7 | * ENGINE AND AFTERBURNER | | | | | | |
| 8 | REDUCTION GEAR BOX | | | | | | |
| 9 | EXTENSION DRIVE SHAFT | | | | | | |
| 10 | FAN SUPPORTS | 2.27 | | | | | |
| 11 | ACCESS. GEAR BOX & DRIVES | | | | | | |
| 12 | | | | | | | |
| 13 | SUPERCHARGER-FOR TURBOS | | | | | | |
| 14 | LUBRICATING SYSTEM | | | | | | |
| 15 | SUPPORTS | | | | | | |
| 16 | CONTROLS | | | | | | |
| 17 | PIPING-EXH TO SUPCHGR | | | | | | |
| 18 | | | | | | | |
| 19 | AIR INDUCTION SYSTEM | | | | | | |
| 20 | INTERCOOLERS & SUPPORTS | | | | | | |
| 21 | AIR DUCTS | | | | 78.70 | | |
| 22 | * INTAKE DOORS | | | | 14.92 | | |
| 23 | AIR FILTERS | | | | | | |
| 24 | SCREENS AND CONTROLS | | | | | | |
| 25 | DUCT SHROUDING | | | | 20.66 | | |
| 26 | DUCT SUPPORTS | | | | 5.74 | | |
| 27 | BELLMOUTH | | | | 19.36 | | |
| 28 | EXHAUST SYSTEM | | | | | | |
| 29 | EXHAUST STACKS | | | | | | |
| 30 | EXHAUST COLLECTORS | | | | | | |
| 31 | COLLECTOR OR ENG SHROUD | | | | | | |
| 32 | TAILPIPE | | | | | | |
| 33 | TAILPIPE SHROUD & INSUL | | | | | | |
| 34 | TAIL CONE | | | | | | |
| 35 | SILENCING DEVICES | | | | | | |
| 36 | SUPPORTS, BRACKETS, ETC | | | | | | |
| 37 | ** PITCH THRUST REVERSER | | | | | 46.54 | |
| 38 | ** THRUST REVERSER LINKAGE | | | | | 8.55 | |
| 39 | COOLING SYSTEM | | | | | | |
| 40 | RADIATOR AND SUPPORTS | | | | | | |
| 41 | SHUTTERS, SCOOPS, DUCTS | | | | | | |
| 42 | EXPANSION TANK & SUPTS | | | | | | |
| 43 | LIQ IN SYSTEM- GAL | | | | | | |
| 44 | PIPING, VENTS, CLAMPS, ETC | | | | | | |
| 45 | | | | | | | |
| 46 | | | | | | | |
| 47 | FANS | | | | | | |
| 48 | CONTRAVANES | | | | | | |
| 49 | FAN DRIVES | | | | | | |
| 50 | CONTROLS & OPER MECH | | | | | | |
| 51 | | | | | | | |
| 52 | | | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | COLUMN TOTALS | 116.67 | | | 139.38 | 55.09 | |
| 56 | PAGE TOTAL | | | | | | 311.14 |
| 57 | | | | | | | |

* AS INSTALLED WEIGHT

** FOR ACTUATING MECHANISM & CONTROLS
SEE PAGE 17 "V.T.O.L. CONTROLS"

AN 9102-D-TAB
NAME
DATE

# PROPULSION GROUP
# LUBRICATING AND FUEL SYSTEMS

PAGE 61
MODEL
REPORT 63B123

| | | | | X AUXILIARY XX MAIN X | | | |
|---|---|---|---|---|---|---|---|
| | | | | LUBRI- | | LUBRI- | |
| | VOL-EA | | | CATING | FUEL | CATING | FUEL |
| | TYPE LOC QTY GAL | | | | | | |
| TANKS | | | | | | | |
| BLADDER-FWD FUS-1-262 | | | | | | | 18.88 |
| METAL-AFT-FUS-1-134 | | | | | | | 30.89 |
| AUXILIARY TANK | | | | | | | |
| METAL-AFT FUS-1-126 | | | | | | | |
| NOT USED. IN WE. EMPTY | | | | | | | |
| INTEG TANK SEALS & SEALANT | | | | | | | 8.85 |
| BACKING BOARD | | | | | | | |
| TANK SUPPORTS AND PADDING | | | | | 2.19 | | 2.80 |
| TANK BAY SEALING | | | | | | | |
| TANK RELEASE AND CONTROLS | | | | | | | |
| OIL COOLING INSTALLATION | | | | | | | |
| * COOLERS AND SUPPORTS | | | | | | | |
| DUCTS AND SHUTTERS | | | | | | | |
| AUTO OIL TEMP VALVE | | | | | | | |
| SHUTTER CONTROLS | | | | | | | |
| FUEL VAPOR RECOVERY | | | | | | | |
| OIL DILUTION SYSTEM | | | | | | | |
| VAPOR INERTION-CYL & SUPT | | | | | | | |
| -GENERATOR | | | | | | | |
| -CONTROLS | | | | | | | |
| PUMP INSTALLATION QTY | | | | | | | |
| ENGINE DRIVEN | | | | | | | |
| BOOSTER | | | | | | | 13.82 |
| HAND-INCL CONTROLS | | | | | | | |
| TRANSFER | | | | | | | |
| FILLING SYSTEM-GROUND | | | | | | | 4.33 |
| -IN FLIGHT | | | | | | | |
| ENGINE DRAIN SYSTEM | | | | | | | 4.67 |
| DISTRIBUTION SYSTEM | | | | | | | 18.76 |
| TRANSFER SYSTEM | | | | | | | |
| VENT SYSTEM | | | | | | | 5.19 |
| PRESSURIZATION SYSTEM | | | | | | | |
| DUMP SYSTEM | | | | | | | |
| WARMING SYST. - LOW PRESSURE | | | | | | | 1.75 |
| COLUMN TOTALS | | | | | 2.19 | | 109.94 |
| PAGE TOTAL | | | | | | | 112.13 |

* OIL COOLER-QTY • SIZE •

| | | | | WATER INJECT. | ENGINE CONTROLS | STARTING SYSTEM | PROP INSTL |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | WATER INJECTION SYSTEM | | | | | | |
| 5 | * TANKS | | | | | | |
| 6 | PUMPS | | | | | | |
| 7 | METERING UNIT | | | | | | |
| 8 | VALVES AND PLUMBING | | | | | | |
| 9 | CONTROLS | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | ENGINE CONTROLS | | | | | | |
| 13 | IGNITION | | | | .54 | | |
| 14 | THROTTLE | | | | 17.38 | | |
| 15 | DIVERTER VALVE | | | | 11.77 | | |
| 16 | ***SUPERCHARGER | | | | | | |
| 17 | AFTERBURNER | | | | | | |
| 18 | THRUST SPOILER | | | | 8.42 | | |
| 19 | | | | | | | |
| 20 | STARTING SYSTEM - AIR IMPINGEMENT | | | | | 6.08 | |
| 21 | POWER UNIT-TYPE | | | | | | |
| 22 | STARTER-TYPE | | | | | | |
| 23 | STARTER CONTROLS | | | | | | |
| 24 | CRANK AND EXTENSION | | | | | | |
| 25 | PRIMER AND PIPING | | | | | | |
| 26 | MESHING SOLENOID | | | | | | |
| 27 | CIRCUITRY | | | | | | |
| 28 | | | | | | | |
| 29 | | | | | | | |
| 30 | | | | | | | |
| 31 | | | | | | | |
| 32 | PROPELLER INSTL-DIA | | | | | | |
| 33 | PROPELLER-QTY | | | | | | |
| 34 | CUFFS | | | | | | |
| 35 | SPINNER | | | | | | |
| 36 | CONTROLS-TYPE GFAE | | | | | | |
| 37 | SPEED | | | | | | |
| 38 | PITCH | | | | | | |
| 39 | FEATHER | | | | | | |
| 40 | REVERSE | | | | | | |
| 41 | | | | | | | |
| 42 | | | | | | | |
| 43 | | | | | | | |
| 44 | | | | | | | |
| 45 | | | | | | | |
| 46 | | | | | | | |
| 47 | **OIL GAL | | | | | | |
| 48 | **TANK AND PLUMBING | | | | | | |
| 49 | | | | | | | |
| 50 | | | | | | | |
| 51 | | | | | | | |
| 52 | | | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | COLUMN TOTALS | | | | 38.11 | 6.08 | |
| 56 | PAGE TOTAL | | | | | | 44.19 |
| 57 | TOTAL PROPULSION GROUP | | | | | | 3435.85 |

* WATER TANKS-QTY , GAL PER TANK
** WHEN SEPARATE OIL SYSTEM IS USED.
***SUPERCHARGER INTEGRAL WITH ENGINE.

| | | | | | | X INSTRMT |
|---|---|---|---|---|---|---|
| | FUNCTIONAL GROUPS | | | | TRANSM | POWER |
| | AND ITEMS | QTY | INDIC | & AMPL | INSTL | SYSTEM |
| 4 | ACCELEROMETER | | .66 | | | |
| 5 | MACHMETER | | 1.65 | | .39 | |
| 6 | ALTIMETER | | 1.31 | | | |
| 7 | ATTITUDE | | 2.86 | | .21 | |
| 8 | AIR SPEED - LOW SPEED | | .60 | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | TURN AND BANK | | 1.20 | | .11 | |
| 12 | FLAP-THRUST SPOIL. POSITION | | .57 | .10 | 1.64 | |
| 13 | STANDBY COMPASS | | .72 | | .15 | |
| 14 | LANDING GEAR POSITION | | .32 | | 1.43 | |
| 15 | FUEL QUANITTY | | 1.82 | 3.77 | 2.38 | |
| 16 | FUEL FLOW | | 1.40 | 4.90 | 2.54 | |
| 17 | OIL PRESSURE - DUAL | | .63 | 2.70 | 3.74 | |
| 18 | ENGINE TACHOMETER (2) | | .98 | | 1.08 | |
| 19 | LANDING GEAR WARNING | | .05 | | | |
| 20 | HYDRAULIC PRESSURE | | .87 | 3.00 | 1.19 | |
| 21 | PITOT SYSTEM | | | | 9.39 | |
| 22 | CLOCK | | .43 | | | |
| 23 | ALPHA METER - ANGLE ATTACK | | .63 | | | |
| 24 | ANGLE OF YAW | | .63 | | | |
| 25 | VECTOR ANGLE | | .26 | | | |
| 26 | EXHAUST TEMP - DUAL | | 1.35 | | 2.38 | |
| 27 | VERTICAL SPEED | | 1.46 | | | |
| 28 | | | | | | |
| 29 | RUD., AIL., HORIZ.STAB. POS. | | 1.11 | | 3.02 | |
| 30 | LOUVER POSITION | | 1.11 | | .16 | |
| 31 | | | | | | |
| 32 | | | | | | |
| 33 | | | | | | |
| 34 | | | | | | |
| 35 | | | | | | |
| 36 | | | | | | |
| 37 | | | | | | |
| 38 | | | | | | |
| 39 | MASTER CAUTION IND. | | .13 | | | |
| 40 | MASTER CAUTION PNL. | | 1.41 | | 1.36 | |
| 41 | | | | | | |
| 42 | | | | | | |
| 43 | | | | | | |
| 44 | | | | | | |
| 45 | | | | | | |
| 46 | | | | | | |
| 47 | | | | | | |
| 48 | | | | | | |
| 49 | | | | | | |
| 50 | | | | | | |
| 51 | | | | | | |
| 52 | | | | | | |
| 53 | ATTACHING PARTS | | | | .58 | |
| 54 | SWITCHES, ETC. | | | | .71 | |
| 55 | COLUMN TOTALS | | 24.16 | 14.47 | 32.46 | |
| 56 | TOTAL-INSTRUMENTS | | | | | 71.09 |
| 57 | | | | | | |

LIST ITEMS BY FUNCTIONAL GROUPS- FLIGHT, ENGINE & MISC. LIST SUB-GROUPS BY CREW STATION. ADD SUPPLEMENTAL PAGE 26A IF NECESSARY.

AN 9102-D-TAB * HYDRAULIC AND PNEUMATIC GROUP PAGE 67
NAME MODEL
DATE REPORT 63B123

| | X HYDRAULIC | | | XX PNEUMATIC | | X |
|---|---|---|---|---|---|---|
| | UTILITY | EMERG | | UTILITY | EMERG | |
| PUMPS, COMPRESSORS MODEL | | | | | | |
| PUMPS - ENGINE DRIVEN (2) | 14.32 | | | | | |
| OIL COOLERS (2) | 6.10 | | | | | |
| REMOTE PUMP DRIVES | | | | | | |
| QTY CAP.EA | | | | | | |
| RESERVOIRS 2 272 IN³ | 14.30 | | | | | |
| AIR BOTTLES | | | | | *** | |
| ACCUMULATORS | 7.43 | | | | | |
| ACCUMULATOR CHARGE FTG. | .80 | | | | | |
| FILTERS | 6.64 | | | | | |
| PRESSURE REGULATORS | | | | | | |
| PRESSURE SWITCH | .74 | | | | | |
| VALVES | - | | | | | |
| CHECK | .16 | | | | | |
| RELIEF | 2.92 | | | | | |
| CONTROL | .15 | | | | | |
| CONTROLS | | | | | | |
| TEMPERATURE INDICATION | .94 | | | | | |
| LOW PRESS. WARNING | .38 | | | | | |
| QUICK DISCONNECTS | 1.04 | | | | | |
| PLUMBING | 21.46 | | | | 1.96 | |
| FLUID IN SYSTEM | 25.62 | | | | | |
| TYPE MIL-O-5606 | | | | | | |
| CAPACITY 3.66 GAL | | | | | | |
| SUPPORTS-WING | | | | | | |
| -TAIL | | | | | | |
| -BODY | 6.52 | | | | | |
| -NACELLE | | | | | | |
| FURNISHES POWER FOR ** | | | | | | |
| SEE FOLLOWING PAGE | | | | | | |
| COLUMN TOTALS | 109.52 | | | | 1.96 | |
| PAGE TOTAL | | | | | | 111.48 |
| TOTAL-HYDRAULIC AND PNEUMATIC GROUP | | | | | | 111.48 |

SYSTEM PRESSURE PSI 3000

* INCLUDES SYSTEM FROM SOURCES OF POWER TO MAIN DISTRIBUTION POINTS.
** LIST ITEMS AND INDICATE H-HYDRAULIC, P-PNEUMATIC
*** SEE NEXT PAGE

HYDRAULIC SYSTEM FURNISHES POWER FOR:

Wing Fan Doors
Main Landing Gear Doors
" " " Retraction
" " " Uplatch
" " " Brakes
" " " Two Positioning
Nose " " Retraction
Aileron
Horizontal Stabilizer
V.T.O.L. Pitch, Roll and Yaw Control
V.T.O.L. Lift Controls
Diverter Valve
Thrust Spoiler

PNEUMATIC SYSTEM SUPPLIES POWER FOR:

Main Landing Gear Emergency Extension
Nose Landing Gear Emergency Extension
Wing Fan Overspeed Control

*** Upper portion of main landing gear struts contain 210 cu. in. of dry nitrogen at 3000 psig for pneumatic system supply.

** ELECTRICAL GROUP
A.C. SYSTEM



| | | POWER SUPPLY | POWER CONVER | DISTR & CONT | LIGHTS-SIGNALS | EQUIP SUPPOR |
|---|---|---|---|---|---|---|
| 4 | POWER SUPPLY* KVA VOLT QTY | | | | | |
| 5 | GENERATORS | | | | | |
| 10 | REMOTE GENERATOR DRIVES | | | | | |
| 14 | POWER CONVERSION QTY | | | | | |
| 15 | CONVERTER AC-DC | | | | | |
| 16 | TRANSFORMER | | .81 | | | |
| 17 | RECTIFIER | | | | | |
| 18 | MOTOR-GENERATOR | | | | | |
| 19 | PHASE ADAPTER | | | | | |
| 20 | FREQUENCY CONVERTER | | | | | |
| 24 | POWER DISTRIBUTION & CONT | | | | | |
| 25 | GENERATOR CONTROL BOXES | | | | | |
| 26 | CUTOUTS, VOLT.REGULATORS | | | | | |
| 27 | AMMETERS AND VOLTMETERS | | | | | |
| 28 | SWITCHES, RHEO & PANELS | | | | | |
| 29 | CIRCUIT BREAKERS & FUSES | | | | | |
| 30 | JUNCT, FUSE & DIST BOXES | | | | | |
| 31 | RECEPT & CONNECTOR PLUGS | | | | | |
| 32 | RELAYS | | | 2.28 | | |
| 33 | WIRING | | | .84 | | |
| 34 | CONDUIT | | | .76 | | |
| 36 | LIGHTS AND SIGNAL DEVICES | | | | | |
| 37 | LIGHTS-INTERIOR | | | | | |
| 38 | -EXTERIOR -WIRING ONLY | | | | 1.11 | |
| 39 | -LANDING-INCL MECH | | | | | |
| 41 | SIGNAL DEVICES-LIGHTS | | | | | |
| 42 | -HORNS | | | | | |
| 43 | -BELLS | | | | | |
| 45 | EQUIPMENT SUPPORTS-WING | | | | | |
| 46 | -TAIL | | | | | |
| 47 | -BODY | | | | | |
| 48 | -NACELLE | | | | | |
| 49 | FURNISHES POWER FOR | | | | | |
| 50 | SEE FOLLOWING PAGE | | | | | |
| 55 | COLUMN TOTALS | | .81 | 3.88 | 1.11 | |
| 56 | TOTAL- AC SYSTEM | | | | | 5.80 |

* DRIVEN BY- 5 , 6 , 7 , 8 , 9 ,

** INCLUDES SYSTEM FROM SOURCE OF POWER TO MAIN DISTRIBUTION POINTS.

A.C. SYSTEM FURNISHES POWER FOR:

Engine Ignition
Amplifier-Stab./Augment
3 Axis Rate Gyro
Indicator-Fuel Quantity
Xmtr-Hyd Press.
Ind-Hyd Press.
Xmtr-Eng Oil Press.
Ind-Eng Oil Press.
Ind-Attitude

Valve-Engine Anti-Ice
Xmtr-Fuel Flow
Indicatór-Fuel Flow
Flight Instrumentation

AN 9102-D-TAB
NAME
DATE

** ELECTRICAL GROUP
D.C. SYSTEM


MODEL
REPORT 63B123

| | | POWER SUPPLY | POWER CONVER | DISTR & CONT | LIGHTS-SIGNALS | EQUIP. SUPPORTS |
|---|---|---|---|---|---|---|
| 4 | POWER SUPPLY* VOLT AMP QTY | | | | | |
| 5 | GENERATORS 165 2 | 74.00 | | | | |
| 10 | REMOTE GENERATOR DRIVES | | | | | |
| 11 | BATTERY--AN | 18.00 | | | | |
| 12 | BATTERY CONTAINER, SUPTS | .96 | | | | |
| 14 | POWER CONVERSION QTY | | | | | |
| 15 | INVERTER DC-AC 250VA (2) | | 24.06 | | | 1.08 |
| 16 | MOTOR-GENERATOR | | | | | |
| 24 | POWER DISTRIBUTION & CONT | | | | | |
| 25 | GENERATOR CONTROL BOXES | | | 13.24 | | |
| 26 | CUTOUTS, VOLT, REGULATORS | | | | | |
| 27 | AMMETERS AND VOLTMETERS | | | 1.06 | | |
| 28 | SWITCHES, RHEO & PANELS | | | .27 | | |
| 29 | CIRCUIT BREAKERS & FUSES | | | 9.57 | | |
| 30 | JUNCT, FUSE & DIST BOXES | | | 1.78 | | 1.98 |
| 31 | RECEPT & CONNECTOR PLUGS | | | 1.84 | | |
| 32 | RELAYS | | | 7.11 | | |
| 33 | WIRING | | 4.35 | 23.25 | | |
| 34 | CONDUIT | | | 1.87 | | |
| 35 | BONDING INST'L. | | | .48 | | |
| 36 | LIGHTS AND SIGNAL DEVICES | | | | | |
| 37 | LIGHTS-INTERIOR | | | | | |
| 38 | -EXTERIOR | | | | | |
| 39 | -LANDING-INCL MECH | | | | | |
| 41 | SIGNAL DEVICES-LIGHTS | | | | | |
| 42 | -HORNS | | | | | |
| 43 | -BELLS | | | | | |
| 45 | EQUIPMENT SUPPORTS-WING | | | | | 1.08 |
| 46 | -TAIL | | | | | |
| 47 | -BODY | | | | | 2.27 |
| 48 | -NACELLE | | | | | |
| 49 | FURNISHES POWER FOR | | | | | |
| 50 | SEE FOLLOWING PAGE | | | | | |
| 55 | COLUMN TOTALS | 92.96 | 28.41 | 60.47 | | 6.41 |
| 56 | TOTAL DC SYSTEM | | | | | 188.25 |
| 57 | TOTAL ELECTRICAL GROUP - PG 29-30 | | | | | 194.05 |

* DRIVEN BY- 5 , 6 , 7 , 8 , 9 ,

** INCLUDES SYSTEM FROM SOURCE OF POWER TO MAIN DISTRIBUTION POINTS.

D.C. SYSTEM FURNISHES POWER FOR:

FLIGHT CONTROLS
- Sol Valve-Wing Fan Doors
- Sol Valve-Diverters
- Sol Valve-Stab/Fan Speed
- Sol Valve-Stab/High Speed
- Sol Valve-Stab/Trim
- Sol Valve-Spoilers
- Sol Valve-Low Airspeed Ind.
- Actr-Aileron Trim
- Actr-Rudder Trim
- Actr-VTOL Roll Trim
- Actr-VTOL Yaw Trim
- Actr-VTOL Pitch Trim
- Actr-Thrust Vector
- Actr-Wing Fan Door Latch
- Actr-Pitch Fan Inlet Louver
- Actr-Aileron Droop
- Actr-Wing Flaps
- Relay-Wing Flaps Control
- Controller-Stab/Aug System
- Flight Control Electrical Mixer

INSTRUMENT
- Fan Speed Ind. and Limiting Control
- Sol Valve-Throttle Cutback
- Ind-Vector Angle
- Ind-Flap/Spoiler
- Ind-VTOL Trim
- Ind-CTOL Trim
- Ind-Landing Gear Position

FLIGHT INSTRUMENT
- Ind-Turn and Slip
- Test Instrumentation (F.T.)

LANDING GEAR
- Sol Valve-Nose Gear
- Sol Valve-Main Gear
- Sol Valve-Main Gear Door
- Sol Valve-Main Gear Mode

POWER
- Inverter
- Relay-Battery
- Relay-Emer Bus
- Relay-Nonessential Bus
- Relay-Gen. Monitor

FUEL AND OIL
- Sol Valve-Fuel Booster Pump
- Motor Valve-Fwd. Fuel Tank
- Motor Valve-Aft Fuel Tank
- Motor Valve-Fuel Cross-Over

RADIO
- Transmitting
- Receiving

DC CONTROL FOR AC POWER
- Relay-Inverter On/Off

WARNING
- Fire Detect and Structure O'heat
- Fans Frame and Bearing O'heat
- Annunciator Panel
- Sig.Gen.-Audible Warning
- Lamp-Condition (MS25331)
  - Diverted (Fan Mode)
  - Fan Doors Locked
  - Fan Doors Unlocked
  - Stab.Aug.-Pri.
  - Stab.Aug.-Stby.
  - Landing Gear STOL
  - Pwr. Bus Monitors

AN 9102-D-TAB
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DATE

ELECTRONICS GROUP

PAGE 79
MODEL
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| | *EQUIPMENT COMPONENTS AND PART NUMBERS OR IDENT LIST BY FUNCTIONAL GROUPS | | | | X EQUIPMENT XX | | X |
|---|---|---|---|---|---|---|---|
| | | | | | GFAE | CFE | INSTL |
| 5 | UHF TRANSCEIVER ARC/51X | | | | | | |
| 6 | TRANSCEIVER RT-702 | | | | | 30.30 | .89 |
| 8 | ANTENNA AT 256A | | | | | 1.54 | .33 |
| 9 | CABLING | | | | | 2.93 | |
| 10 | CONTROL UNIT C3984 | | | | | 3.00 | |
| 47 | ELECTRONIC INSTALLATION | | | | | | |
| 48 | TABLES | | | | | | |
| 49 | RACKS, SHELVES & SUPPORTS | | | | | | |
| 50 | LOCKERS | | | | | | |
| 55 | COLUMN TOTALS | | | | | 37.77 | 1.22 |
| 56 | PAGE TOTAL | | | | | | 38.99 |
| 57 | TOTAL-ELECTRONIC GROUP | | | | | | 38.99 |

* LIST COMPONENTS- INCL RADOMES, MTS, ANT, SWITCHES, RELAYS, FILTERS, ETC FROM MAIN DISTRIBUTION POINT TO UNIT OPERATED, BY FUNCTIONAL GROUPS-E.G. COM, VHF, SEARCH, NAV, INTERCOMM, ETC. ADD SUPPLEMENTAL PG 31A IF NEC.

FURNISHINGS AND EQUIPMENT GROUP
ACCOMODATIONS FOR PERSONNEL



| | X CREW SEATS AND PASSENGER CHAIRS ** | | | | | XX MISC X |
|---|---|---|---|---|---|---|
| | | ASST | | | | ACCOM |
| | PILOT | PILOT | | | | & OXYGEN |
| SEATS AND CHAIRS | | | | | | |
| CUSHION | | | | | | |
| SEAT | 170.80 | | | | | |
| SAFETY BELT | | | | | | |
| HARNESS & INERTIA REEL | | | | | | |
| ADJUSTING MECHANISM | | | | | | |
| CATAPULT OR EJECT. MECH | | | | | | |
| TRACKS AND SUPPORTS | 17.71 | | | | | |
| HEADREST | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| MISC ACCOMODATIONS | | | | | | |
| BUNKS AND SUPPORTS | | | | | | |
| | | | | | | |
| LITTER SUPPORTS | | | | | | |
| KNEELING PADS | | | | | | |
| PARACHUTE STOWAGE PROV | | | | | | |
| TOILET AND RELIEF TUBES | | | | | | |
| WASH BASINS & SHOWERS | | | | | | |
| WATER TANKS & PIPING | | | | | | |
| DRINKING WATER PROV | | | | | | |
| LOCKERS-FOOD | | | | | | |
| LOCKERS-PERSONAL EFFECTS | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| GALLEY STOVES, HOTPLATES | | | | | | |
| REFRIGERATOR | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| ANTI-G SUIT PROVISIONS | | | | | | |
| | | | | | | |
| OXYGEN INSTALLATION- INCLUDED WITH EJECTION SEAT | | | | | | |
| * BOTTLES TYPE SIZE QTY | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| CONVERTER | | | | | | |
| * REGULATORS | | | | | | |
| SUPTS-BOTTLES, REGULATORS | | | | | | |
| PLUMBING, ETC | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| COLUMN TOTALS | 188.51 | | | | | |
| TOTAL-PERSONNEL ACCOMODATIONS | | | | | | 188.51 |
| | | | | | | |

* OXYGEN BOTTLE INCLUDING CHARGE, IF NOT SPECIFIED AS USEFUL LOAD OR SPECIAL EQUIPMENT

** ADD ADDITIONAL PAGE 34A IF NECESSARY.

| | | | | | | MISC EQUIP. | FURN |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | MISCELLANEOUS EQUIPMENT | | | | | | |
| 5 | * PORT. PLATFORMS, LADDERS | | | | | | |
| 9 | BALANCE COMPUTER & SUPT | | | | | | |
| 6 | | | | | | | |
| 7 | DATA CASES OR HOLDERS | | | | | | |
| 8 | MANUALS-FLIGHT & MAINT | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | TOOL LOCKERS | | | | | | |
| 13 | | | | | | | |
| 14 | WINDSHIELD WIPER, WASHER | | | | | | |
| 15 | REL MECH-TARGET & TOW | | | | | | |
| 16 | | | | | | | |
| 17 | BILGE SYSTEM | | | | | | |
| 18 | STALL WARNING DEVICES | | | | | | |
| 19 | REAR VIEW MIRROR | | | | | | |
| 20 | | | | | | | |
| 21 | AUXILIARY FLOORING | | | | | | |
| 22 | INSTRUMENT BOARDS | | | | | 2.81 | |
| 23 | CONSOLES | | | | | 5.31 | |
| 24 | CONTROL STANDS | | | | | | |
| 25 | INST. PANEL SUPPORTS | | | | | 1.54 | |
| 26 | * CARGO HANDLING EQUIPMENT | | | | | | |
| 27 | RAMPS | | | | | | |
| 28 | HOISTS AND BOOMS | | | | | | |
| 29 | MONORAILS | | | | | | |
| 30 | MONORAIL MOTORS | | | | | | |
| 31 | TIE DOWN FITTINGS | | | | | | |
| 32 | | | | | | | |
| 33 | | | | | | | |
| 34 | | | | | | | |
| 35 | PYROTECHNIC INSTALLATION | | | | | | |
| 36 | SIGNAL PISTOL HOLDER | | | | | | |
| 37 | AMMO HOLDER-CAP.- | | | | | | |
| 38 | PARA FLARE | | | | | | |
| 39 | -CONTAINER-CAP.- | | | | | | |
| 40 | -RACKS -CAP.- | | | | | | |
| 41 | -RELEASE MECHANISM | | | | | | |
| 42 | SMOKE CANDLE-HANDLE | | | | | | |
| 43 | | | | | | | |
| 44 | FLOATLIGHT RACK & REL | | | | | | |
| 45 | CAP.- | | | | | | |
| 46 | FURNISHINGS | | | | | | |
| 47 | FLOOR COVERING, RUGS ETC | | | | | | |
| 48 | SOUNDPROOFING & INSUL | | | | | | |
| 49 | TRIM | | | | | | |
| 50 | CURTAINS AND SCREENS | | | | | | |
| 51 | CRASH PADDING | | | | | | |
| 52 | PARTITIONS-NON STRUCT | | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | COLUMN TOTALS | | | | | 9.66 | |
| 56 | TOTAL-MISCELLANEOUS EQUIPMENT AND FURNISHINGS | | | | | | 9.66 |
| 57 | | | | | | | |

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT

# FURNISHINGS AND EQUIPMENT
## EMERGENCY EQUIPMENT



| | | X FIRE PREVENTION & DETECTION SYSTEMS | | | | | XX OTHER |
|---|---|---|---|---|---|---|---|
| | | ENGINE COMPT | BAGGAGE COMPT | FUEL COMPT | OTHER | | EMERG EQUIP |
| 4 | FIRE PREVENT AND DETECTION | | | | | | |
| 5 | BOTTLES TYPE SIZE QTY | | | | | | |
| 6 | BOTTLE | 12.44 | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | PORTABLE | | | | | | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | | | | | | | |
| 16 | CONTROLS | 3.08 | | | | | |
| 17 | PLUMBING | 4.93 | | | | | |
| 18 | BOTTLE SUPTS-FIXED EXT | .20 | | | | | |
| 19 | | | | | | | |
| 20 | | | | | | | |
| 21 | BOTTLE SUPTS-PORT. EXT | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | FIRE DETECTION SYSTEM | 8.24 | | | | | |
| 25 | STRUCTURAL OVERHEAT WARNING | | | | 4.22 | | |
| 26 | FIRE RESISTANT PAINT | | | | | | |
| 27 | FIRE CURTAINS | | | | | | |
| 28 | | | | | | | |
| 29 | OTHER EMERGENCY EQUIPMENT | | | | | | |
| 30 | FIRST AID KITS & SUPTS | | | | | | |
| 31 | FLASHLIGHTS-QTY | | | | | | |
| 32 | | | | | | | |
| 33 | STOWAGE-EMERG FOOD, WATER | | | | | | |
| 34 | | | | | | | |
| 35 | * LIFE RAFTS TYPE QTY | | | | | | |
| 36 | | | | | | | |
| 37 | | | | | | | |
| 38 | | | | | | | |
| 39 | LIFE RAFT SUPPORTS | | | | | | |
| 40 | | | | | | | |
| 41 | DITCHING STATION EQUIP | | | | | | |
| 42 | | | | | | | |
| 43 | | | | | | | |
| 44 | | | | | | | |
| 45 | | | | | | | |
| 46 | | | | | | | |
| 47 | | | | | | | |
| 48 | | | | | | | |
| 49 | | | | | | | |
| 50 | | | | | | | |
| 51 | | | | | | | |
| 52 | | | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | COLUMN TOTALS | 28.89 | | | 4.22 | | |
| 56 | TOTAL-EMERGENCY EQUIPMENT | | | | | | 33.11 |
| 57 | TOTAL-FURNISHINGS & EQUIPMENT GROUP - PG 34-36 | | | | | | 231.28 |

* IF NOT SPECIFIED AS USEFUL LOAD OR SPECIAL EQUIPMENT.

| | | | | PRESS. SYSTEM | VENTIL SYSTEM | HEATING SYSTEM | COOLING SYSTEM |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | *HEAT EXCHANGERS-QTY | | | | | | |
| 5 | | | | | | | |
| 6 | *HEATERS-BTU EA QTY | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | HEATING FLUID- GAL | | | | | | |
| 12 | | | | | | | |
| 13 | COMPRESSORS OR SUPCHGRS | | | | | | |
| 14 | | | | | | | |
| 15 | MOTORS | | | | | | |
| 16 | TURBINES | | | | | | |
| 17 | FANS | | | | | | 11.59 |
| 18 | | | | | | | |
| 19 | | | | | | | |
| 20 | TANKS | | | | | | |
| 21 | WATER SEPARATOR | | | | | | |
| 22 | REGULATOR | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | SCOOPS | | | | | | |
| 26 | DUCTING | | | | | | 13.06 |
| 27 | SHROUDS | | | | | | |
| 28 | | | | | | | |
| 29 | PLENUM CHAMBER | | | | | | 4.99 |
| 30 | PLUMBING | | | | | | |
| 31 | | | | | | | |
| 32 | | | | | | | |
| 33 | BOMB BAY HEATING | | | | | | |
| 34 | | | | | | | |
| 35 | | | | | | | |
| 36 | | | | | | | |
| 37 | | | | | | | |
| 38 | | | | | | | |
| 39 | CONTROLS | | | | | | |
| 40 | -MANUAL | | | | | | |
| 41 | | | | | | | |
| 42 | -ELECTRICAL | | | | | | |
| 43 | | | | | | | |
| 44 | -HYDRAULIC | | | | | | |
| 45 | | | | | | | |
| 46 | -PNEUMATIC | | | | | | |
| 47 | | | | | | | |
| 48 | SUPPORTS & BRACKETS-WING | | | | | | |
| 49 | -TAIL | | | | | | |
| 50 | -BODY | | | | | | .18 |
| 51 | -NACELLE | | | | | | |
| 52 | | | | | | | |
| 53 | | | | | | | |
| 54 | PRESSURIZATION SEALING | | | | | | |
| 55 | COLUMN TOTALS | | | | | | 29.82 |
| 56 | TOTAL-AIR CONDITIONING | | | | | | 29.82 |
| 57 | | | | | | | |

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | AIR | | CANOPY & | FUEL |
| 3 | | WING | TAIL | INDUCT. | ENGINE | WINDSHLD | SYSTEM |
| 4 | *HEATERS BTU EA QTY | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | *HEAT EXCHANGERS | | | | | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | DUCTING | | | | | | |
| 16 | SHROUDING | | | | | | |
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | *BOOTS | | | | | | |
| 20 | | | | | | | |
| 21 | *ATTACHING STRIPS | | | | | | |
| 22 | | | | | | | |
| 23 | OIL SEPARATORS | | | | | | |
| 24 | | | | | | | |
| 25 | AIR PUMPS | | | | | | |
| 26 | | | | | | | |
| 27 | AIR LINES AND HOSES | | | | | | |
| 28 | | | | | | | |
| 29 | TANKS | | | | | | |
| 30 | | | | | | | |
| 31 | *FLUID- GAL | | | | | | |
| 32 | | | | | | | |
| 33 | | | | | | | |
| 34 | | | | | | | |
| 35 | PLUMBING | | | | | | |
| 36 | | | | | | | |
| 37 | | | | | | | |
| 38 | DISTRIBUTOR | | | | | | |
| 39 | -VALVE | | | | | | |
| 40 | -CONTROLS | | | | | | |
| 41 | | | | | | | |
| 42 | CONTROLS | | | | | | |
| 43 | -MANUAL | | | | | | |
| 44 | -ELECTRICAL | | | | | | |
| 45 | -HYDRAULIC | | | | | | |
| 46 | -PNEUMATIC | | | | | | |
| 47 | | | | | | | |
| 48 | **CIRCUITRY | | | | 1.12 | | |
| 49 | SUPPORTS AND BRACKETS-WING | | | | | | |
| 50 | -TAIL | | | | | | |
| 51 | -BODY | | | | | | |
| 52 | -NACELLE | | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | COLUMN TOTALS | | | | 1.12 | | |
| 56 | TOTAL-ANTI-ICING | | | | | | 1.12 |
| 57 | TOTAL-AIR CONDITIONING AND ANTI-ICING GROUP - PG 37-38 | | | | | | 30.94 |

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT
** FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | HANDLING | ARREST | CATAPULT | ATO |
| 4 | HANDLING GEAR | | | | | | |
| 5 | ANCHOR | | | | | | |
| 6 | ANCHOR LINE | | | | | | |
| 7 | PENDANT & CLAMP FITTING | | | | | | |
| 8 | LIZARD | | | | | | |
| 9 | SHEAVES | | | | | | |
| 10 | WINCH-COMPLETE | | | | | | |
| 11 | WINCH CRANK | | | | | | |
| 12 | ANCHOR RIG OR DAVIT | | | | | | |
| 13 | WINCH ENGINE OR MOTOR | | | | | | |
| 14 | | | | | | | |
| 15 | * HOISTING SLING | | | | | | |
| 16 | WING HANDLING LINES | | | | | | |
| 17 | WATER RUDDER | | | | | | |
| 18 | FITTINGS | | | | | | |
| 19 | -RECOVERY HOOK | | | | | | |
| 20 | -BEACH GEAR ATTACHMENT | | | | | | |
| 21 | -TIEDOWN | | | | | | |
| 22 | -JACKING | | | .49 | | | |
| 23 | -TOWING | | | | | | |
| 24 | -MOORING & SNUBBING | | | | | | |
| 25 | -ANCHORAGE | | | | | | |
| 26 | -LEVELING | | | | | | |
| 27 | -HOISTING | | | | | | |
| 28 | | | | | | | |
| 29 | ARRESTING OR DECELER GEAR | | | | | | |
| 30 | TRAILING HOOK | | | | | | |
| 31 | HOOK POINT-TYPE | | | | | | |
| 32 | EXTENSION GEAR | | | | | | |
| 33 | RETRIEVING GEAR | | | | | | |
| 34 | BUMPER | | | | | | |
| 35 | SHOCK ABSORBER | | | | | | |
| 36 | ATTACHMENT FITTINGS | | | | | | |
| 37 | BARRIER CRASH FITTINGS | | | | | | |
| 38 | | | | | | | |
| 39 | DECELERATION-PARACHUTE | | | | 13.60 | | |
| 40 | -CONTAINER & FITTINGS | | | | 5.37 | | |
| 41 | -CONTROLS | | | | 7.74 | | |
| 42 | | | | | | | |
| 43 | CATAPULTING GEAR | | | | | | |
| 44 | CATAPULT FITTINGS | | | | | | |
| 45 | CATAPULT HOOKS | | | | | | |
| 46 | HOLD BACK FITTINGS | | | | | | |
| 47 | | | | | | | |
| 48 | ASSISTED TAKE OFF | | | | | | |
| 49 | HOOKS | | | | | | |
| 50 | CONTROLS-FIRING | | | | | | |
| 51 | -BOTTLE RELEASE | | | | | | |
| 52 | | | | | | | |
| 53 | BOTTLE STOWAGE PROV | | | | | | |
| 54 | QTY BOTTLES- | | | | | | |
| 55 | COLUMN TOTALS | | | .49 | 26.71 | | |
| 56 | PAGE TOTAL | | | | | | 27.20 |
| 57 | TOTAL-AUXILIARY GEAR GROUP | | | | | | 27.20 |

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT.

## 2.4 Actual Weight and Center of Gravity

AN-92-49-A

Load Condition EMPTY

Prepared by B. Giske

Date

Page 95

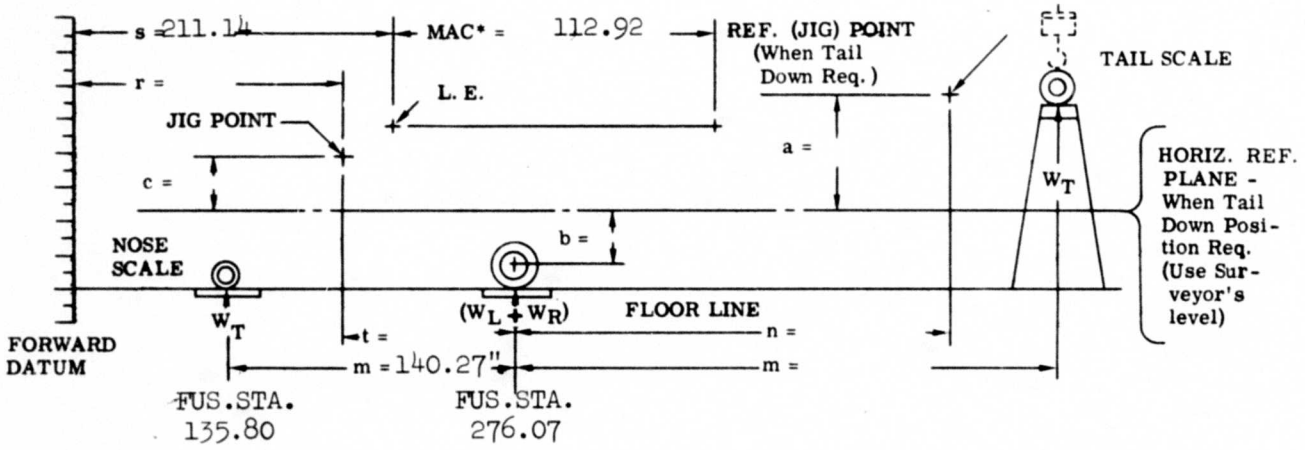
Model XV-5A

Report No. 63B123

# AIRCRAFT ACTUAL WEIGHT AND HORIZONTAL BALANCE

Contract No. DA44-177-TC-715, Gov't. No. 62-4506, Fact. No. 2, Art. No. 2

| SCALE POSITION | SCALE NO. | SCALE READING (Lbs.) | TARE | SCALE ERROR | SYMBOL | NET WEIGHT |
|---|---|---|---|---|---|---|
| Left Main Wheel | E215993 | 3055.0 | -6.7 | 0.0 | $W_L$ | 3048.3 |
| Right Main Wheel | E239583 | 3058.0 | -6.7 | -3.0 | $W_R$ | 3048.3 |
| Nose Wheel | E239584 | 1998.0 | 0 | +6.0 | $W_T$ | 2004.0 |
| TOTAL WEIGHT | | 8111.0 | -13.4 | +3.0 | W | 8100.6 |




## CENTER OF GRAVITY TO FORWARD DATUM (HORIZ. DIST. - AS WEIGHED)

Tail Wheel Type: $r + t + \frac{W_T \times m}{W}$ = _____ = _____ In.

Nose Wheel Type: $r + t - \frac{W_T \times m}{W}$ = 276.07 − $\frac{(2004.0)\ (140.27)}{8100.6}$ = 241.37 In.

## CORRECTED WEIGHT & HORIZONTAL BALANCE

| ITEMS ADDED & SUBTRACTED | WEIGHT (Lbs.) | H-DIST (In.) C.G. TO FWD. DATUM | MOMENT (In.-Lbs.) | GUARANTEED |
|---|---|---|---|---|
| Aircraft as Weighed | 8100.6 | 241.37 | 1,955,241 | |
| Plus - See Pages | + 39.7 | | + 19,934 | |
| Minus - See Pages | - 599.3 | | - 101,987 | |
| | | | | |
| TOTAL EMPTY WEIGHT (Gear Up) | 7541.0 | 248.40 | 1,873,188 | |
| BALANCE (Corrected) = $\frac{\text{(H-Dist.) - S}}{\text{M.A.C.}}$ = $\frac{248.40 - 211.14}{112.92}$ = 33.0 % M.A.C. | | | | to % M.A.C. % M.A.C. |

*M.A.C. calc. in accord. with Handb'k Sec. II, Part II, (Army) or SR-7 (Navy)

WF-8-6-43-2M-5713

Witnessed by A. W. Lawrence QUALITY CONTROL

WEIGHT EMPTY ITEMS NOT ON AIRPLANE DURING WEIGHING:

| | WEIGHT | ARM | MOMENT |
|---|---|---|---|
| Initiators & Cartridges - Seat | .80 | 125.0 | 100 |
| Rocket Catapult - Seat | 21.75 | 147.0 | 3,197 |
| Fluid - Battery | 3.27 | 471.7 | 1,542 |
| Finish - Mag. Skin, Aft Fus. | 3.73 | 395.0 | 1,473 |
| Finish - Mag. Skin, Horiz. Stab. | 2.96 | 493.7 | 1,461 |
| Finish - Mag. Skin, Vert. Stab. | 2.00 | 476.5 | 953 |
| F074 Attach Parts | .50 | 248.5 | 124 |
| F076 Attach Parts | .13 | 184.6 | 24 |
| P006 Attach Parts | .90 | 126.0 | 113 |
| Retract Nose & Main Gear | .00 | | 9,906 |
| Fasteners for Misc. Access Panels | 1.15 | 233.0 | 268 |
| W056 Fairing - Flap Hinge Fitting | 1.78 | 301.1 | 536 |
| Bolts - Horiz. Stab. Tips | .19 | 513.3 | 98 |
| F176 Tension Rod | .54 | 257.4 | 139 |
| TOTAL ADDITIONS | 39.70 | | 19,934 |

ITEMS ON AIRPLANE THAT ARE NOT PART OF WEIGHT EMPTY:

| | WEIGHT | ARM | MOMENT |
|---|---|---|---|
| Flight Test Equipment | 314.33 | 171.7 | 53,962 |
| P085 Aft Auxiliary Fuel Tank | 35.17 | 339.0 | 11,922 |
| Simulated Pilot | 182.00 | 137.0 | 24,934 |
| G.E. Slip Ring - Pitch Fan | 5.60 | 61.2 | 343 |
| G.E. Slip Ring - Lift Fan | 15.48 | 256.0 | 3,963 |
| Oil - Trapped | 3.00 | 204.0 | 612 |
| Oil - Engine | 12.00 | 204.0 | 2,448 |
| Fan Overspeed Control | 8.32 | 121.9 | 1,014 |
| F148-1 Nose Boom | 5.60 | - 1.9 | - 11 |
| Auto-Stab System Instrumentation | 1.70 | 109.0 | 185 |
| E027 Fan Warning | 2.91 | 160.5 | 467 |
| E019 Wiring | 6.11 | 168.1 | 1,027 |
| R.P.M. Indicator (AC-106) | 6.80 | 156.0 | 1,061 |
| W006 -69 and -73 Tube Portion | .28 | 214.3 | 60 |
| TOTAL DEDUCTIONS | -599.30 | | -101,987 |

## 2.5 Weight Empty - Weight and Balance Summary

## WEIGHT EMPTY - WEIGHT AND BALANCE SUMMARY

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| WING | 1047.46 | 263.5 | 275979 | 104 | 108480 |
| TAIL | 237.79 | 495.7 | 117866 | 183 | 43446 |
| BODY | 1264.88 | 246.6 | 311864 | 109 | 138215 |
| LANDING GEAR (Gear Up) | ( 420.14) | 281.5 | (118260) | 92 | ( 38445) |
| Main Gear | 354.33 | 312.5 | 110739 | 93 | 33094 |
| Nose Gear | 65.81 | 114.3 | 7521 | 81 | 5351 |
| SURFACE CONTROLS | 380.40 | 230.4 | 87631 | 105 | 39928 |
| ENGINE SECTION | 44.39 | 249.9 | 11092 | 139 | 6148 |
| PROPULSION | (3435.85) | 235.4 | (808761) | 116 | (399390) |
| Gas Generator Section | 1221.85 | 241.3 | 294768 | 143 | 174427 |
| Lift Fan Section | 1746.54 | 255.8 | 446720 | 102 | 177813 |
| Pitch Fan Section | 311.14 | 97.8 | 30419 | 94 | 29153 |
| Fuel System | 112.13 | 241.0 | 27018 | 117 | 13128 |
| Engine Controls | 38.11 | 221.3 | 8435 | 109 | 4156 |
| Starting System | 6.08 | 230.4 | 1401 | 117 | 713 |
| FIXED EQUIPMENT | ( 705.03) | 199.8 | (140826) | 116 | ( 81815) |
| Instruments | 71.09 | 163.8 | 11645 | 120 | 8535 |
| Hydraulics & Pneumatics | 111.48 | 183.7 | 20482 | 122 | 13652 |
| Electrical | 194.05 | 253.9 | 49274 | 118 | 22816 |
| Radio | 38.99 | 153.3 | 5979 | 95 | 3706 |
| Furnishings & Equipment | 231.28 | 152.5 | 35260 | 112 | 25968 |
| Air Conditioning & Anti-Icing | 30.94 | 193.2 | 5977 | 137 | 4242 |
| Auxiliary Gear | 27.20 | 448.9 | 12209 | 106 | 2896 |
| UNACCOUNTABLE WEIGHT | + 5.06 | 178.4 | + 909 | | |
| TOTAL WEIGHT EMPTY (Gear Up) | 7541.00 | 248.4 | 1873188 | 113 | 855867 |

2.6 Weight Empty - Weight and Balance Details

BLANK PAGE

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| WING GROUP | (1047.46) | 263.5 | (275979) | 104 | (108480) |
| Basic Structure | ( 567.12) | 255.7 | (145009) | 102 | ( 57615) |
| Center Section | ( 423.12) | 250.2 | (105879) | 101 | ( 42744) |
| Upper Skin and Supports | ( 31.28) | 254.9 | ( 7973) | 105 | ( 3298) |
| Interspar Skin | 17.29 | 251.9 | 4356 | 107 | 1850 |
| Skin Joints, Splices, etc. | 8.81 | 259.6 | 2287 | 102 | 903 |
| Brackets - Skin Support | 5.18 | 256.7 | 1330 | 105 | 545 |
| Lower Skin and Supports | ( 36.41) | 256.6 | ( 9343) | 96 | ( 3492) |
| Interspar Skin | 25.07 | 257.5 | 6456 | 95 | 2393 |
| Skin Joints, Splices, etc. | 4.44 | 252.9 | 1123 | 96 | 428 |
| Brackets - Skin Support | 6.90 | 255.7 | 1764 | 97 | 671 |
| Front Spar | 94.34 | 217.0 | 20473 | 101 | 9528 |
| Rear Spar | 88.50 | 296.5 | 26240 | 101 | 8939 |
| Ribs - Interspar | 4.42 | 263.3 | 1164 | 100 | 442 |
| Bulkhead @ B.L. 100.75 | 23.09 | 261.6 | 6041 | 102 | 2351 |
| Joints, Splices and Fasteners | 5.83 | 260.0 | 1516 | 99 | 577 |
| Fan Ring | 25.95 | 258.1 | 6697 | 101 | 2624 |
| Leading Edge | ( 63.37) | 208.6 | ( 13220) | 101 | ( 6407) |
| Skin | 36.00 | 207.2 | 7460 | 101 | 3643 |
| Ribs | 22.09 | 209.4 | 4626 | 101 | 2231 |
| Joints, Splices & Fasteners | 5.28 | 214.8 | 1134 | 101 | 533 |
| Trailing Edge | ( 23.60) | 303.9 | ( 7172) | 103 | ( 2435) |
| Skin | 16.95 | 304.6 | 5163 | 103 | 1754 |
| Ribs | 3.75 | 300.2 | 1126 | 102 | 383 |
| Auxiliary Spar | 1.58 | 306.0 | 483 | 103 | 163 |
| Joints, Splices & Fasteners | 1.32 | 303.4 | 400 | 103 | 135 |
| Attach Fittings - Wing to Body | 26.33 | 229.4 | 6040 | 101 | 2650 |
| Outer Panel | ( 144.00) | 271.7 | ( 39130) | 103 | ( 14870) |
| Skin | 56.04 | 272.0 | 15243 | 104 | 5811 |
| Front Spar | 14.79 | 252.5 | 3734 | 103 | 1524 |
| Rear Spar | 13.55 | 296.5 | 4018 | 103 | 1401 |
| Doublers - Skin | 3.90 | 288.6 | 1126 | 99 | 386 |
| Ribs | 29.82 | 271.5 | 8096 | 103 | 3067 |
| Joints, Splices & Fasteners | 1.77 | 293.2 | 519 | 102 | 181 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| WING GROUP (Cont'd.) | | | | | |
| Basic Structure (Cont'd.) | | | | | |
| Outer Panel (Cont'd.) | | | | | |
| Leading Edge | ( 14.48) | 245.5 | ( 3555) | 103 | ( 1497) |
| Skin | 10.80 | 245.7 | 2653 | 103 | 1117 |
| Ribs | 2.48 | 248.1 | 615 | 104 | 257 |
| Joints, Splices & Fasteners | 1.20 | 238.9 | 287 | 103 | 123 |
| Trailing Edge | ( 5.61) | 299.6 | ( 1681) | 103 | ( 579) |
| Skin | 3.48 | 299.6 | 1043 | 103 | 357 |
| Stiffeners | .71 | 301.5 | 214 | 106 | 75 |
| Ribs | 1.27 | 298.7 | 379 | 104 | 132 |
| Joints, Splices & Fasteners | .15 | 298.9 | 45 | 99 | 15 |
| Tips | 4.04 | 286.7 | 1158 | 105 | 424 |
| Secondary Structure | ( 343.53) | 258.2 | ( 88699) | 108 | ( 37015) |
| Doors, Panels & Miscellaneous | ( 343.53) | 258.2 | ( 88699) | 108 | ( 37015) |
| Access Doors | 15.78 | 273.6 | 4317 | 100 | 1575 |
| Fan Doors | ( 259.47) | 256.3 | ( 66515) | 110 | ( 28541) |
| Fan Door Structure | 126.46 | 256.0 | 32375 | 110 | 13921 |
| Hinges and Supports | 27.16 | 255.9 | 6951 | 112 | 3053 |
| Power Transmission | 17.47 | 272.5 | 4760 | 105 | 1838 |
| Actuator | 27.36 | 256.0 | 7004 | 109 | 2982 |
| Actuator - Support | 41.05 | 256.0 | 10508 | 112 | 4594 |
| Lock Mechanism | 19.97 | 246.2 | 4917 | 108 | 2153 |
| Fan Seal | 12.70 | 254.2 | 3228 | 103 | 1308 |
| Seal- Trailing Edge-Flap | 1.64 | 311.1 | 510 | 103 | 169 |
| Insulation - External | 28.99 | 268.7 | 7790 | 97 | 2821 |
| Fairings and Fillets | 24.95 | 254.1 | 6339 | 104 | 2601 |
| Control Surfaces | ( 136.81) | 309.0 | ( 42271) | 101 | ( 13850) |
| Ailerons | ( 60.27) | 306.2 | ( 18457) | 103 | ( 6217) |
| Spars | 5.60 | 305.5 | 1711 | 103 | 576 |
| Ribs | 8.81 | 307.4 | 2708 | 103 | 910 |
| Skin and Stiffeners | 9.77 | 307.1 | 3001 | 104 | 1015 |
| Trailing Edge Strip | .42 | 320.4 | 135 | 105 | 44 |
| Tips | 1.80 | 306.5 | 552 | 106 | 191 |
| Tabs | ( 11.69) | 318.6 | ( 3725) | 102 | ( 1188) |
| Tab Structure | 8.11 | 319.4 | 2590 | 102 | 826 |
| Balance Weights | 3.58 | 317.0 | 1135 | 101 | 362 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| WING GROUP (Cont'd.) | | | | | |
| Control Surfaces (Cont'd.) | | | | | |
| Ailerons (Cont'd.) | | | | | |
| Aerodynamic Seals | 1.66 | 298.0 | 495 | 104 | 173 |
| Access Doors | .69 | 310.0 | 214 | 105 | 72 |
| Hinges and Pins | 1.38 | 306.8 | 423 | 103 | 142 |
| Control Surface Supports | ( 18.45) | 297.8 | ( 5495) | 103 | ( 1906) |
| Hinges | 14.12 | 299.2 | 4224 | 103 | 1461 |
| Brackets | 4.33 | 293.4 | 1271 | 103 | 445 |
| Flaps | ( 76.54) | 311.1 | ( 23814) | 100 | ( 7633) |
| Spars | 8.95 | 310.0 | 2774 | 100 | 895 |
| Stringers | 1.48 | 317.1 | 469 | 100 | 149 |
| Ribs | 14.00 | 311.2 | 4356 | 100 | 1403 |
| Skin and Stiffeners | 34.35 | 312.9 | 10747 | 100 | 3435 |
| Trailing Edge Strip | 1.80 | 324.0 | 583 | 100 | 180 |
| Actuator Attach Structure | 2.48 | 308.7 | 765 | 100 | 248 |
| Hinges and Pins | 7.23 | 307.8 | 2226 | 100 | 720 |
| Control Surface Supports | ( 6.25) | 303.0 | ( 1894) | 96 | ( 603) |
| Hinges | 4.85 | 301.5 | 1462 | 97 | 471 |
| Brackets | 1.40 | 308.7 | 432 | 94 | 132 |
| TAIL GROUP | ( 237.79) | 495.7 | (117866) | 183 | ( 43446) |
| Horizontal Stabilizer | ( 73.52) | 500.0 | ( 36757) | 205 | ( 15102) |
| Skin | 20.24 | 504.4 | 10208 | 206 | 4170 |
| Front Spar | 2.73 | 483.1 | 1319 | 206 | 562 |
| Center Spar | 8.43 | 496.0 | 4181 | 206 | 1737 |
| Rear Spar | 3.44 | 513.7 | 1767 | 203 | 697 |
| Ribs | 13.30 | 501.9 | 6676 | 206 | 2738 |
| Joints, Splices & Fasteners | 2.15 | 497.1 | 1069 | 206 | 443 |
| Leading Edge | ( 8.72) | 485.5 | ( 4234) | 206 | ( 1796) |
| Skin | 6.24 | 485.0 | 3027 | 206 | 1285 |
| Ribs | 2.48 | 486.5 | 1207 | 206 | 511 |
| Trailing Edge | ( .71) | 521.1 | ( 370) | 206 | ( 146) |
| Stiffeners | .05 | 533.1 | 27 | 206 | 10 |
| Ribs | .66 | 519.2 | 343 | 206 | 136 |
| Fibreglass Fairing | 3.99 | 501.2 | 2000 | 200 | 796 |
| Tips | 4.26 | 510.6 | 2175 | 206 | 878 |
| Actuator Fitting | .29 | 483.8 | 140 | 205 | 59 |
| Pivot Fitting | 1.39 | 496.1 | 690 | 204 | 283 |
| Aerodynamic Seal Attachment | .91 | 513.7 | 467 | 206 | 187 |
| Exterior Finish | 2.96 | 493.7 | 1461 | 206 | 610 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| TAIL GROUP (Cont'd.) | | | | | |
| Vertical Stabilizer | ( 85.37) | 481.2 | ( 41081) | 168 | ( 14301) |
| Skin | 25.76 | 484.6 | 12484 | 165 | 4250 |
| Front Spar | 4.07 | 456.4 | 1858 | 158 | 643 |
| Center Spar | 10.23 | 478.6 | 4896 | 163 | 1669 |
| Rear Spar | 3.01 | 498.6 | 1501 | 151 | 455 |
| Ribs | 20.71 | 483.1 | 10006 | 167 | 3455 |
| Leading Edge | ( 7.66) | 453.7 | ( 3475) | 164 | ( 1260) |
| Skin | 4.67 | 452.6 | 2114 | 165 | 771 |
| Ribs | 2.99 | 455.2 | 1361 | 163 | 489 |
| Trailing Edge | ( .96) | 505.2 | ( 485) | 160 | ( 154) |
| Stiffeners | .68 | 502.1 | 341 | 154 | 104 |
| Ribs | .28 | 513.9 | 144 | 180 | 50 |
| Fibreglass Fairing | 4.96 | 498.0 | 2470 | 193 | 957 |
| Actuator Fitting | .42 | 474.9 | 199 | 186 | 78 |
| Pivot Fitting | 2.59 | 495.8 | 1284 | 200 | 518 |
| Access Doors | 2.60 | 488.6 | 1270 | 185 | 480 |
| Aerodynamic Seal Attachment | .41 | 500.0 | 205 | 155 | 64 |
| Exterior Finish | 1.99 | 476.5 | 948 | 160 | 318 |
| Dorsal Fin | ( 3.15) | 421.7 | ( 1328) | 145 | ( 458) |
| Skin | 1.54 | 420.0 | 647 | 145 | 223 |
| Joints, Splices & Fasteners | .63 | 419.3 | 264 | 148 | 93 |
| Frames | .88 | 426.6 | 375 | 145 | 128 |
| Exterior Finish | .10 | 420.0 | 42 | 145 | 14 |
| Elevator | ( 43.32) | 517.6 | ( 22424) | 206 | ( 8925) |
| Spars | 2.14 | 518.2 | 1109 | 206 | 441 |
| Ribs | 2.44 | 521.8 | 1273 | 206 | 503 |
| Skin | 8.70 | 522.4 | 4545 | 206 | 1792 |
| Trailing Edge Strip | .60 | 530.5 | 318 | 206 | 124 |
| Torque Tube | 3.15 | 517.8 | 1631 | 206 | 649 |
| Balance Weights & Supports | 21.28 | 515.0 | 10959 | 206 | 4384 |
| Aerodynamic Seal | 1.23 | 515.0 | 633 | 206 | 253 |
| Access Doors | .38 | 517.7 | 197 | 207 | 79 |
| Hinges and Pins | 1.50 | 517.8 | 777 | 206 | 309 |
| Control Surface Support Hinges | 1.90 | 517.0 | 982 | 206 | 391 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| TAIL GROUP (Cont'd.) | | | | | |
| Rudder | ( 32.43) | 501.9 | ( 16276) | 144 | ( 4660) |
| Spars | 4.55 | 504.3 | 2295 | 149 | 678 |
| Ribs | 1.83 | 507.0 | 928 | 146 | 267 |
| Rib Attach Angles | .11 | 507.0 | 56 | 138 | 15 |
| Skin | 4.02 | 507.7 | 2041 | 151 | 607 |
| Trailing Edge Strip | .24 | 520.8 | 125 | 161 | 39 |
| Tab | 1.88 | 512.3 | 963 | 131 | 247 |
| Torque Tube | 3.48 | 496.2 | 1727 | 122 | 424 |
| Balance Weights and Supports | 12.21 | 498.0 | 6081 | 148 | 1803 |
| Aerodynamic Seal | .84 | 500.1 | 420 | 154 | 129 |
| Access Doors | .53 | 505.4 | 268 | 130 | 69 |
| Hinges and Pins | .96 | 512.0 | 492 | 168 | 162 |
| Control Surface Supports | ( 1.78) | 494.4 | ( 880) | 124 | ( 220) |
| Hinges | .69 | 495.3 | 342 | 120 | 83 |
| Brackets | .77 | 492.3 | 379 | 122 | 94 |
| Actuator | .32 | 496.6 | 159 | 134 | 43 |
| BODY GROUP | (1264.88) | 246.6 | (311864) | 109 | (138215) |
| Basic Structure | ( 794.54) | 257.1 | (204314) | 110 | ( 87534) |
| Bulkhead and Frames | ( 324.31) | 254.6 | ( 82574) | 110 | ( 35801) |
| Front Hinge Frame | 3.92 | 35.2 | 138 | 93 | 364 |
| Rear Hinge Frame | 12.30 | 80.4 | 988 | 83 | 1022 |
| Frame - Sta. 91 | 12.48 | 90.2 | 1126 | 97 | 1215 |
| Bulkhead - Sta. 214 | 47.13 | 214.1 | 10090 | 106 | 4993 |
| Canted Bulkhead - Sta. 146 | 27.74 | 148.5 | 4118 | 108 | 3000 |
| Bulkhead - Sta. 165.2 | 14.46 | 165.0 | 2386 | 106 | 1530 |
| Frame, Engine Support - Sta. 214 | 13.63 | 210.4 | 2867 | 150 | 2049 |
| Bulkhead, M.L.G. Drag Strut | 20.25 | 317.0 | 6419 | 112 | 2277 |
| Bulkhead - M.L.G. - Sta. 287 | 20.06 | 287.0 | 5757 | 125 | 2502 |
| Bulkhead - Rear Spar - Sta. 296 | 39.49 | 296.5 | 11709 | 104 | 4114 |
| Bulkhead - Stab. Front Spar | 5.12 | 432.8 | 2216 | 119 | 608 |
| Bulkhead - Stab. Center Spar | 6.30 | 456.6 | 2876 | 116 | 732 |
| Bulkhead - Stab. Rear Spar | 3.44 | 488.4 | 1680 | 120 | 413 |
| Minor Frames | 97.99 | 308.3 | 30206 | 112 | 10982 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| BODY GROUP (Cont'd.) | | | | | |
| Basic Structure (Cont'd.) | | | | | |
| Truss Structure | 108.80 | 253.0 | 27524 | 114 | 12400 |
| Joints, Splices & Fasteners | 19.51 | 293.4 | 5724 | 110 | 2151 |
| Vertical Stiffeners | 2.59 | 131.3 | 340 | 106 | 275 |
| Skin - Upper Between Longerons | 25.33 | 348.7 | 8831 | 143 | 3615 |
| Skin - Side Between Longerons | 50.31 | 299.3 | 15057 | 112 | 5637 |
| Skin - Lower Between Longerons | 21.30 | 336.2 | 7161 | 93 | 1990 |
| Horizontal Stiffeners | 4.51 | 215.8 | 973 | 111 | 500 |
| Stringers - Side | 8.76 | 199.6 | 1749 | 109 | 958 |
| Wing L.E. Attach Fittings | .78 | 189.0 | 147 | 100 | 78 |
| Drag Angle - Fuselage to Fin | 4.99 | 440.0 | 2196 | 135 | 674 |
| Longerons - Upper | 36.55 | 264.0 | 9648 | 127 | 4626 |
| Longerons - Lower | 40.43 | 277.4 | 11217 | 98 | 3967 |
| Longerons - Upper External | 8.04 | 349.1 | 2807 | 152 | 1221 |
| Horizontal Shear Webs | 65.02 | 239.1 | 15547 | 107 | 6971 |
| Flooring and Supports | 21.21 | 158.6 | 3363 | 94 | 1984 |
| Nose Wheel Well | 12.89 | 117.4 | 1513 | 82 | 1054 |
| Main Gear - Door Support Structure | 21.18 | 309.4 | 6554 | 89 | 1887 |
| Pitch Fan Mount Structure | 15.63 | 67.8 | 1059 | 98 | 1527 |
| Pitch Fan Cutout Keelson | 1.32 | 57.9 | 76 | 77 | 102 |
| Miscellaneous | 1.08 | 235.2 | 254 | 108 | 116 |
| Secondary Structure | ( 148.50) | 138.7 | ( 20592) | 123 | ( 18257) |
| Enclosure | ( 66.90) | 133.2 | ( 8908) | 132 | ( 8798) |
| Canopy | 61.87 | 131.5 | 8136 | 131 | 8116 |
| Canopy Hinge Structure | 4.25 | 160.4 | 682 | 141 | 598 |
| Canopy Latch Structure | .78 | 115.7 | 90 | 108 | 84 |
| Windshield | 53.94 | 104.5 | 5636 | 122 | 6607 |
| Heat Shielding - Internal | 2.21 | 271.5 | 600 | 138 | 305 |
| Jack Pad Provisions | 1.07 | 394.0 | 422 | 97 | 104 |
| Nose Cone | 14.85 | 17.9 | 265 | 94 | 1394 |
| Tail Cone | 8.06 | 499.4 | 4025 | 111 | 899 |
| Tail Bumper | 1.47 | 501.0 | 736 | 102 | 150 |
| Doors, Panels & Miscellaneous | ( 321.84) | 270.2 | ( 86958) | 101 | ( 32424) |
| Nose Ldg. Gear Door | ( 10.22) | 112.3 | ( 1148) | 76 | ( 778) |
| Door Structure | 6.22 | 115.4 | 717 | 73 | 454 |
| Door Mechanism | 4.00 | 107.9 | 431 | 81 | 324 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| BODY GROUP (Cont'd.) | | | | | |
| Doors, Panels & Miscellaneous (Cont'd.) | | | | | |
| Main Ldg. Gear Door | ( 91.75) | 312.0 | ( 28626) | 84 | ( 7734) |
| Door Structure | 50.23 | 313.5 | 15745 | 82 | 4099 |
| Mechanism and Controls | 4.85 | 317.6 | 1540 | 85 | 410 |
| Power Transmission | 3.71 | 326.2 | 1210 | 90 | 335 |
| Actuator | 32.96 | 307.4 | 10131 | 88 | 2890 |
| Access Doors - Miscellaneous | 6.26 | 238.1 | 1490 | 95 | 593 |
| Access Door - Spin Chute | 2.31 | 470.2 | 1086 | 113 | 262 |
| Access Door - Sta. 100 to 133 | 7.36 | 116.2 | 855 | 79 | 582 |
| Access Door - Elect. Compt. | 5.34 | 155.0 | 828 | 100 | 534 |
| Panels | (152.70) | 238.6 | ( 36429) | 114 | ( 17339) |
| Access - Top - Sta. 214-287 | 47.52 | 248.8 | 11824 | 152 | 7207 |
| Access - Side - Sta. 214-287 | 36.30 | 249.3 | 9051 | 121 | 4385 |
| Access - Lower - Sta. 165-276 | 60.14 | 226.3 | 13610 | 81 | 4893 |
| Seal - Fuselage to Canoe | 2.65 | 285.0 | 755 | 94 | 250 |
| Closure - Pitch Fan | 2.81 | 63.8 | 179 | 96 | 270 |
| M.L.G. Well Protective | 3.28 | 308.0 | 1010 | 102 | 334 |
| Fairing - Tail Pipe Exit | 16.04 | 413.5 | 6632 | 95 | 1529 |
| Exterior Finish | 5.59 | 311.3 | 1740 | 110 | 617 |
| Insulation - External | 24.27 | 334.8 | 8124 | 101 | 2456 |
| ALIGHTING GEAR GROUP (Retracted Positon) | (420.14) | 281.5 | (118260) | 92 | ( 38445) |
| Main Gear | (354.33) | 312.5 | (110739) | 93 | ( 33094) |
| Running Gear | ( 73.70) | 352.7 | ( 25994) | 92 | ( 6780) |
| Wheels, 20 X 4.4 | 28.90 | 352.7 | 10193 | 92 | 2659 |
| Tires, 20 X 4.4, 12 Ply, Type VII | 23.70 | 352.7 | 8359 | 92 | 2180 |
| Brakes | 21.10 | 352.7 | 7442 | 92 | 1941 |
| Structure | (221.07) | 316.6 | ( 69983) | 93 | ( 20593) |
| Drag Strut | 34.83 | 308.6 | 10749 | 89 | 3085 |
| Side Strut | 10.10 | 312.6 | 3157 | 87 | 879 |
| Vee Brace | 15.09 | 287.7 | 4342 | 86 | 1304 |
| Shock Strut | 79.14 | 327.9 | 25946 | 92 | 7285 |

WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS
(Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| **ALIGHTING GEAR GROUP (Cont'd.)** (Retracted Position) | | | | | |
| Main Gear (Cont'd.) | | | | | |
| Structure (Cont'd.) | | | | | |
| Oil - Shock Strut | 3.40 | 332.1 | 1129 | 92 | 313 |
| Torque Arms | 5.66 | 343.3 | 1943 | 88 | 498 |
| Two Position Linkage | 25.86 | 312.4 | 8078 | 98 | 2547 |
| Main Attach Fittings - Body | 45.22 | 311.6 | 14091 | 100 | 4515 |
| Ground Feeler Probe | .62 | 352.7 | 219 | 92 | 57 |
| Pins, Bolts, Nuts, Etc. | 1.15 | 286.0 | 329 | 96 | 110 |
| Controls | ( 59.56) | 247.8 | ( 14762) | 96 | ( 5721) |
| Retracting | ( 30.36) | 276.8 | ( 8405) | 96 | ( 2907) |
| Electrical Circuitry | 3.37 | 239.7 | 808 | 100 | 338 |
| Electrical Controls | 1.04 | 110.1 | 115 | 114 | 119 |
| Hydraulic Operating Mech. | ( 13.11) | 304.0 | ( 3986) | 92 | ( 1207) |
| Plumbing | 3.97 | 305.3 | 1212 | 95 | 377 |
| Selector Valves | 1.36 | 292.0 | 397 | 94 | 128 |
| Sequence Valves | .68 | 305.0 | 207 | 93 | 63 |
| Actuator | 7.06 | 305.7 | 2158 | 90 | 635 |
| Fluid | .04 | 296.0 | 12 | 98 | 4 |
| Uplatch Operating Mech. | ( 8.79) | 328.7 | ( 2889) | 94 | ( 829) |
| Actuator | .97 | 329.0 | 319 | 91 | 88 |
| Mechanism | 7.82 | 328.6 | 2570 | 95 | 741 |
| Position Indicating Mech. | 3.88 | 143.2 | 556 | 103 | 398 |
| Supports - Body | .17 | 298.2 | 51 | 96 | 16 |
| Brake Operating | ( 12.65) | 145.8 | ( 1845) | 105 | ( 1333) |
| Mechanical Controls | 4.92 | 97.1 | 478 | 110 | 540 |
| Hydraulic Plumbing | 6.19 | 193.6 | 1199 | 101 | 624 |
| Supports - Body | 1.30 | 95.1 | 124 | 113 | 147 |
| Hydraulic Fluid | .24 | 185.0 | 44 | 90 | 22 |
| Emergency Extension | ( 5.98) | 220.1 | ( 1316) | 93 | ( 557) |
| Electrical Circuitry | .24 | 127.7 | 31 | 94 | 23 |
| Pneumatic Operating Mech. | ( 5.34) | 231.1 | ( 1234) | 93 | ( 498) |
| Controls | 1.65 | 128.1 | 211 | 95 | 157 |
| Plumbing | 3.69 | 277.2 | 1023 | 92 | 341 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| ALIGHTING GEAR GROUP (Cont'd.) (Retracted Position) | | | | | |
| Main Gear (Cont'd.) | | | | | |
| Controls (Cont'd.) | | | | | |
| Emergency Extension (Cont'd.) | | | | | |
| Supports - Body | .40 | 127.4 | 51 | 91 | 36 |
| Two Positioning Controls | ( 10.57) | 302.4 | ( 3196) | 87 | ( 924) |
| Electrical Circuitry | 1.13 | 222.7 | 252 | 98 | 111 |
| Plumbing | .47 | 319.0 | 150 | 87 | 41 |
| Selector Valve | 1.34 | 322.0 | 431 | 91 | 122 |
| Actuator | 7.40 | 309.4 | 2290 | 85 | 629 |
| Supports - Body | .15 | 323.0 | 48 | 93 | 14 |
| Hydraulic Fluid | .08 | 316.0 | 25 | 84 | 7 |
| Nose Gear | ( 65.81) | 114.3 | ( 7521) | 81 | ( 5351) |
| Running Gear | ( 20.17) | 99.2 | ( 2001) | 83 | ( 1674) |
| Wheels | 9.22 | 99.2 | 915 | 83 | 765 |
| Tires, 18 X 4.4 | 10.95 | 99.2 | 1086 | 83 | 909 |
| Structure | ( 38.83) | 120.6 | ( 4682) | 79 | ( 3086) |
| Shock Strut, Oil & Damper | 27.75 | 120.3 | 3338 | 78 | 2165 |
| Drag Strut | 7.14 | 120.9 | 863 | 86 | 612 |
| Main Attach Fittings - Body | 3.94 | 122.1 | 481 | 78 | 309 |
| Controls | ( 6.81) | 123.0 | ( 838) | 87 | ( 591) |
| Retracting | ( 6.27) | 123.6 | ( 775) | 87 | ( 543) |
| Electrical Circuitry | .77 | 130.6 | 101 | 87 | 67 |
| Hydraulic Operating Mech. | ( 5.09) | 122.6 | ( 624) | 86 | ( 437) |
| Plumbing | 2.81 | 121.4 | 341 | 84 | 237 |
| Fluid | .10 | 125.0 | 12 | 85 | 8 |
| Actuator | 2.18 | 124.1 | 271 | 88 | 192 |
| Position Indicating Mech. | .32 | 122.8 | 39 | 97 | 31 |
| Supports - Body | .09 | 121.7 | 11 | 86 | 8 |
| Emergency Extension | ( .54) | 116.7 | ( 63) | 89 | ( 48) |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| ALIGHTING GEAR GROUP (Cont'd.) (Retracted Position) | | | | | |
| Nose Gear (Cont'd.) | | | | | |
| Controls (Cont'd.) | | | | | |
| Emergency Extension (Cont'd.) | | | | | |
| Electrical Circuitry | .26 | 116.4 | 30 | 94 | 24 |
| Pneumatic Plumbing | .28 | 117.0 | 33 | 86 | 24 |
| SURFACE CONTROLS | ( 380.40) | 230.4 | ( 87631) | 105 | ( 39928) |
| Cockpit Controls | ( 22.49) | 116.7 | ( 2625) | 102 | ( 2285) |
| Control Column | 3.67 | 117.7 | 432 | 109 | 399 |
| Control Column Conn. Members | 5.62 | 122.7 | 690 | 89 | 499 |
| Rudder Pedals | 6.26 | 101.9 | 638 | 108 | 678 |
| Rudder Pedal Supports | .12 | 102.0 | 12 | 114 | 14 |
| Rudder Pedal Adjust Mech. | 1.40 | 101.3 | 142 | 108 | 151 |
| Lift Stick | 5.04 | 130.3 | 656 | 101 | 509 |
| Lift Stick Mechanism | .38 | 144.0 | 55 | 92 | 35 |
| Auto-Stabilization | ( 39.24) | 155.6 | ( 6107) | 101 | ( 3952) |
| Auto Stabilization Controller | 29.19 | 150.0 | 4379 | 101 | 2951 |
| Electrical Circuitry | 10.05 | 171.9 | 1728 | 100 | 1001 |
| System Controls - Conventional | ( 131.86) | 318.0 | ( 41931) | 117 | ( 15444) |
| Aileron | ( 37.87) | 247.0 | ( 9353) | 100 | ( 3768) |
| Mechanical Controls | 16.93 | 231.0 | 3910 | 99 | 1680 |
| Electrical Circuitry | .40 | 252.6 | 101 | 102 | 41 |
| Trim Controls | 1.58 | 307.8 | 486 | 104 | 164 |
| Hydraulic Operating Mech. | ( 9.98) | 298.2 | ( 2976) | 100 | ( 993) |
| Plumbing | 3.29 | 300.0 | 987 | 99 | 324 |
| Fluid | .39 | 300.0 | 117 | 99 | 39 |
| Actuators | 6.30 | 297.2 | 1872 | 100 | 630 |
| Aileron Droop System | ( 4.93) | 192.1 | ( 947) | 100 | ( 494) |
| Mechanical Controls | 3.37 | 193.5 | 652 | 100 | 336 |
| Electric Actuator | 1.24 | 198.0 | 246 | 101 | 125 |
| Electric Circuitry | .32 | 154.1 | 49 | 104 | 33 |
| Supports - Wing | 2.73 | 255.7 | 698 | 100 | 272 |
| Supports - Body | 1.32 | 178.0 | 235 | 94 | 124 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| SURFACE CONTROLS (Cont'd.) | | | | | |
| System Controls - Conventional (Cont'd.) | | | | | |
| Elevator | ( 20.90) | 294.5 | ( 6154) | 119 | ( 2488) |
| Mechanical Controls | 12.86 | 352.6 | 4534 | 135 | 1737 |
| Tension Regulator | 4.20 | 159.2 | 669 | 86 | 361 |
| Supports - Body | 3.84 | 247.8 | 951 | 102 | 390 |
| Rudder | ( 19.54) | 302.4 | ( 5908) | 106 | ( 2068) |
| Mechanical Controls | 10.16 | 204.9 | 2082 | 98 | 991 |
| Tension Regulator | 4.12 | 494.9 | 2039 | 117 | 482 |
| Electrical Circuitry | .75 | 264.5 | 198 | 120 | 90 |
| Trim Controls | 1.57 | 470.4 | 739 | 127 | 200 |
| Supports - Body | 2.94 | 289.3 | 850 | 104 | 305 |
| Flaps | ( 18.91) | 315.3 | ( 5962) | 100 | ( 1895) |
| Electrical Circuitry | 2.52 | 271.3 | 684 | 102 | 258 |
| Electric Actuator | 15.22 | 321.5 | 4893 | 100 | 1522 |
| Supports - Body | 1.17 | 329.3 | 385 | 99 | 115 |
| Horizontal Stabilizer | ( 34.64) | 420.1 | ( 14554) | 151 | ( 5225) |
| Electrical Circuitry | 5.18 | 304.5 | 1577 | 119 | 617 |
| Trim Controls - Electrical | .05 | 141.5 | 7 | 101 | 5 |
| Hydraulic Actuating Mech. | ( 29.41) | 441.0 | ( 12970) | 157 | ( 4603) |
| Plumbing | 14.77 | 410.8 | 6068 | 125 | 1847 |
| Fluid | 1.63 | 404.7 | 660 | 121 | 197 |
| Actuator | 12.60 | 481.0 | 6061 | 198 | 2495 |
| Supports - Tail | .29 | 468.1 | 136 | 184 | 53 |
| Supports - Body | .12 | 374.5 | 45 | 89 | 11 |
| System Controls - V.T.O.L. | ( 186.81) | 197.9 | ( 36968) | 98 | ( 18247) |
| Pitch System | ( 35.38) | 110.6 | ( 3913) | 91 | ( 3218) |
| Mechanical Controls | 10.83 | 144.2 | 1562 | 87 | 942 |
| Electrical Operating Mech. | ( 4.86) | 97.5 | ( 474) | 103 | ( 499) |
| Controls | 3.70 | 59.0 | 218 | 104 | 385 |
| Circuitry | .35 | 216.2 | 76 | 94 | 33 |
| Trim Controls | .81 | 222.0 | 180 | 100 | 81 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| SURFACE CONTROLS (Cont'd.) | | | | | |
| System Controls - V.T.O.L. (Cont'd.) | | | | | |
| Pitch System (Cont'd.) | | | | | |
| Hydraulic Operating Mech. | ( 19.69) | 95.3 | ( 1877) | 90 | ( 1777) |
| Plumbing | 5.91 | 111.3 | 657 | 95 | 561 |
| Fluid | .81 | 111.7 | 90 | 93 | 75 |
| Actuators | 9.60 | 88.0 | 845 | 87 | 835 |
| Supports - Body | 3.37 | 84.7 | 285 | 91 | 306 |
| Yaw System | ( 2.55) | 197.3 | ( 504) | 99 | ( 252) |
| Mechanical Controls | 1.26 | 190.3 | 240 | 97 | 122 |
| Electrical Circuitry | .32 | 162.1 | 52 | 104 | 33 |
| Trim Controls - Elect. | .97 | 218.1 | 212 | 100 | 97 |
| Roll System | ( 1.52) | 213.2 | ( 324) | 100 | ( 153) |
| Mechanical Controls | .40 | 206.0 | 82 | 99 | 40 |
| Electrical Circuitry | .26 | 167.6 | 44 | 100 | 26 |
| Trim Controls - Electrical | .86 | 230.3 | 198 | 101 | 87 |
| Lift System | ( 63.62) | 242.0 | ( 15394) | 97 | ( 6200) |
| Mechanical Controls | 19.65 | 247.9 | 4870 | 97 | 1904 |
| Electrical Circuitry | .58 | 166.5 | 97 | 99 | 58 |
| Thrust Vector Actuator | 2.74 | 220.5 | 604 | 100 | 274 |
| Hydraulic Operating Mech. | ( 40.65) | 241.6 | ( 9823) | 98 | ( 3964) |
| Plumbing | 8.36 | 224.6 | 1877 | 99 | 830 |
| Fluid | .87 | 207.1 | 180 | 99 | 87 |
| Servo Actuator | 24.54 | 256.0 | 6282 | 97 | 2380 |
| Supports - Wing | 6.80 | 215.7 | 1467 | 97 | 659 |
| Supports - Body | .08 | 216.2 | 17 | 97 | 8 |
| Common To All Systems | ( 83.74) | 201.0 | ( 16833) | 101 | ( 8424) |
| Mechanical Mixer | 34.94 | 225.7 | 7885 | 100 | 3480 |
| Electrical Circuitry | 6.64 | 172.7 | 1147 | 105 | 700 |
| Circuitry Interlock | 14.68 | 241.7 | 3548 | 112 | 1640 |
| Electrical Mixer | 27.04 | 154.8 | 4185 | 95 | 2564 |
| Supports - Body | .44 | 155.4 | 68 | 91 | 40 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| ENGINE SECTION | ( 44.39) | 249.9 | ( 11092) | 139 | ( 6148) |
| Engine Mounts | 14.34 | 251.6 | 3608 | 140 | 2007 |
| Firewall | 30.05 | 249.1 | 7484 | 138 | 4141 |
| PROPULSION GROUP | (3435.85) | 235.4 | (808761) | 116 | (399390) |
| Main Propulsion - Gas Generator | (1221.85) | 241.3 | (294768) | 143 | (174427) |
| Engine - G.E. J85-GE-5B (2) | 923.00 | 224.8 | 207490 | 147 | 135681 |
| Accessory Gear Box & Drive | ( 28.24) | 195.8 | ( 5528) | 137 | ( 3864) |
| Gear Box | 19.60 | 192.4 | 3770 | 137 | 2680 |
| Flex Shaft - Accessory Drive | 8.64 | 203.5 | 1758 | 137 | 1184 |
| Air Induction System | ( 57.73) | 186.9 | ( 10790) | 147 | ( 8476) |
| Air Intake Duct | 56.28 | 186.3 | 10484 | 147 | 8258 |
| Compressor Bleed Duct | 1.45 | 211.0 | 306 | 151 | 218 |
| Exhaust System | ( 212.88) | 333.3 | ( 70961) | 124 | ( 26406) |
| Tailpipe | 148.90 | 322.6 | 48037 | 128 | 19099 |
| Tailipipe Shroud & Insulation | 50.67 | 343.4 | 17401 | 120 | 6068 |
| Supports | .30 | 287.0 | 86 | 134 | 40 |
| Thrust Spoiler Doors | 7.57 | 418.1 | 3165 | 92 | 696 |
| Thrust Spoiler Linkage | 5.44 | 417.6 | 2272 | 92 | 503 |
| Main Propulsion - Lift Fan | (1746.54) | 255.8 | (446720) | 102 | (177813) |
| Lift Fan - G.E. X353-5B (2) | 1616.38 | 256.0 | 413793 | 101 | 163254 |
| Fan Mounts | 8.06 | 244.8 | 1973 | 104 | 838 |
| Air Induction System | ( 122.10) | 253.5 | ( 30954) | 112 | ( 13721) |
| Crossover Ducting | 100.28 | 253.5 | 25423 | 112 | 11194 |
| Duct Insulation | 6.79 | 256.0 | 1738 | 117 | 794 |
| Duct Supports | 15.03 | 252.3 | 3793 | 115 | 1733 |
| Auxiliary Propulsion - Pitch Fan | ( 311.14) | 97.8 | ( 30419) | 94 | ( 29153) |
| Pitch Fan - G.E. X376 (1) | 114.40 | 61.2 | 7001 | 100 | 11440 |
| Fan Mounts | 2.27 | 79.1 | 179 | 101 | 229 |
| Air Induction System | ( 139.38) | 142.4 | ( 19848) | 93 | ( 12914) |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| PROPULSION GROUP (Cont'd.) | | | | | |
| Auxiliary Propulsion - Pitch Fan (Cont'd.) | | | | | |
| Air Induction System (Cont'd.) | | | | | |
| Air Ducts | 78.70 | 168.0 | 13221 | 87 | 6838 |
| Duct Supports | 5.74 | 171.1 | 982 | 89 | 514 |
| Duct Shrouding | 20.66 | 167.2 | 3454 | 85 | 1750 |
| Intake Bellmouth | 19.36 | 61.9 | 1198 | 111 | 2149 |
| Intake Louvers | 14.92 | 66.6 | 993 | 111 | 1663 |
| Exhasut System | ( 55.09) | 61.5 | ( 3391) | 83 | ( 4570) |
| Pitch Thrust Reverser | 46.54 | 57.3 | 2667 | 83 | 3847 |
| Thrust Reverser Linkage | 8.55 | 84.7 | 724 | 85 | 723 |
| Lubricating & Fuel System | ( 112.13) | 241.0 | ( 27018) | 117 | ( 13128) |
| Main Fuel System | ( 109.94) | 241.1 | ( 26507) | 117 | ( 12874) |
| Forward Tank (262 gal.) | 18.88 | 187.4 | 3539 | 112 | 2114 |
| Aft Tank (134 gal.) | 30.89 | 297.5 | 9190 | 117 | 3621 |
| Backing Board - Fwd. Tank | 8.85 | 188.7 | 1670 | 111 | 982 |
| Tank Supports | 2.80 | 299.4 | 838 | 113 | 316 |
| Boost Pumps & Elect. Controls | 13.82 | 220.6 | 3049 | 108 | 1499 |
| Ground Filling System | 4.33 | 214.8 | 930 | 130 | 564 |
| Engine Drain System | 4.67 | 236.3 | 1104 | 120 | 560 |
| Distribution System | 18.76 | 220.2 | 4131 | 122 | 2296 |
| Vent System | 5.19 | 331.7 | 1722 | 139 | 724 |
| Low Pressure Warning System | 1.75 | 191.0 | 334 | 113 | 198 |
| Auxiliary Fuel System | ( 2.19) | 233.2 | ( 511) | 116 | ( 254) |
| Tank Supports | 2.19 | 233.2 | 511 | 116 | 254 |
| Oil System - Integral With Engine | | | | | |
| Engine Controls | ( 38.11) | 221.3 | ( 8435) | 109 | ( 4156) |
| Ignition | .54 | 167.7 | 91 | 120 | 65 |
| Throttle | 17.38 | 149.3 | 2595 | 108 | 1874 |
| Diverter Valve | 11.77 | 216.6 | 2549 | 125 | 1466 |
| Thrust Spoiler | 8.42 | 380.1 | 3200 | 89 | 751 |
| Starting System - Air Impingement | 6.08 | 230.4 | 1401 | 117 | 713 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| INSTRUMENTS | ( 71.09) | 163.8 | ( 11645) | 120 | ( 8535) |
| Accelerometer | .66 | 106.0 | 70 | 121 | 80 |
| Machmeter | ( 2.04) | 115.7 | ( 236) | 121 | ( 247) |
| Indicator | 1.65 | 105.2 | 174 | 124 | 204 |
| Wiring | .39 | 158.4 | 62 | 111 | 43 |
| Altimeter | 1.31 | 105.0 | 138 | 124 | 162 |
| Attitude | ( 3.07) | 106.2 | ( 326) | 121 | ( 370) |
| Indicator | 2.86 | 106.0 | 303 | 121 | 346 |
| Wiring | .21 | 110.5 | 23 | 115 | 24 |
| Airspeed - Low Speed | .60 | 105.0 | 63 | 124 | 74 |
| Rate of Climb Indicator | 1.46 | 105.0 | 153 | 123 | 180 |
| Landing Gear Warning Indicator | .05 | 110.0 | 5 | 116 | 6 |
| Turn and Bank | ( 1.31) | 109.2 | ( 143) | 115 | ( 150) |
| Indicator | 1.20 | 109.0 | 131 | 115 | 138 |
| Wiring | .11 | 111.9 | 12 | 112 | 12 |
| Flap - Thrust Spoiler Position | ( 2.31) | 217.7 | ( 503) | 108 | ( 249) |
| Indicator | .57 | 107.5 | 61 | 120 | 68 |
| Transmitter | .10 | 410.0 | 41 | 100 | 10 |
| Wiring | 1.64 | 244.5 | 401 | 104 | 171 |
| Standby Compass | ( .87) | 106.9 | ( 93) | 129 | ( 112) |
| Indicator | .72 | 107.0 | 77 | 129 | 93 |
| Installation | .15 | 104.5 | 16 | 129 | 19 |
| Landing Gear Position | ( 1.75 | 167.4 | ( 293) | 103 | ( 180) |
| Indicator | .32 | 110.5 | 35 | 112 | 36 |
| Wiring | 1.43 | 180.6 | 258 | 101 | 144 |
| Fuel Quantity | ( 7.97) | 196.9 | ( 1569) | 119 | ( 946) |
| Indicator | 1.82 | 140.5 | 256 | 116 | 211 |
| Transmitters | 3.77 | 228.0 | 860 | 117 | 442 |
| Wiring | 2.38 | 190.5 | 453 | 123 | 293 |
| Fuel Flow | ( 8.84) | 172.7 | ( 1527) | 130 | ( 1146) |
| Indicator | 1.40 | 108.5 | 152 | 120 | 168 |
| Transmitters | 4.90 | 196.0 | 960 | 132 | 647 |
| Wiring | 2.54 | 163.3 | 415 | 130 | 331 |
| Oil Pressure | ( 7.07) | 198.3 | ( 1402) | 134 | ( 950) |
| Indicator | .63 | 109.5 | 69 | 118 | 74 |
| Transmitters | 2.70 | 232.0 | 626 | 144 | 389 |
| Wiring | 3.74 | 189.0 | 707 | 130 | 487 |
| Engine Tachometers (2) | ( 2.06) | 137.9 | ( 284) | 129 | ( 265) |
| Indicators | .98 | 108.5 | 106 | 124 | 122 |
| Wiring | 1.08 | 164.6 | 178 | 132 | 143 |
| Hydraulic Pressure | ( 5.06) | 145.8 | ( 738) | 127 | ( 642) |
| Indicator | .87 | 120.4 | 105 | 123 | 107 |
| Transmitter | 3.00 | 156.5 | 470 | 131 | 393 |
| Wiring | 1.19 | 137.1 | 163 | 120 | 142 |
| Pitot System | 9.39 | 189.9 | 1783 | 103 | 972 |
| Clock | .43 | 109.5 | 47 | 115 | 49 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| INSTRUMENTS (Cont'd.) | | | | | |
| Alpha Meter - Angle of Attack | .63 | 108.5 | 68 | 118 | 74 |
| Angle of Yaw | .63 | 108.5 | 68 | 118 | 74 |
| Vector Angle | .26 | 107.0 | 28 | 120 | 31 |
| Exhaust Temperature | ( .73) | 153.1 | ( 571) | 123 | ( 457) |
| Indicator - Dual | 1.35 | 108.5 | 146 | 122 | 165 |
| Wiring | 2.38 | 178.7 | 425 | 123 | 292 |
| Rudder, Aileron, Stab. Position | ( 4.13) | 211.1 | ( 872) | 118 | ( 488) |
| Indicator | 1.11 | 108.5 | 120 | 115 | 128 |
| Wiring | 3.02 | 249.2 | 752 | 119 | 360 |
| Louver Position | ( 1.27) | 107.9 | ( 137) | 116 | ( 147) |
| Indicator | 1.11 | 108.5 | 120 | 115 | 128 |
| Wiring | .16 | 109.0 | 17 | 118 | 19 |
| Master Caution Panel | ( 2.90) | 132.4 | ( 384) | 117 | ( 338) |
| Indicator | .13 | 108.5 | 14 | 122 | 16 |
| Panel | 1.41 | 109.0 | 154 | 121 | 171 |
| Wiring | 1.36 | 158.5 | 216 | 111 | 151 |
| Attaching Hardware | .58 | 109.0 | 63 | 118 | 68 |
| Switches, Etc. | .71 | 114.0 | 81 | 110 | 78 |
| HYDRAULIC AND PNEUMATIC GROUP | ( 111.48) | 183.7 | ( 20482) | 122 | ( 13652) |
| Hydraulic Utility System | ( 109.52) | 184.0 | ( 20148) | 123 | ( 13476) |
| Pumps, Engine Driven (2) | 14.32 | 174.8 | 2503 | 140 | 2005 |
| Oil Coolers (2) | 6.10 | 176.2 | 1075 | 135 | 823 |
| Reservoirs (2) | 14.30 | 165.1 | 2361 | 128 | 1830 |
| Accumulators (2) | 7.43 | 171.4 | 1274 | 127 | 944 |
| Accumulator Charge Fittings | .80 | 171.2 | 137 | 129 | 103 |
| Filters | 6.64 | 168.0 | 1116 | 135 | 894 |
| Pressure Switch | .74 | 159.9 | 118 | 128 | 95 |
| Valves | ( 3.23) | 171.8 | ( 555) | 128 | ( 412) |
| Check | .16 | 177.7 | 28 | 140 | 22 |
| Relief | 2.92 | 171.5 | 501 | 127 | 371 |
| Control | .15 | 171.4 | 26 | 127 | 19 |
| Temperature Indication | .94 | 149.9 | 141 | 145 | 136 |
| Low Pressure Warning | .38 | 143.4 | 54 | 123 | 47 |
| Quick Disconnects | 1.04 | 157.5 | 164 | 124 | 129 |
| Plumbing | 21.46 | 208.0 | 4463 | 112 | 2401 |
| Fluid in System | 25.62 | 203.1 | 5203 | 113 | 2898 |
| Supports - Body | 6.52 | 151.0 | 984 | 116 | 759 |
| Pneumatic Emergency System | ( 1.96) | 170.6 | ( 334) | 90 | ( 176) |
| Plumbing | 1.96 | 170.6 | 334 | 90 | 176 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| ELECTRICAL GROUP | ( 194.05) | 253.9 | ( 49274) | 118 | ( 22816) |
| A. C. System | ( 5.80) | 326.3 | ( 1892) | 109 | ( 633) |
| Power Conversion | ( .81) | 146.5 | ( 119) | 102 | ( 83) |
| Transformer | .81 | 146.5 | 119 | 102 | 83 |
| Distribution & Controls | ( 3.88) | 381.3 | ( 1479) | 112 | ( 435) |
| Relays | 2.28 | 458.1 | 1044 | 117 | 267 |
| Wiring | .84 | 300.7 | 253 | 107 | 90 |
| Conduit | .76 | 240.0 | 182 | 103 | 78 |
| Lights and Signals | ( 1.11) | 265.2 | ( 294) | 104 | ( 115) |
| Wiring for Exterior Lights | 1.11 | 265.2 | 294 | 104 | 115 |
| D. C. System | ( 188.25) | 251.7 | ( 47382) | 118 | ( 22183) |
| Power Supply | ( 92.96) | 243.5 | ( 22634) | 133 | ( 12388) |
| Generators 165 AMP (2) | 74.00 | 185.0 | 13690 | 139 | 10286 |
| Battery (1) | 18.00 | 471.7 | 8491 | 111 | 1998 |
| Battery Supports | .96 | 471.8 | 453 | 109 | 104 |
| Power Conversion | ( 28.41) | 432.5 | ( 12287) | 110 | ( 3115) |
| Static Inverter (2) | 24.06 | 455.7 | 10964 | 110 | 2647 |
| Wiring | 4.35 | 304.2 | 1323 | 108 | 468 |
| Distribution and Controls | ( 60.47) | 183.7 | ( 11106) | 100 | ( 6030) |
| Generator Controls | 13.24 | 150.2 | 1988 | 93 | 1232 |
| Volt-Ammeter | 1.06 | 120.0 | 127 | 100 | 106 |
| Switches, Rheostats & Panels | .27 | 120.0 | 32 | 100 | 27 |
| Circuit Breaker & Fuses | 9.57 | 132.3 | 1266 | 94 | 900 |
| Junction Fuse & Dist. Boxes | 1.78 | 130.4 | 232 | 95 | 168 |
| Receptacles & Connectors | 1.84 | 156.4 | 288 | 88 | 162 |
| Relays | 7.11 | 199.2 | 1416 | 103 | 735 |
| Wiring | 23.25 | 220.8 | 5133 | 105 | 2446 |
| Conduit | 1.87 | 251.9 | 471 | 108 | 203 |
| Bonding Installations | .48 | 318.3 | 153 | 106 | 51 |
| Equipment Supports | ( 6.41) | 211.3 | ( 1355) | 102 | ( 650) |
| Distribution Box | 1.98 | 146.5 | 290 | 102 | 202 |
| Equipment Supports - Wing | 1.08 | 204.7 | 221 | 101 | 109 |
| Equipment Supports - Body | 3.35 | 251.9 | 844 | 101 | 339 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| ELECTRONICS | ( 38.99) | 153.3 | ( 5979) | 95 | ( 3706) |
| UHF Tranceiver, ARC-51X | ( 38.99) | 153.4 | ( 5979) | 95 | ( 3706) |
| Equipment | ( 37.77) | 153.2 | ( 5786) | 95 | ( 3602) |
| Transceiver | ( 30.30) | 158.5 | ( 4803) | 95 | ( 2877) |
| Radio, RT-702/ARC-51X | 27.90 | 158.5 | 4422 | 95 | 2650 |
| Mount, MT-2653 | .40 | 158.5 | 63 | 92 | 37 |
| Cooler, HD-615/ARC-51X | 1.00 | 158.5 | 159 | 95 | 95 |
| Indicator, ID-1003/ARC-51X | 1.00 | 158.5 | 159 | 95 | 95 |
| Antenna, AT256A/ARC | 1.54 | 162.0 | 249 | 66 | 102 |
| Control Unit C3984/ARC-51 | 3.00 | 110.0 | 330 | 115 | 345 |
| Cabling | 2.93 | 138.0 | 404 | 95 | 278 |
| Installation | ( 1.22) | 158.6 | ( 193) | 86 | ( 104) |
| Transceiver | .89 | 157.3 | 140 | 91 | 81 |
| Antenna | .33 | 162.0 | 53 | 71 | 23 |
| FURNISHINGS AND EQUIPMENT | ( 231.28) | 152.5 | ( 35260) | 112 | ( 25968) |
| Accommodations For Personnel | ( 188.51) | 142.1 | ( 26794) | 112 | ( 21116) |
| Pilot's Seat - North American LW-2 | ( 170.80) | 141.4 | ( 24147) | 112 | ( 19137) |
| Seat 9142-53009 | 138.50 | 140.0 | 19390 | 111 | 15374 |
| Seat Adjusting Mechanism | 5.96 | 152.0 | 906 | 130 | 775 |
| Bulkhead Fittings (2) | 3.10 | 145.5 | 451 | 106 | 329 |
| Speed Sensor | .69 | 149.0 | 103 | 111 | 77 |
| Rocket Catapult | 21.75 | 147.0 | 3197 | 115 | 2501 |
| Initiators T-30E2 (2) | .70 | 122.0 | 85 | 100 | 70 |
| Cartridges (4) | .10 | 147.0 | 15 | 106 | 11 |
| Seat Tracks & Supports | 17.71 | 149.5 | 2647 | 112 | 1979 |
| Miscellaneous Equipment | ( 9.66) | 112.3 | ( 1085) | 108 | ( 1045) |
| Instrument Panel | 2.81 | 109.3 | 307 | 117 | 330 |
| Instrument Panel Supports | 1.54 | 106.5 | 164 | 115 | 178 |
| Consoles | 5.31 | 115.6 | 614 | 101 | 537 |

## WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| FURNISHINGS AND EQUIPMENT (Cont'd.) | | | | | |
| Emergency Equipment | ( 33.11) | 222.9 | ( 7381) | 115 | ( 3807) |
| Fire Extinguishing System | ( 20.65) | 223.5 | ( 4616) | 114 | ( 2359) |
| Bottles (Including Charge) | 12.44 | 219.0 | 2724 | 112 | 1393 |
| Controls | 3.08 | 244.3 | 753 | 115 | 354 |
| Plumbing | 4.93 | 222.4 | 1096 | 119 | 589 |
| Bottle Supports | .20 | 216.5 | 43 | 114 | 23 |
| Fire Detection System | 8.24 | 217.8 | 1795 | 123 | 1011 |
| Structure Overheat Warning | 4.22 | 230.0 | 970 | 104 | 437 |
| AIR CONDITIONING & ANTI-ICING | ( 30.94) | 193.2 | ( 5977) | 137 | ( 4242) |
| Air Conditioning System | ( 29.82) | 193.1 | ( 5759) | 137 | ( 4094) |
| Cooling System | ( 29.82) | 193.1 | ( 5759) | 137 | ( 4094) |
| Fans (2) | 11.59 | 192.0 | 2226 | 137 | 1588 |
| Ducting | 13.06 | 197.2 | 2575 | 138 | 1805 |
| Plenum Chamber | 4.99 | 184.1 | 919 | 136 | 677 |
| Supports - Body | .18 | 214.0 | 39 | 132 | 24 |
| Anti-Icing | ( 1.12) | 194.4 | ( 218) | 132 | ( 148) |
| Engine Anti-Icing Wiring | 1.12 | 194.4 | 218 | 132 | 148 |
| AUXILIARY GEAR | ( 27.20) | 448.9 | ( 12209) | 106 | ( 2896) |
| Handling | ( .49) | 386.6 | ( 189) | 87 | ( 43) |
| Jacking Fittings | .49 | 386.6 | 189 | 87 | 43 |
| Arresting Gear | ( 26.71) | 450.0 | ( 12020) | 107 | ( 2853) |
| Decelerating Parachute | 13.60 | 500.0 | 6800 | 110 | 1496 |
| Chute Container & Fittings | 5.37 | 485.0 | 2604 | 108 | 579 |
| Chute Controls | 7.74 | 338.0 | 2616 | 101 | 778 |

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## 2.7 Instrumentation

## INSTRUMENTATION

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| Nose Boom | 5.60 | - 1.91 | - 11 | 94. | 526 |
| Fan Overspeed Control | 8.32 | 121.91 | 1014 | 106. | 880 |
| Circuitry Fan Bearing Heat | 5.11 | 165.11 | 844 | 95. | 486 |
| Circuitry Fan RPM & Limit | 10.71 | 159.75 | 1711 | 94. | 1011 |
| Auto Stab. System Instrumentation | 1.70 | 109.00 | 185 | 112. | 190 |
| G.E. Fan Slip Rings (2) | 21.08 | 204.25 | 4306 | 101. | 2123 |
| Tubing for Static Test Wiring | .28 | 212.86 | 60 | 102. | 29 |
| * Sub Total | * 52.80 | 153.58 | 8109 | 99. | 5245 |
| D023 Temp. Measurement Instl. | 2.32 | 240.00 | 557 | 100. | 232 |
| D020 Signal Access & Harn. Standoffs | 2.03 | 242.00 | 491 | 120. | 244 |
| D021 Oat Probe Installation | 1.16 | 256.03 | 297 | 104. | 120 |
| D022 Probe - Nose, Yaw & Angle | 2.14 | - 75.70 | - 162 | 95. | 203 |
| D025 Probe - Hyd. Temp. | .54 | 165.00 | 89 | 128. | 69 |
| D026 Transducer Installation | 1.39 | 1.44 | 2 | 95. | 132 |
| D027 Pos. Potentiometer | .24 | 495.83 | 119 | 113. | 27 |
| D028 Pos. Potentiometer-Rudder | .35 | 494.28 | 173 | 114. | 40 |
| D029 Pos. Potentiometer-Aileron | .45 | 299.00 | 135 | 104. | 47 |
| D030 Force Transducers | .09 | 122.22 | 11 | 100. | 9 |
| D031 Pos. Potentiometer-Aileron Tab | .07 | 317.70 | 22 | 102. | 7 |
| D033 Pot.-Fwd Louver Servo-Fan Exit | .42 | 211.00 | 89 | 97. | 41 |
| D034 Pot.-Aft Louver Servo-Fan Exit | .42 | 300.00 | 126 | 97. | 41 |
| D035 Photo Recorder Installation | 49.65 | 100.95 | 5012 | 97. | 4826 |
| D036 Pot.-Pitch Fan Exit Door | .22 | 88.00 | 19 | 87. | 19 |
| D037 Pos. Potentiometer-Rudder Hinge | .11 | 513.00 | 56 | 183. | 20 |
| D038 Pos. Potentiometer-Throttle | .60 | 111.67 | 67 | 97. | 58 |
| D039 Potentiometer-Stick-Long. & Lat. | .45 | 113.33 | 51 | 87. | 39 |
| D040 Potentiometer-Rudder Pedal | .28 | 94.00 | 26 | 110. | 31 |
| D041 Post.-Potentiometer-Control Col. | .26 | 140.00 | 36 | 87. | 23 |
| D044 C.G. Accel. Mtng. Box | 9.54 | 241.71 | 2306 | 121. | 1159 |
| D045 Accels.-Wing & Tail | 1.40 | 380.00 | 532 | 141. | 198 |
| D047 Inverter Elapsed Time | .23 | 455.00 | 105 | 113. | 26 |
| D049 Equip.-Data Acquisition | | | | | |
| PCM Package | 65.00 | 145.00 | 9425 | 108. | 7020 |
| Vertical Gyro | 5.00 | 115.00 | 575 | 96. | 480 |
| Rate Gyro | 3.85 | 105.00 | 404 | 95. | 366 |
| Analog Record Electronics | 10.00 | 99.00 | 990 | 95. | 950 |
| Tape Transport | 25.00 | 98.7 | 2467 | 94. | 2350 |
| Telemetry Package | 22.50 | 114.0 | 2565 | 94. | 2115 |
| Telemetry Package | 22.50 | 145.0 | 3263 | 105. | 2363 |
| D050 Signal Conditioner | 51.00 | 128.5 | 6554 | 105. | 5355 |
| Temp Syst. Instl. Box | 10.00 | 128.5 | 1285 | 99. | 990 |
| -3 Fwd Mounting Board | 11.00 | 108.0 | 1188 | 93. | 1023 |
| -5 Aft Mounting Board | 5.40 | 130.0 | 702 | 94. | 508 |
| D051 Antenna-Telemetry | .81 | 136.5 | 111 | 71. | 58 |
| D054 Wiring | 105.31 | 220.57 | 23228 | 103. | 10808 |
| D057 Press. Probes-Cooling Syst. | 11.75 | 202.00 | 2374 | 112. | 1316 |

INSTRUMENTATION (Continued)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| D058 Pos. Potentiometer-Elevator | .09 | 518.00 | 47 | 206. | 19 |
| D059 Accelerometers-Flutter | 15.41 | 288.58 | 4447 | 117. | 1808 |
| * Sub Total | *438.98 | 158.97 | 69784 | 103. | 45140 |
| TOTAL INSTRUMENTATION | 491.78 | 158.39 | 77893 | 102. | 50385 |

## INSTRUMENTATION CONFIGURATIONS FOR FLIGHT TEST

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| Total Instrumentation | 491.78 | 158.39 | 77,893 | 102. | 50,385 |
| Delete: D059 Accel.-Flutter | -15.41 | 288.58 | - 4,447 | 117. | - 1,808 |
| Telemetry Pkg.-2nd | -22.50 | 145.00 | - 3,263 | 105. | - 2,363 |
| D035 Photo Recorder | -49.65 | 100.95 | - 5,012 | 97. | - 4,826 |
| **STANDARD INSTRUMENTATION CONFIGURATION** | 404.22 | 161.23 | 65,171 | 102. | 41,388 |
| Total Instrumentation | 491.78 | 158.39 | 77,893 | 102. | 50,385 |
| Delete: D059 Accel.-Flutter | -15.41 | 288.58 | - 4,447 | 117. | - 1,808 |
| Telemetry Pkg.-2nd | -22.50 | 145.00 | - 3,263 | 105. | - 2,363 |
| **STANDARD & TEMP. SURVEY INSTRU. CONFIG.** | 453.87 | 154.63 | 70,183 | 102. | 46,214 |
| Total Instrumentation | 491.78 | 158.39 | 77,893 | 102. | 50,385 |
| Delete: D035 Photo Recorder | -49.65 | 100.95 | - 5,012 | 97. | - 4,826 |
| Temp. Syst. Box | -10.00 | 128.50 | - 1,285 | 99. | - 990 |
| P.C.M. Pkg. | -65.00 | 145.00 | - 9,425 | 108. | - 7,020 |
| **FLUTTER & VIBRATION INSTRU. CONFIG.** | 367.13 | 169.34 | 62,171 | 102. | 37,549 |

2.8 Moment Change-Landing Gear Extended

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## MOMENT CHANGE - LANDING GEAR EXTENSION (RETRACTABLE ITEM ONLY)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| LANDING GEAR RETRACTED (As Reflected in This Report) | (297.77) | | (85044) | | (26477) |
| Main Gear | (238.03) | (328.6) | (78216) | (91.0) | (21655) |
| Shock Strut, Oil and Axle | 88.20 | 329.0 | 29019 | 92 | 8096 |
| Drag Brace | 30.28 | 311.2 | 9424 | 88 | 2657 |
| Side Brace | 10.10 | 312.6 | 3157 | 87 | 879 |
| Vee Brace | 25.57 | 293.4 | 7503 | 91 | 2320 |
| Retracting Cylinder | 7.06 | 305.7 | 2158 | 90 | 635 |
| Wheels | 28.90 | 352.7 | 10193 | 92 | 2659 |
| Brakes | 21.10 | 352.7 | 7442 | 92 | 1941 |
| Tires | 23.70 | 352.7 | 8359 | 92 | 2180 |
| Hydraulic Hoses, Brackets, etc. | 3.12 | 308.0 | 961 | 92 | 288 |
| Nose Gear | ( 59.74) | (114.3) | ( 6828) | (80.7) | ( 4822) |
| Shock Strut, Oil & Shimmy Damper | 27.75 | 120.3 | 3339 | 78 | 2166 |
| Braces & Jury Links | 8.41 | 122.2 | 1028 | 85 | 712 |
| Retracting Cylinder | 2.18 | 124.1 | 271 | 88 | 192 |
| Wheel | 8.22 | 99.2 | 815 | 83 | 682 |
| Tire | 10.95 | 99.2 | 1086 | 83 | 909 |
| Aft Door | 2.23 | 129.6 | 289 | 72 | 161 |

## MOMENT CHANGE - LANDING GEAR EXTENSION (RETRACTABLE ITEMS ONLY)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| **LANDING GEAR EXTENDED** | | | | | |
| **VTOL** (Vertical Take-off Position) | (297.77) | | (78418) | | (17630) |
| Main Gear | (238.03) | (296.1) | (70472) | (60.0) | (14284) |
| Shock Strut, Oil & Axle | 88.20 | 292.4 | 25786 | 58 | 5081 |
| Drag Brace | 30.28 | 306.0 | 9266 | 75 | 2274 |
| Side Brace | 10.10 | 292.2 | 2951 | 63 | 636 |
| Vee Brace | 25.57 | 293.4 | 7503 | 91 | 2320 |
| Retracting Cylinder | 7.06 | 318.0 | 2245 | 91 | 642 |
| Wheels | 28.90 | 296.0 | 8554 | 42 | 1214 |
| Brakes | 21.10 | 296.0 | 6246 | 42 | 886 |
| Tires | 23.70 | 296.0 | 7015 | 42 | 995 |
| Hydraulic Hoses, Brackets, etc. | 3.12 | 290.4 | 906 | 76 | 236 |
| Nose Gear | ( 59.74) | (133.0) | ( 7946) | (56.0) | ( 3346) |
| Shock Strut, Oil & Shimmy Damper | 27.75 | 135.8 | 3768 | 58 | 1610 |
| Braces & Jury Links | 8.41 | 119.6 | 1006 | 76 | 642 |
| Retracting Cylinder | 2.18 | 117.1 | 255 | 78 | 170 |
| Wheel | 8.22 | 135.6 | 1115 | 41 | 337 |
| Tire | 10.95 | 135.6 | 1485 | 41 | 449 |
| Aft Door | 2.23 | 142.0 | 317 | 62 | 138 |

## MOMENT CHANGE - LANDING GEAR EXTENSION (RETRACTABLE ITEMS ONLY)

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| LANDING GEAR EXTENDED CTOL (Conventional Take-off Position) | (297.77) | | (75139) | | (17361) |
| Main Gear | (238.03) | (282.3) | (67193) | (58.9) | (14015) |
| Shock Strut, Oil & Axle | 88.20 | 278.3 | 24544 | 58 | 5081 |
| Drag Brace | 30.28 | 297.1 | 8997 | 70 | 2106 |
| Side Brace | 10.10 | 280.0 | 2828 | 63 | 636 |
| Vee Brace | 25.57 | 291.1 | 7444 | 88 | 2261 |
| Retracting Cylinder | 7.06 | 305.4 | 2156 | 85 | 600 |
| Wheels | 28.90 | 276.0 | 7976 | 42 | 1214 |
| Brakes | 21.10 | 276.0 | 5824 | 42 | 886 |
| Tires | 23.70 | 276.0 | 6541 | 42 | 995 |
| Hydraulic Hoses, Brackets, etc. | 3.12 | 283.0 | 883 | 76 | 236 |
| Nose Gear - Same as VTOL | ( 59.74) | | ( 7946) | | ( 3346) |

## SUMMARY - MOMENT CHANGE

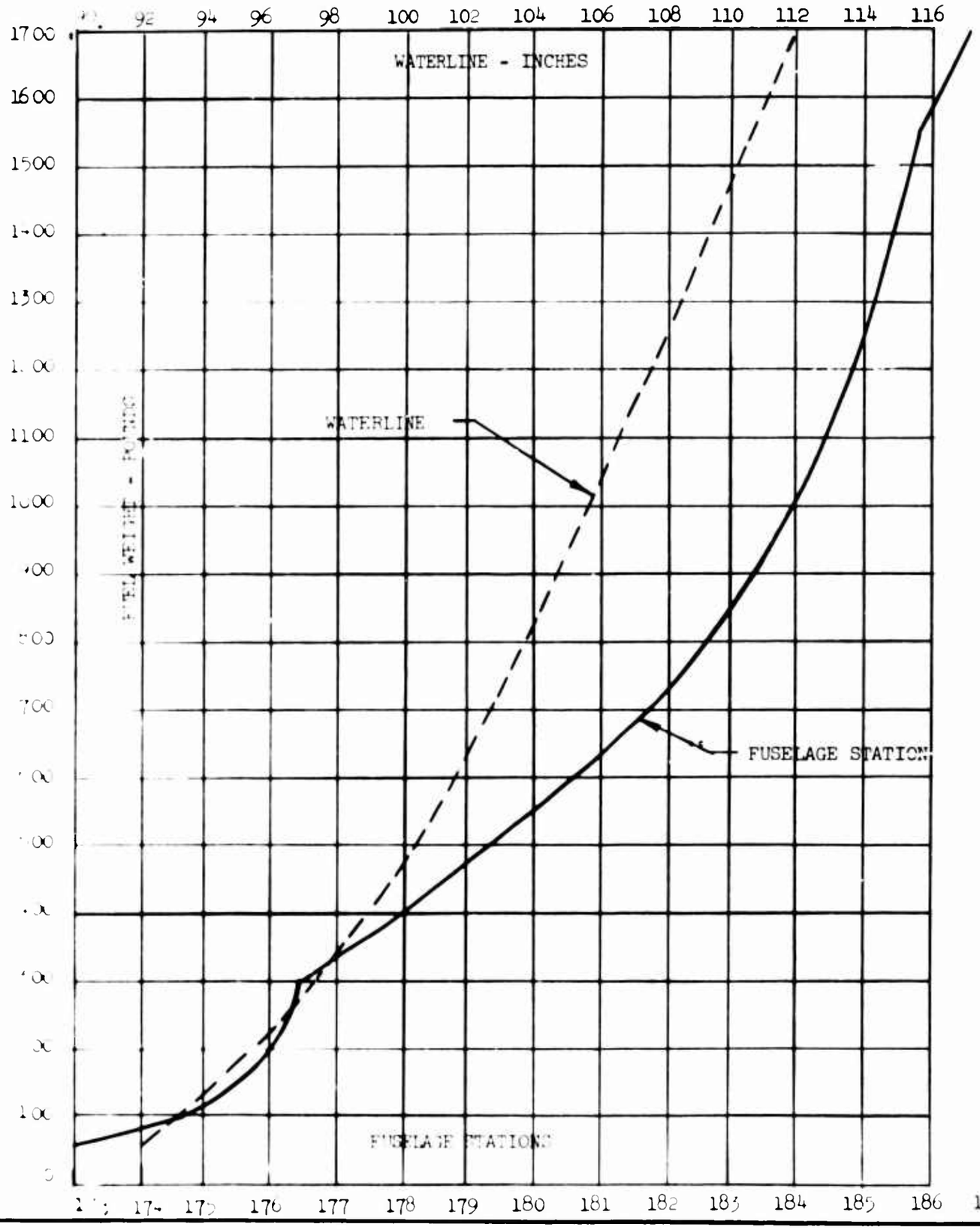
| | | | | |
|---|---|---|---|---|
| RETRACTED TO VTOL | | | | |
| Retracted Main and Nose | | | 85044 | 26477 |
| VTOL Main and Nose | | | 78418 | 17630 |
| MOMENT CHANGE: RETRACTED TO VTOL | | | - 6626 | - 8847 |
| RETRACTED TO CTOL | | | | |
| Retracted Main and Nose | | | 85044 | 26477 |
| CTOL Main and Nose | | | 75139 | 17361 |
| MOMENT CHANGE: RETRACTED TO CTOL | | | - 9905 | - 9116 |
| VTOL Position | | | 78418 | 17630 |
| CTOL Position | | | 75139 | 17361 |
| △ MOMENT CHANGE: VTOL TO CTOL | | | - 3279 | - 269 |

2.9 Fuel Center of Gravity Graphs

FUEL CENTER OF GRAVITY TRAVEL

FWD. MAIN TANK

Figure 3



FUEL CENTER OF GRAVITY TRAVEL

AFT MAIN TANK

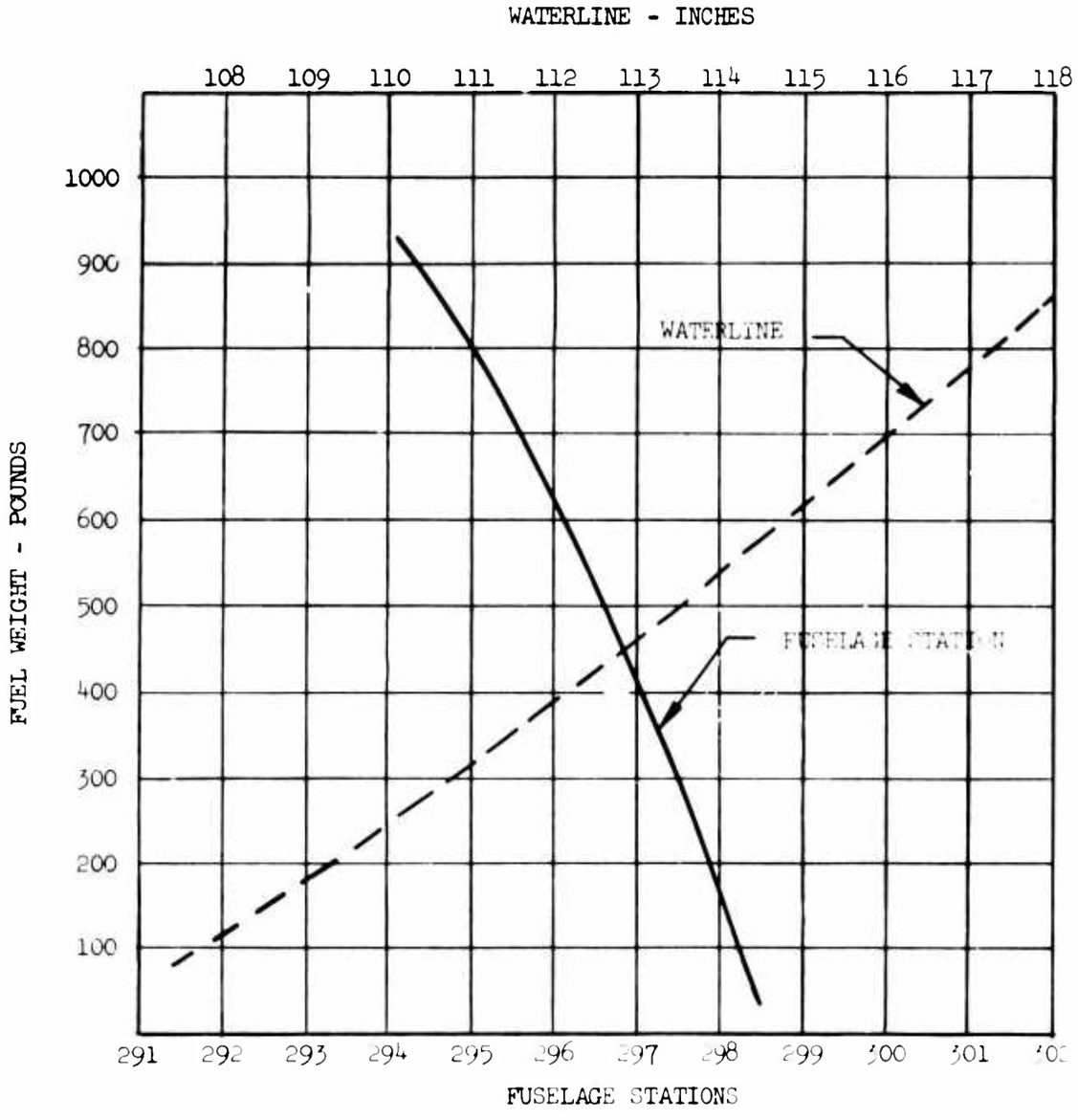



Figure 4

FUEL CENTER OF GRAVITY TRAVEL

DORSAL AUXILIARY FUEL TANK

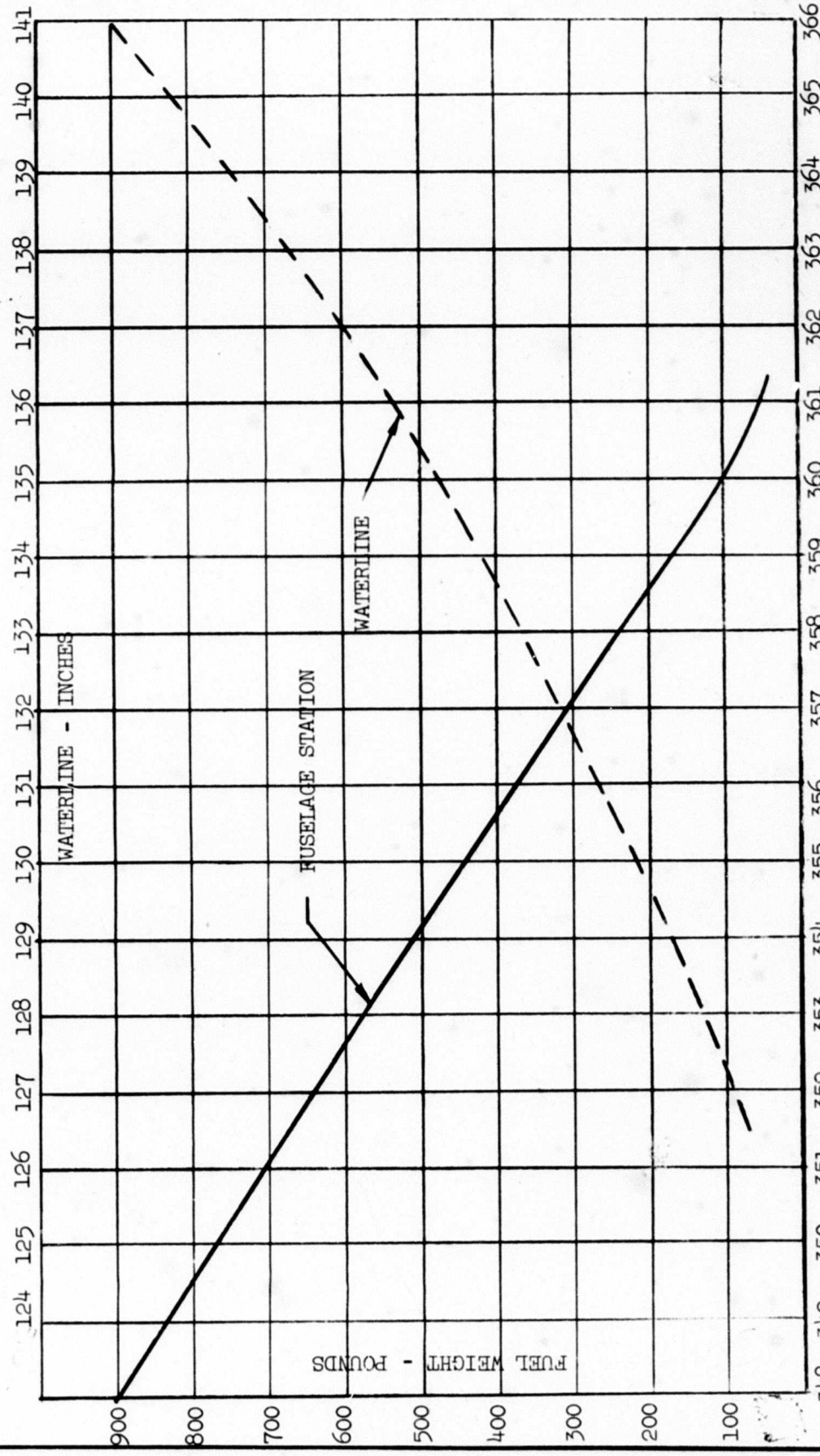



Figure 5

## 2.10 Gross Weight Balance Calculations

## GROSS WEIGHT - 45 MINUTE MISSION

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| WEIGHT EMPTY (Gear Up) | 7541 | 248.4 | 1873188 | 113 | 855864 |
| Crew | 180 | 137 | 24660 | 111 | 19980 |
| Fuel - Unusable - Fwd. | 30 | 172 | 5160 | 92 | 2760 |
| Fuel - Unusable - Aft | 15 | 302.9 | 4543 | 105 | 1575 |
| Oil - Trapped | 3 | 204 | 612 | 136 | 408 |
| Oil - Engine | 12 | 204 | 2448 | 136 | 1632 |
| Standard Instrumentation | 404 | 161.2 | 65171 | 102 | 41388 |
| Usable Fuel | | | | | |
| Forward Main Tank | 817 | 182.7 | 149266 | 104 | 84968 |
| Aft Main Tank | 818 | 294.9 | 241228 | 117 | 95706 |
| CROSS WEIGHT - 45 Minute Mission | 9820 | 240.9 | 2366276 | 112 | 1104281 |
| $\frac{240.9 - 211.14}{112.92}$ = | 26.4% M.A.C. | | | | |
| Extend Gear to VTOL Position | | | - 6626 | | - 8847 |
| GROSS WEIGHT - 45 Minute - VTOL | 9820 | 240.3 | 2359650 | 112 | 1095434 |
| $\frac{240.3 - 211.14}{112.92}$ = | 25.8% M.A.C. | | | | |
| Δ Change - Gear - VTOL to CTOL | | | - 3279 | | - 269 |
| GROSS WEIGHT - 45 Minute - CTOL | 9820 | 240.0 | 2356371 | 112 | 1095165 |
| $\frac{240.0 - 211.14}{112.92}$ = | 25.6% M.A.C. | | | | |

## GROSS WEIGHT - 20 MINUTE MISSION

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| WEIGHT EMPTY (Gear Up) | 7541 | 248.4 | 1873188 | 113 | 855864 |
| Crew | 180 | 137 | 24660 | 111 | 19980 |
| Fuel - Unusable - Fwd. | 30 | 172 | 5160 | 92 | 2760 |
| Fuel - Unusable - Aft | 15 | 302.9 | 4543 | 105 | 1575 |
| Oil - Trapped | 3 | 204 | 612 | 136 | 408 |
| Oil - Engine | 12 | 204 | 2448 | 136 | 1632 |
| Standard Instrumentation | 404 | 161.2 | 65171 | 102 | 41388 |
| Usable Fuel | | | | | |
| Forward Main Tank | 472 | 178.7 | 84346 | 100 | 47200 |
| Aft Main Tank | 473 | 296.7 | 140339 | 113 | 53449 |
| GROSS WEIGHT - 20 Minute Mission | 9130 | 241.0 | 2200467 | 112 | 1024256 |
| $\frac{241.0 - 211.14}{112.92}$ = | 26.4% M.A.C. | | | | |
| Extend Gear to VTOL Position | | | - 6626 | | - 8847 |
| GROSS WEIGHT - 20 Minute - VTOL | 9130 | 240.3 | 2193841 | 111 | 1015409 |
| $\frac{240.2 - 211.14}{112.92}$ = | 25.7% M.A.C. | | | | |
| Δ Change - Gear - VTOL TO CTOL | | | - 3279 | | - 269 |
| GROSS WEIGHT - 20 Minute - CTOL | 9130 | 240.0 | 2190562 | 111 | 1015240 |
| $\frac{240.0 - 211.14}{112.92}$ = | 25.6% M.A.C. | | | | |

## GROSS WEIGHT 9200 LBS. - INCLUDING INSTRUMENTATION

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| WEIGHT EMPTY (Gear Up) | 7541 | 248.4 | 1873188 | 113 | 855864 |
| Crew | 180 | 137 | 24660 | 111 | 19980 |
| Fuel - Unusable - Fwd. | 30 | 172 | 5160 | 92 | 2760 |
| Fuel - Unusable - Aft | 15 | 302.9 | 4543 | 105 | 1575 |
| Oil - Trapped | 3 | 204 | 612 | 136 | 408 |
| Oil - Engine | 12 | 204 | 2448 | 136 | 1632 |
| Standard Instrumentation | 404 | 161.2 | 65171 | 102 | 41388 |
| Usable Fuel | | | | | |
| Forward Main Tank | 507 | 179.3 | 90905 | 100 | 50700 |
| Aft Main Tank | 508 | 296.5 | 150622 | 114 | 57912 |
| GROSS WEIGHT - 9200 Lbs. (Gear Up) | 9200 | 241.0 | 2217309 | 112 | 1032219 |
| $\frac{241.0 - 211.14}{112.92}$ = | 26.4% M.A.C. | | | | |
| Extend Gear to VTOL Position | | | - 6626 | | - 8847 |
| GROSS WEIGHT - 9200 Lbs. - VTOL | 9200 | 240.3 | 2210683 | 111 | 1023372 |
| $\frac{240.3 - 211.14}{112.92}$ = | 25.8% M.A.C. | | | | |
| Δ Change - Gear - VTOL to CTOL | | | - 3279 | | - 269 |
| GROSS WEIGHT - 9200 Lbs. - CTOL | 9200 | 240.0 | 2207404 | 111 | 1023103 |
| $\frac{240.0 - 211.14}{112.92}$ = | 25.6% M.A.C. | | | | |

## GROSS WEIGHT 9200 LBS. - NO INSTRUMENTATION

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| WEIGHT EMPTY (Gear Up) | 7541 | 248.4 | 1873188 | 113 | 855864 |
| Crew | 180 | 137 | 24660 | 111 | 19980 |
| Fuel - Unusable - Fwd. | 30 | 172 | 5160 | 92 | 2760 |
| Fuel - Unusable - Aft | 15 | 302.9 | 4543 | 105 | 1575 |
| Oil - Trapped | 3 | 204 | 612 | 136 | 408 |
| Oil - Engine | 12 | 204 | 2448 | 136 | 1632 |
| Usable Fuel | | | | | |
| Forward Main Tank | 709 | 181.7 | 128825 | 103 | 73027 |
| Aft Main Tank | 710 | 295.5 | 209805 | 116 | 82360 |
| GROSS WEIGHT - 9200 Lbs. (Gear Up) | 9200 | 244.5 | 2249241 | 113 | 1037606 |
| $\frac{244.5 - 211.14}{112.92}$ = | 29.5% M.A.C. | | | | |
| Extend Gear to VTOL Position | | | - 6626 | | - 8847 |
| GROSS WEIGHT - 9200 Lbs. - VTOL | 9200 | 243.8 | 2242615 | 112 | 1028759 |
| $\frac{243.8 - 211.14}{112.92}$ = | 28.9% M.A.C. | | | | |
| Δ Change - Gear VTOL to CTOL | | | - 3279 | | - 269 |
| GROSS WEIGHT - 9200 Lbs. - CTOL | 9200 | 243.4 | 2239336 | 112 | 1028490 |
| $\frac{243.4 - 211.14}{112.92}$ = | 28.6% M.A.C. | | | | |

## GROSS WEIGHT - FULL FUEL INCLUDING AFT AUXILIARY TANK

| | WEIGHT | HORIZONTAL ARM | HORIZONTAL MOMENT | VERTICAL ARM | VERTICAL MOMENT |
|---|---|---|---|---|---|
| WEIGHT EMPTY (Gear Up) | 7541 | 248.4 | 1873188 | 113 | 855864 |
| Crew | 180 | 137 | 24660 | 111 | 19980 |
| Fuel - Unusable - Fwd. | 30 | 172 | 5160 | 92 | 2760 |
| Fuel - Unusable - Aft | 15 | 302.9 | 4543 | 105 | 1575 |
| Fuel - Unusable - Auxiliary | 10 | 298.5 | 2985 | 107 | 1070 |
| Oil - Trapped | 3 | 204 | 612 | 136 | 408 |
| Oil - Engine | 12 | 204 | 2448 | 136 | 1632 |
| Standard Instrumentation | 404 | 161.2 | 65171 | 102 | 41388 |
| Install Auxiliary Fuel Tank | 35 | 339.0 | 11865 | 140 | 4900 |
| ZERO FUEL - WITH AUX. AFT TANK | 8230 | 241.9 | 1990632 | 113 | 929577 |
| $\frac{241.9 - 211.14}{112.92}$ = | 27.2% M.A.C. | | | | |
| Usuable Fuel | | | | | |
| Forward Main Tank - 262 gal. | 1703 | 186.5 | 317610 | 112 | 190736 |
| Aft Main Tank - 134 gal. | 870 | 294.5 | 256215 | 111 | 96570 |
| Aft Auxiliary Tank - 126 gal. | 819 | 349.3 | 286077 | 124 | 101556 |
| TOTAL - FULL FUEL (Gear Up) | 11622 | 245.3 | 2850534 | 113 | 1318439 |
| $\frac{245.3 - 211.14}{112.92}$ = | 30.3% M.A.C. | | | | |
| Extend Gear to VTOL Position | | | - 6626 | | - 8847 |
| GROSS WEIGHT - FULL FUEL - VTOL | 11622 | 244.7 | 2843908 | 113 | 1309592 |
| $\frac{244.7 - 211.14}{112.92}$ = | 29.7% M.A.C. | | | | |
| Δ Change - Gear - VTOL to CTOL | | | - 3279 | | - 269 |
| GROSS WEIGHT - FULL FUEL - CTOL | 11622 | 244.4 | 2840629 | 113 | 1309323 |
| $\frac{244.4 - 211.14}{112.92}$ = | 29.5% M.A.C. | | | | |

2.11 Gross Weight Center of Gravity Graph

CENTER OF GRAVITY TRAVEL
DUE TO FUEL CONSUMPTION

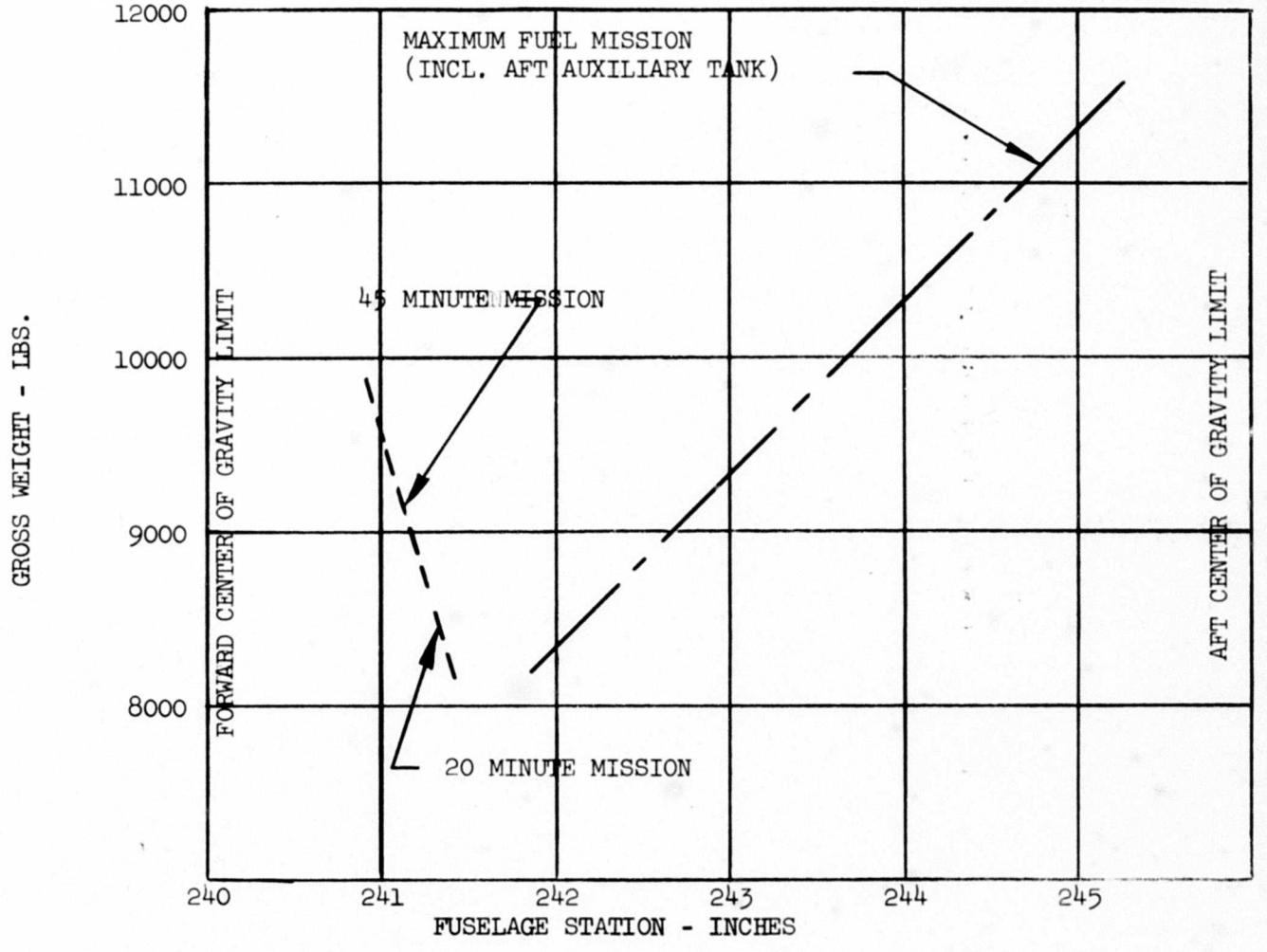



Figure 6

2.12 Contractor Responsibility Over Or Under Weight

## CONTRACTOR RESPONSIBLE OVERWEIGHT/UNDERWEIGHT

| | |
|---|---|
| Contracted aircraft weight including mock-up review changes | 7161 5 |
| Weight additions not contractor responsibility | |
| Ejection seat interchangeability | 15.0 |
| LW-2 seat increase over LW-1 seat | 63.5 |
| Total aircraft weight objective | 7240.0 |
| Calaculated empty weight per this report | 7541.0 |
| Contractor overweight | 301.0 |

# 3.0 MOMENT OF INERTIA

## 3.1 Gross Weight Moment of Inertia Summary

## SUMMARY OF MOMENT OF INERTIA VALUES

| | | * CONFIGURATION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | WEIGHT EMPTY (NO INSTRUMENTATION) | 20 MINUTE MISSION | 45 MINUTE MISSION | DESIGN GROSS WEIGHT 9200 LBS. | DESIGN GROSS WEIGHT 9200 LBS. (LESS INSTRUMENTATION) | ZERO FUEL INCLUDING AUXILIARY FUEL TANK | FULL FUEL INCLUDING AUXILIARY FUEL TANK |
| 1. | WEIGHT (POUNDS) | 7541 | 9130 | 9820 | 9200 | 9200 | 8230 | 11622 |
| 2. | HORIZONTAL C.G. (FUS.STA.) | 248.4 | 241.0 | 240.9 | 241.0 | 244.5 | 241.9 | 245.3 |
| 3. | VERTICAL C.G. (WATERLINE) | 113.5 | 112.2 | 112.5 | 112.2 | 112.8 | 112.9 | 113.4 |
| 4. | FUEL (POUNDS) | 0 | 945 | 1635 | 1015 | 1419 | 0 | 3392 |
| 5. | $I_{Y_o}$ (PITCH) SLUG-FT$^2$ | 14160 | 16614 | 17017 | 16660 | 15720 | 16032 | 19981 |
| 6. | $I_{X_o}$ (ROLL) SLUG-FT$^2$ | 4193 | 4313 | 4319 | 4316 | 4241 | 4306 | 4596 |
| 7. | $I_{Z_o}$ (YAW) SLUG-FT$^2$ | 16311 | 18780 | 19186 | 18824 | 17855 | 18193 | 22030 |
| 8. | $I_{XZ}$ (PRODUCT) SLUG-FT$^2$ | 946 | 1160 | 1206 | 1172 | 1082 | 1118 | 1708 |
| 9. | PRINCIPAL AXIS ANGLE THRU C.G. | $4^o26'$ | $4^o33'$ | $4^o36'$ | $4^o35'$ | $4^o31'$ | $4^o35'$ | $5^o32'$ |

* NOTE: All conditions include 404 lbs. of standard instrumentation equipment unless otherwise noted.

## 3.2 Fuselage Moment of Inertia

## MOMENTS OF INERTIA - FUSELAGE AND CONTENTS - WEIGHT EMPTY

| SECTION | FUS. STA. BOUNDARIES | WEIGHT | $\bar{X}$ | $\bar{Z}$ | $I_{x(Roll)}$ LBS. INCH$^2$ | $I_{y(Pitch)}$ LBS. INCH$^2$ | $I_{z(Yaw)}$ LBS. INCH$^2$ |
|---|---|---|---|---|---|---|---|
| 1 | -10 to 0 | .42 | - 2.2 | 94.0 | 3 | 2 | 2 |
| 5 | 0 10 | 2.33 | 4.8 | 93.9 | 49 | 42 | 41 |
| 15 | 10 20 | 7.95 | 16.5 | 94.0 | 182 | 175 | 172 |
| 25 | 20 30 | 2.14 | 25.2 | 94.0 | 321 | 165 | 184 |
| 35 | 30 40 | 17.22 | 35.8 | 92.5 | 4206 | 1436 | 2866 |
| 45 | 40 50 | 17.59 | 44.8 | 92.9 | 6230 | 2361 | 3908 |
| 55 | 50 60 | 31.60 | 56.0 | 98.1 | 13357 | 5515 | 8081 |
| 65 | 60 70 | 139.45 | 61.9 | 99.4 | 25196 | 17779 | 32647 |
| 75 | 70 80 | 33.01 | 76.5 | 92.2 | 14735 | 5997 | 9040 |
| 85 | 80 90 | 55.23 | 85.8 | 90.8 | 17137 | 7028 | 11320 |
| 95 | 90 100 | 87.62 | 95.6 | 98.1 | 37206 | 24466 | 15649 |
| 105 | 100 110 | 86.92 | 105.9 | 110.8 | 41368 | 24138 | 18635 |
| 115 | 110 120 | 90.74 | 114.5 | 103.7 | 62434 | 34399 | 29528 |
| 125 | 120 130 | 102.00 | 125.1 | 96.7 | 58335 | 33138 | 26505 |
| 135 | 130 140 | 81.89 | 134.6 | 99.8 | 51746 | 29564 | 23013 |
| 145 | 140 150 | 223.08 | 147.0 | 109.5 | 97375 | 52692 | 47057 |
| 155 | 150 160 | 180.79 | 155.6 | 104.9 | 94652 | 53449 | 43579 |
| 165 | 160 170 | 90.01 | 165.1 | 112.5 | 51545 | 31371 | 21057 |
| 175 | 170 180 | 104.53 | 174.3 | 121.3 | 58040 | 41795 | 17429 |
| 185 | 180 190 | 138.10 | 185.3 | 127.5 | 68095 | 53527 | 15195 |
| 195 | 190 200 | 102.36 | 194.2 | 123.0 | 57499 | 46074 | 12312 |
| 205 | 200 210 | 75.59 | 204.9 | 116.3 | 57657 | 44378 | 14189 |
| * 215 | 210 220 | 878.03 | 214.9 | 140.5 | 400270 | 252770 | 410076 |
| 225 | 220 230 | 72.17 | 224.5 | 111.4 | 48178 | 32883 | 16199 |
| 235 | 230 240 | 55.99 | 234.2 | 117.8 | 50694 | 36958 | 14487 |
| 245 | 240 250 | 73.33 | 244.4 | 110.8 | 53293 | 33516 | 21252 |
| ** 255 | 250 260 | 380.00 | 256.1 | 133.8 | 176573 | 442073 | 340928 |
| 265 | 260 270 | 54.13 | 264.5 | 120.4 | 42108 | 27927 | 15026 |
| 275 | 270 280 | 87.01 | 275.6 | 119.8 | 76909 | 58133 | 20384 |
| 285 | 280 290 | 165.53 | 285.5 | 113.4 | 133220 | 95878 | 39335 |
| 295 | 290 300 | 110.30 | 295.3 | 108.0 | 64523 | 41868 | 23945 |
| 305 | 300 310 | 114.00 | 305.0 | 102.8 | 71877 | 50464 | 23095 |
| 315 | 310 320 | 128.11 | 315.0 | 103.9 | 58285 | 39225 | 20411 |
| 325 | 320 330 | 99.07 | 324.7 | 101.8 | 41416 | 27676 | 15370 |
| 335 | 330 340 | 81.24 | 334.9 | 100.9 | 34854 | 21409 | 14380 |
| 345 | 340 350 | 60.14 | 344.0 | 103.9 | 31076 | 22112 | 9684 |
| 355 | 350 360 | 127.22 | 352.9 | 96.7 | 38275 | 21618 | 20512 |
| 365 | 360 370 | 31.71 | 365.2 | 107.2 | 18085 | 11853 | 6652 |
| 375 | 370 380 | 34.04 | 374.4 | 103.5 | 18589 | 11776 | 7380 |
| 385 | 380 390 | 27.39 | 384.7 | 105.5 | 14269 | 9056 | 5705 |
| 395 | 390 400 | 49.05 | 394.2 | 104.9 | 17973 | 12619 | 6050 |
| 405 | 400 410 | 29.99 | 404.2 | 105.9 | 11705 | 8258 | 3929 |
| 415 | 410 420 | 27.50 | 415.5 | 105.8 | 9583 | 6957 | 3045 |
| 425 | 420 430 | 18.53 | 424.4 | 110.3 | 7146 | 4984 | 2323 |
| 435 | 430 440 | 17.16 | 434.7 | 117.7 | 5263 | 3644 | 1782 |
| 445 | 440 450 | 11.34 | 444.5 | 111.7 | 2597 | 1353 | 1386 |

MOMENTS OF INERTIA - FUSELAGE AND CONTENTS - WEIGHT EMPTY (Continued)

| SECTION | FUS. STA. BOUNDARIES | WEIGHT | $\overline{X}$ | $\overline{Z}$ | $I_{x_{(Roll)}}$ LBS. INCH$^2$ | $I_{y_{(Pitch)}}$ LBS. INCH$^2$ | $I_{z_{(Yaw)}}$ LBS. INCH$^2$ |
|---|---|---|---|---|---|---|---|
| 455 | 450 to 460 | 42.99 | 455.6 | 112.5 | 3456 | 2281 | 1346 |
| 465 | 460 470 | 9.20 | 465.3 | 116.3 | 1273 | 904 | 444 |
| 475 | 470 480 | 28.79 | 472.8 | 111.7 | 950 | 733 | 480 |
| 485 | 480 490 | 15.06 | 485.7 | 110.6 | 613 | 510 | 224 |
| 495 | 490 500 | 7.70 | 494.8 | 111.0 | 110 | 99 | 46 |
| 505 | 500 510 | 9.24 | 504.6 | 110.7 | 195 | 229 | 48 |
| 515 | 510 520 | 3.47 | 513.8 | 113.5 | 8 | 16 | 16 |
| TOTAL | | 4520.0 | 227.4 | 116.4 | 3390265 | 42706268 | 40974346 |

* INCLUDES FORWARD ENGINE REACTION OF 705.63 Lbs.

** INCLUDES AFT ENGINE REACTION OF 217.37 Lbs.

3.3 Wing Moment of Inertia

MOMENTS OF INERTIA - WING AND CONTENTS - INCLUDING FLAP - LESS AILERON

WING AND CONTENTS - INCLUDING FLAP - LESS AILERON
DATA SHOWN FOR 1/2 WING
LIFT FAN AND MOVEABLE PORTION OF FAN DOORS ARE TREATED AS SEPARATE UNITS

| *WEIGHT PANEL NUMBER | WEIGHT POUNDS | $\bar{X}$ HORIZ. C.G. FUS STA | $\bar{Z}$ VERT. C. G. WATERLINE | $\bar{Y}$ SPAN C.G. BUTTOCK LINE | Iy PITCH LB. IN$^2$ | Ix ROLL LB. IN$^2$ | Iz YAW LB. IN$^2$ | Ixz PRODUCT LB. IN$^2$ | Ixy PRODUCT LB. IN$^2$ | Ixy PRODUCT LB. IN$^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.975 | 273.89 | 104.41 | 168.66 | 1963.2 | 111.8 | 2007.8 | 155.3 | 52.1 | 48.7 |
| 2 | 1.610 | 285.69 | 105.19 | 165.54 | 30.3 | 33.7 | 34.6 | -0.4 | 7.4 | 11.3 |
| 3 | 1.765 | 295.73 | 105.44 | 165.22 | 17.8 | 23.4 | 24.0 | 1.2 | 0.3 | 11.6 |
| 4 | 4.190 | 264.55 | 103.96 | 152.69 | 92.4 | 152.4 | 174.6 | -1.3 | -9.8 | 40.8 |
| 5 | 2.680 | 282.01 | 104.45 | 152.00 | 102.9 | 102.2 | 99.6 | 0.1 | 0 | 59.7 |
| 6 | 3.350 | 295.31 | 104.96 | 151.59 | 59.7 | 91.8 | 88.3 | 1.2 | -1.7 | 41.5 |
| 7 | 6.325 | 252.83 | 103.31 | 135.84 | 265.6 | 278.7 | 401.9 | 10.8 | 39.8 | 68.4 |
| 8 | 5.130 | 274.06 | 103.74 | 135.96 | 330.6 | 283.1 | 295.3 | 0 | 19.7 | 131.5 |
| 9 | 6.655 | 293.78 | 102.79 | 133.70 | 195.0 | 246.1 | 254.6 | -1.5 | -14.5 | 104.0 |
| 10 | 12.065 | 239.84 | 101.91 | 117.15 | 679.2 | 521.3 | 806.1 | 21.3 | 147.8 | 157.4 |
| 20 | 10.615 | 268.63 | 101.50 | 119.36 | 879.8 | 517.7 | 763.7 | -7.9 | 32.0 | 317.2 |
| 30 | 18.280 | 294.46 | 101.98 | 120.99 | 1611.7 | 630.1 | 1839.6 | 17.5 | 82.5 | 207.1 |
| 40 | 4.820 | 219.36 | 101.58 | 98.34 | 119.5 | 387.7 | 473.4 | -2.5 | 151.0 | 3.5 |
| 50 | 25.145 | 230.50 | 100.88 | 100.47 | 1187.1 | 1123.5 | 1369.1 | -51.6 | 193.7 | 281.9 |
| 60 | 18.390 | 262.19 | 101.42 | 101.14 | 1467.6 | 701.3 | 1343.2 | -5.1 | 67.2 | 369.5 |
| 70 | 27.580 | 296.25 | 100.09 | 100.74 | 3354.3 | 1267.5 | 3702.5 | -40.6 | -551.1 | 365.4 |
| 80 | 18.505 | 221.79 | 100.53 | 80.76 | 1141.3 | 864.3 | 1405.3 | -76.9 | 158.0 | 87.6 |
| 90 | 24.280 | 299.25 | 100.64 | 81.37 | 2481.9 | 754.6 | 2686.5 | 28.4 | -124.7 | 127.5 |
| 100 | 14.390 | 205.68 | 101.08 | 60.72 | 211.2 | 1128.4 | 1201.9 | -9.8 | 76.4 | 22.9 |
| 200 | 59.960 | 229.03 | 104.55 | 59.34 | 23084.4 | 9562.2 | 27679.8 | 5218.6 | -2285.4 | 1239.7 |
| 300 | 58.925 | 287.45 | 104.07 | 60.48 | 23711.8 | 3851.6 | 23017.1 | -5376.2 | -426.6 | 1194.9 |
| 400 | 7.865 | 195.12 | 100.54 | 30.39 | 313.5 | 274.0 | 439.2 | 12.8 | 119.3 | 2.6 |
| 500 | 23.425 | 215.51 | 101.01 | 41.85 | 1539.9 | 969.0 | 1572.7 | 58.7 | -99.1 | 119.4 |
| 600 | 28.960 | 301.48 | 100.52 | 41.99 | 2399.0 | 961.5 | 2798.6 | 37.4 | 336.5 | 67.2 |
| 700 | 19.590 | 216.41 | 100.75 | 27.81 | 1670.6 | 535.0 | 1462.6 | 63.7 | 5.5 | 77.3 |
| 800 | 4.170 | 255.65 | 103.12 | 26.15 | 772.4 | 147.5 | 707.0 | -39.3 | 31.9 | 27.0 |
| 900 | 32.305 | 298.94 | 100.20 | 28.03 | 2524.2 | 533.5 | 2366.2 | 69.8 | -9.5 | 59.1 |
| FAN | 815.930 | 256.00 | 101.00 | 56.05 | 406472.5 | 464411.5 | 625290.0 | | | |
| DOORS | 86.005 | 255.76 | 110.49 | 60.90 | 18165.1 | 18193.2 | 35922.0 | 52.7 | -0.8 | 115.5 |
| TOTAL | 1350.885 | 257.69 | 101.95 | 62.82 | 1,049,851 | 1,210,756 | 1,978,703 | -1567 | 121,196 | 10,293 |

*See Fig. 7

MOMENTS OF INERTIA - WING AND CONTENTS - EXCLUDING FLAP AND AILERON

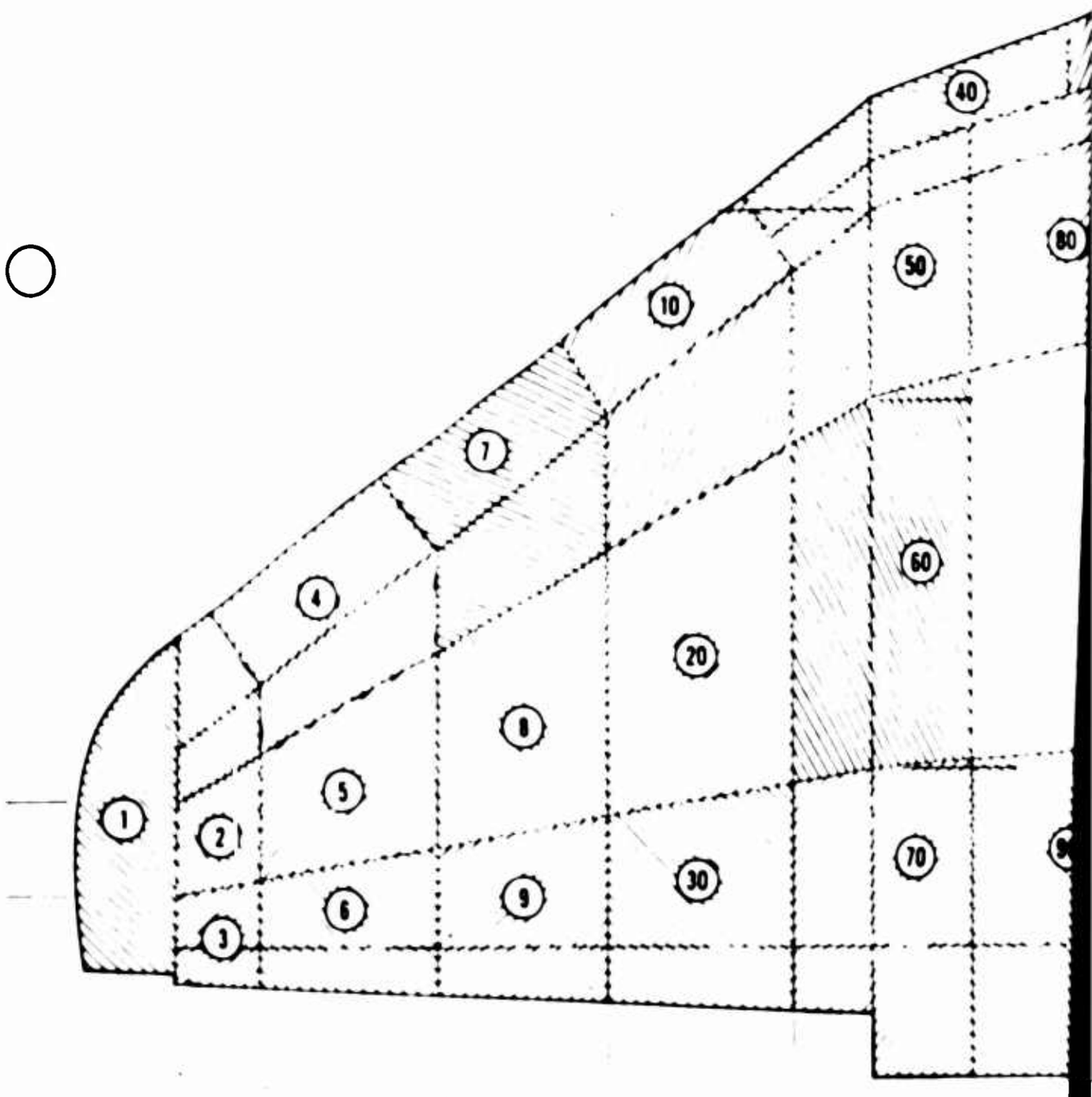
WING AND CONTENTS - EXCLUDING FLAP AND AILERON

DATA SHOWN FOR 1/2 WING

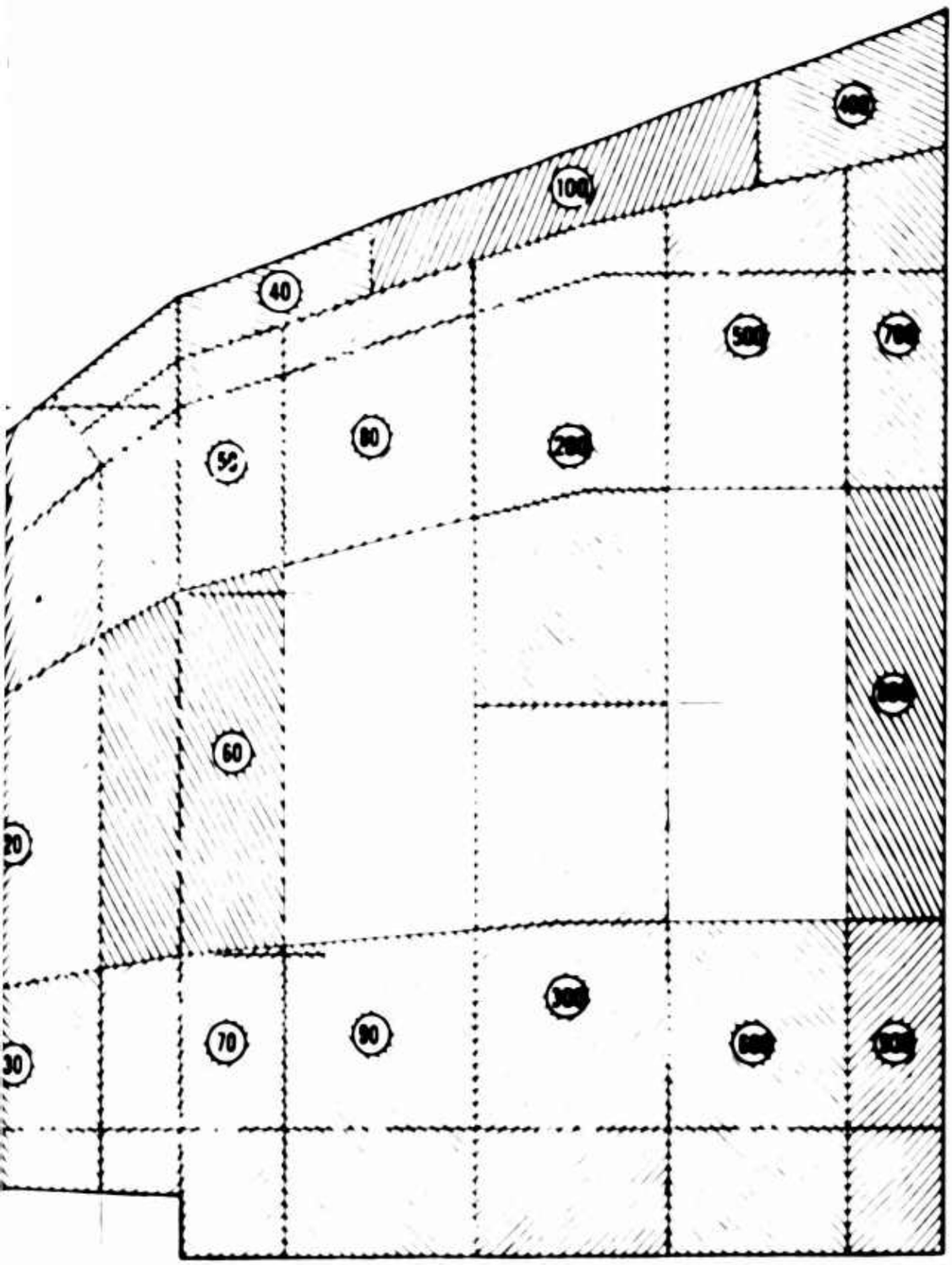
LIFT FAN AND MOVEABLE PORTION OF FAN DOORS ARE TREATED AS SEPARATE UNITS

| WEIGHT PANEL NUMBER * | WEIGHT POUNDS | $\bar{X}$ HORIZ. C.G. FUS. STA | $\bar{Z}$ VERT. C.G. WATERLINE | $\bar{Y}$ SPAN C.G. BUTTOCK LINE | Iy PITCH LB. IN$^2$ | Ix ROLL LB. IN$^2$ | Iz YAW LB. IN$^2$ | Ixz PRODUCT LB. IN$^2$ | Ixy PRODUCT LB. IN$^2$ | Iyz PRODUCT LB. IN$^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.975 | 273.89 | 104.41 | 168.66 | 1963.2 | 111.8 | 2007.8 | 155.3 | 52.1 | 48.7 |
| 2 | 1.610 | 285.69 | 105.19 | 165.54 | 30.3 | 33.7 | 34.6 | -0.4 | 7.4 | 11.3 |
| 3 | 1.765 | 295.73 | 105.44 | 165.22 | 17.8 | 23.4 | 24.0 | 1.2 | 0.3 | 11.6 |
| 4 | 4.190 | 264.55 | 103.96 | 152.69 | 92.4 | 152.4 | 174.6 | -1.3 | -9.8 | 40.8 |
| 5 | 2.680 | 282.01 | 104.45 | 152.00 | 102.9 | 102.2 | 99.6 | 0.1 | 0 | 59.7 |
| 6 | 3.350 | 295.31 | 104.96 | 151.59 | 59.7 | 91.8 | 88.3 | 1.2 | -1.7 | 41.5 |
| 7 | 6.325 | 252.83 | 103.31 | 135.84 | 265.6 | 278.7 | 401.9 | 10.8 | 39.8 | 68.4 |
| 8 | 5.130 | 274.06 | 103.74 | 135.96 | 330.6 | 283.1 | 295.3 | 0 | 19.7 | 131.5 |
| 9 | 6.655 | 293.78 | 102.79 | 133.70 | 195.0 | 246.1 | 254.6 | -1.5 | -14.5 | 104.0 |
| 10 | 12.065 | 239.84 | 101.91 | 117.15 | 679.2 | 521.3 | 806.1 | 21.3 | 147.8 | 157.4 |
| 20 | 10.615 | 268.63 | 101.50 | 119.36 | 879.8 | 517.7 | 763.7 | -7.9 | 32.0 | 317.2 |
| 30 | 18.280 | 294.46 | 101.98 | 120.99 | 1611.7 | 630.1 | 1839.6 | 17.5 | 82.5 | 207.1 |
| 40 | 4.820 | 219.36 | 101.58 | 98.34 | 119.5 | 387.7 | 473.4 | -2.5 | 151.0 | 3.5 |
| 50 | 25.145 | 230.50 | 100.88 | 100.47 | 1187.1 | 1123.5 | 1369.1 | -51.6 | 193.7 | 281.9 |
| 60 | 18.390 | 262.19 | 101.42 | 101.14 | 1467.6 | 701.3 | 1343.2 | -5.1 | 67.2 | 369.5 |
| 70 | 23.550 | 293.60 | 100.18 | 101.37 | 2129.0 | 1176.3 | 2394.5 | -126.9 | -385.5 | 354.0 |
| 80 | 18.505 | 221.79 | 100.53 | 80.76 | 1141.3 | 864.3 | 1405.3 | -76.9 | 158.0 | 87.6 |
| 90 | 18.325 | 294.87 | 100.83 | 81.49 | 983.9 | 689.7 | 1135.9 | 85.0 | -87.0 | 124.0 |
| 100 | 14.390 | 205.68 | 101.08 | 60.72 | 211.2 | 1128.4 | 1201.9 | -9.8 | 76.4 | 22.9 |
| 200 | 59.960 | 229.03 | 104.55 | 59.34 | 23084.4 | 9562.2 | 27679.8 | 218.6 | -2285.4 | 1239.7 |
| 300 | 52.145 | 284.14 | 104.59 | 60.45 | 18529.8 | 3580.5 | 17826.3 | -607.0 | -441.0 | 1193.0 |
| 400 | 7.865 | 195.12 | 100.54 | 30.39 | 313.5 | 274.0 | 439.2 | 12.8 | 119.3 | 2.6 |
| 500 | 23.425 | 215.51 | 101.01 | 41.85 | 1539.9 | 969.0 | 1572.7 | 58.7 | -99.1 | 119.4 |
| 600 | 20.940 | 297.19 | 100.70 | 41.54 | 918.6 | 880.4 | 1251.3 | 73.0 | 188.0 | 71.0 |
| 700 | 19.590 | 216.41 | 100.75 | 27.81 | 1670.6 | 535.0 | 1462.6 | 63.7 | 5.5 | 77.3 |
| 800 | 4.170 | 255.65 | 103.12 | 26.15 | 772.4 | 147.5 | 707.0 | -39.3 | 31.9 | 27.0 |
| 900 | 24.465 | 295.43 | 100.31 | 28.13 | 1178.5 | 493.3 | 1011.1 | 100.0 | 21.0 | 57.0 |
| FAN | 815.930 | 256.00 | 101.00 | 56.05 | 406472.5 | 464411.5 | 625290.0 | | | |
| DOORS | 86.005 | 255.76 | 110.49 | 60.90 | 18165.1 | 18193.2 | 35922.0 | 52.7 | -0.8 | 115.5 |
| TOTAL | 1318.265 | 256.34 | 102.00 | 62.97 | 950,685 | 1,190,771 | 1859,885 | 1979.5 | 131,983 | 9838 |

*See Fig.-


40
80
50
10
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8
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9
3

RYAN



BLANK PAGE

AILERON AND FLIGHT TAB MASS PROPERTIES AND MOMENTS OF INERTIA

## AILERON AND FLIGHT TAB MASS PROPERTIES AND MOMENTS OF INERTIA
DATA FOR ONE SIDE ONLY

PANEL BOUNDARIES ARE BUTTOCK LINES PARALLEL TO CENTER LINE OF AIRPLANE

| PANEL NO. * | PANEL BOUNDARIES BUTT.LINE | WEIGHT POUNDS | $\bar{X}$ PANEL C.G. FUS. STA. | $\bar{Z}$ PANEL C.G. WATERLINE | $\bar{Y}$ SPAN C.G. BUTT.LINE | $I_y$ PITCH $LB.IN^2$ | $I_x$ ROLL $LB.IN^2$ | $I_z$ YAW $LB.IN^2$ | $I_{xz}$ PRODUCT $LB.IN^2$ | $I_{xy}$ PRODUCT $LB.IN^2$ | $I_{yz}$ PRODUCT $LB.IN^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AILERON WITH FLIGHT TAB AND BALANCE WEIGHTS | | | | | | | | | | | |
| 101 | 102-116.3 | 5.850 | 312.27 | 101.52 | 108.24 | 302.7 | 74.0 | 355.4 | - 13.8 | 11.1 | 11.4 |
| 102 | 116.3-130.3 | 11.995 | 311.14 | 102.59 | 124.39 | 512.6 | 84.5 | 558.3 | - 30.5 | - 17.8 | 23.6 |
| 103 | 130.3-144.3 | 2.590 | 306.44 | 103.62 | 136.89 | 111.9 | 52.6 | 141.3 | - 0.5 | - 0.2 | 15.4 |
| 104 | 144.3-158.3 | 2.085 | 306.25 | 104.60 | 151.59 | 90.0 | 34.9 | 105.2 | 0.4 | 0.5 | 14.3 |
| 105 | 158.3-169.3 | 2.525 | 305.81 | 105.17 | 165.84 | 73.0 | 37.6 | 91.2 | - 1.6 | - 1.1 | 15.3 |
| 106 | 169.3-Tip | .995 | 306.74 | 105.82 | 172.79 | 29.4 | 6.7 | 31.2 | - 0.4 | - 0.9 | 1.1 |
| TOTAL | | 26.040 | 309.85 | 102.99 | 130.05 | 1323.0 | 9637.3 | 10750.9 | - 122.1 | - 1124.5 | 129.9 |
| AILERON LESS FLIGHT TAB AND BALANCE WEIGHTS | | | | | | | | | | | |
| 101 | 102-116.3 | 3.470 | 307.67 | 101.83 | 107.67 | 115.0 | 57.8 | 153.4 | - 2.2 | - 6.3 | 10.3 |
| 102 | 116.3-130.3 | 7.820 | 307.34 | 102.88 | 124.71 | 179.3 | 54.4 | 199.1 | - 5.4 | 6.3 | 20.9 |
| 103 | 130.3-144.3 | 2.590 | 306.44 | 103.62 | 136.89 | 111.9 | 52.7 | 141.3 | - 0.5 | - 0.2 | 15.4 |
| 104 | 144.3-158.3 | 2.085 | 306.25 | 104.60 | 151.59 | 90.0 | 34.9 | 105.2 | 0.4 | 0.5 | 14.3 |
| 105 | 158.3-169.3 | 2.525 | 305.81 | 105.17 | 165.84 | 73.0 | 37.6 | 91.2 | - 1.6 | - 1.1 | 15.3 |
| 106 | 169.3-Tip | .995 | 306.74 | 105.82 | 172.79 | 29.4 | 6.7 | 31.2 | - 0.4 | - 0.9 | 1.1 |
| TOTAL | | 19.485 | 306.93 | 103.42 | 133.96 | 634.1 | 8074.2 | 8532.0 | - 22.8 | - 224.8 | 111.8 |
| AILERON FLIGHT TAB WITH BALANCE WEIGHTS | | | | | | | | | | | |
| 101 | 102-116.3 | 2.380 | 318.98 | 101.08 | 109.07 | 6.4 | 12.7 | 18.7 | 0.3 | - 4.8 | .2 |
| 102 | 116.3-Tip | 4.175 | 318.28 | 102.04 | 123.80 | 5.6 | 25.8 | 31.0 | 0.1 | 3.1 | .3 |
| TOTAL | | 6.555 | 318.53 | 101.69 | 118.45 | 14.1 | 368.9 | 379.5 | - 0.6 | - 17.5 | 2.1 |
| FLIGHT TAB BALANCE WEIGHTS | | | | | | | | | | | |
| 101 | 102-116.3 | 1.39 | 317.8 | 101.0 | 110.0 | | | | | | |
| 102 | 116.3-Tip | 1.11 | 316.7 | 102.0 | 121.8 | | | | | | |
| TOTAL | | 2.50 | 317.3 | 101.5 | 115.2 | | | | | | |

* See Fig. 8

AILERON
MASS PANELS

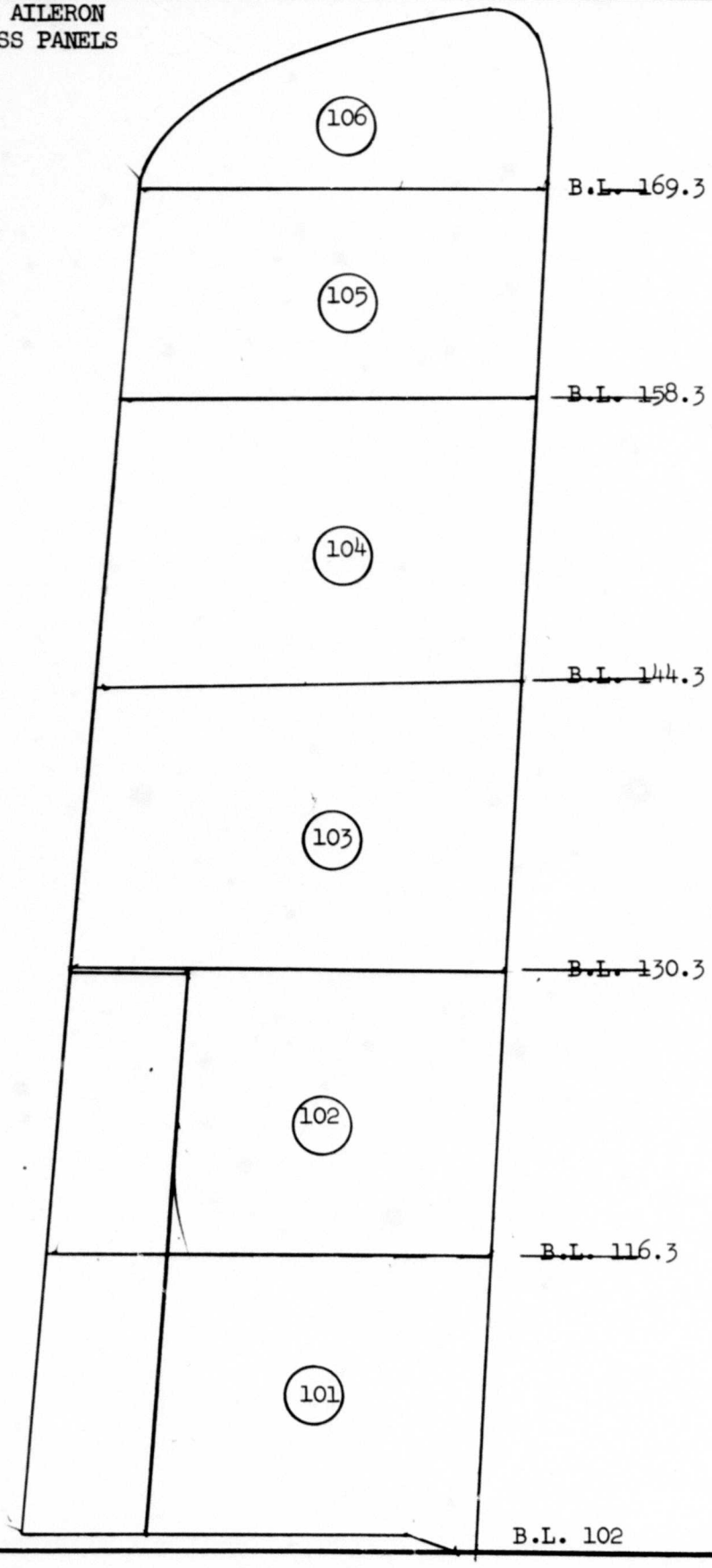



Fig. 8

## MOMENTS OF INERTIA - FLAP

DATA SHOWN FOR ONE SIDE

| WEIGHT PANEL NUMBER * | WEIGHT POUNDS | $\bar{X}$ HORIZ. C.G. FUS. STA | $\bar{Z}$ VERT. C.G. WATERLINE | $\bar{Y}$ SPAN C.G. BUTTOCK LINE | Iy PITCH LB. $IN^2$ | Ix ROLL LB. $IN^2$ | Iz YAW LB. $IN^2$ | Ixz PRODUCT LB. $IN^2$ | Ixy PRODUCT LB. $IN^2$ | Iyz PRODUCT LB. $IN^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 70 | 4.025 | 312.04 | 99.57 | 97.08 | 55.3 | 26.6 | 75.8 | 4.8 | -19.8 | 2.9 |
| 90 | 5.955 | 312.71 | 100.08 | 81.02 | 66.1 | 61.3 | 119.3 | 1.1 | 1.3 | 3.3 |
| 300 | 6.780 | 312.91 | 100.04 | 60.65 | 89.9 | 146.4 | 222.9 | 4.0 | -22.4 | 4.1 |
| 600 | 8.020 | 312.70 | 100.06 | 43.17 | 82.5 | 63.4 | 136.4 | 2.1 | 0.2 | 2.0 |
| 900 | 7.840 | 309.92 | 99.87 | 27.70 | 90.6 | 37.9 | 107.0 | 8.9 | 13.5 | 3.0 |
| TOTAL | 32.620 | 312.00 | 99.95 | 56.65 | 431.8 | 18587.5 | 18959.1 | 23.8 | 504.5 | 17.1 |

* See Fig. 7

FLAP
MASS PANELS

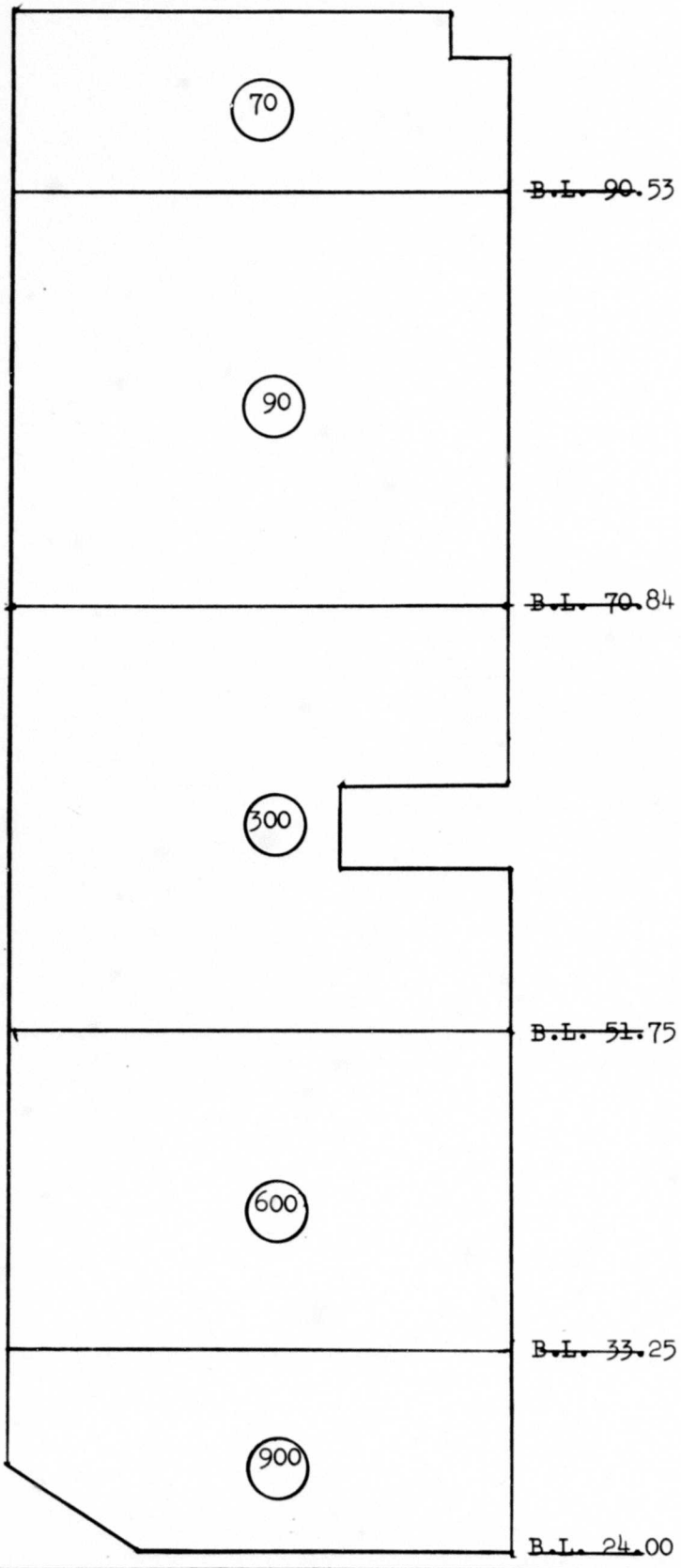



Fig. 9

## 3.4 HORIZONTAL TAIL MOMENT OF INERTIA

RYAN

HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION AND MOMENTS OF INERTIA

DATA FOR ONE SIDE ONLY

PANEL BOUNDARIES ARE BUTTOCK LINES PARALLEL TO CENTER LINE OF AIRPLANE

| PANEL NO. * | PANEL BOUNDARIES BUTTOCK LINE | WEIGHT ONE SIDE POUNDS | $\bar{X}$ PANEL C.G. FUS STA | $\bar{Y}$ PANEL C.G. BUTT. LINE | $\bar{Z}$ PANEL C.G. WATER LINE | $I_y$ PITCH LB.IN$^2$ | $I_x$ ROLL LB.IN$^2$ | $I_z$ YAW LB.IN$^2$ | $I_{xz}$ PRODUCT LB.IN$^2$ | $I_{xy}$ PRODUCT LB.IN$^2$ | $I_{yz}$ PRODUCT LB.IN$^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HORIZONTAL STABILIZER (EXCLUDING ELEVATOR) | | | | | | | | | | | |
| 101 | 0-6.51 | 9.375 | 499.95 | 2.36 | 204.43 | 2006.5 | 259.0 | 2042.4 | - 7.6 | - 36.8 | 1.1 |
| 102 | 6.51-13.21 | 3.650 | 495.72 | 10.00 | 205.85 | 524.9 | 23.1 | 514.6 | - 2.3 | 0 | 0.6 |
| 103 | 13.21-19.91 | 3.385 | 496.57 | 17.00 | 206.00 | 454.3 | 23.2 | 443.2 | .5 | 0 | 1.1 |
| 104 | 19.91-26.61 | 3.175 | 497.43 | 23.00 | 205.99 | 408.5 | 22.2 | 397.7 | - .1 | 0 | 1.4 |
| 105 | 26.61-33.31 | 3.230 | 498.00 | 30.05 | 206.00 | 359.0 | 21.0 | 351.5 | - .1 | 0 | 0 |
| 106 | 33.31-40.01 | 2.935 | 503.29 | 36.94 | 206.00 | 294.2 | 11.3 | 294.1 | - .1 | .7 | .8 |
| 107 | 40.01-46.71 | 2.195 | 502.22 | 43.00 | 206.00 | 184.9 | 10.7 | 183.5 | 0 | 0 | .9 |
| 108 | 46.71-53.41 | 2.065 | 503.04 | 50.00 | 206.00 | 157.6 | 9.8 | 156.7 | 0 | 0 | .9 |
| 109 | 53.41-60.11 | 1.875 | 503.90 | 57.00 | 206.00 | 128.1 | 8.9 | 127.4 | 0 | 0 | 1.1 |
| 110 | 60.11-66.81 | 1.770 | 504.89 | 63.03 | 206.01 | 106.3 | 8.0 | 106.0 | .1 | - .1 | 1.1 |
| 120 | 66.81-79.10 | 3.940 | 509.66 | 71.62 | 206.00 | 287.8 | 33.5 | 300.4 | 0 | 8.0 | .5 |
| TOTAL STAB. | | 37.595 | 500.87 | 29.07 | 205.59 | 5542.0 | 21224.8 | 26307.5 | 6.7 | 2859.8 | 26.1 |
| ELEVATOR | | | | | | | | | | | |
| 101 | 0-6.51 | 2.170 | 517.76 | 3.79 | 205.92 | 24.6 | 11.9 | 35.4 | 0 | -1.7 | 0 |
| 102 | 6.51-13.21 | 3.265 | 517.12 | 9.56 | 206.00 | 59.6 | 11.4 | 69.4 | 0 | 3.5 | 0 |
| 103 | 13.21-19.91 | 1.875 | 517.53 | 17.00 | 206.00 | 46.3 | 6.8 | 51.8 | 0 | 0 | 0 |
| 104 | 19.91-26.61 | 1.765 | 517.51 | 23.38 | 206.00 | 40.6 | 7.0 | 46.4 | 0 | -1.0 | 0 |
| 105 | 26.61-33.31 | 1.730 | 517.52 | 30.00 | 206.00 | 35.9 | 6.3 | 41.1 | 0 | 0 | 0.1 |
| 106 | 33.31-40.01 | 2.170 | 517.71 | 37.02 | 206.12 | 32.3 | 6.0 | 36.4 | -0.1 | -0.1 | 0.2 |
| 107 | 40.01-46.71 | 1.720 | 517.38 | 43.23 | 206.00 | 28.4 | 6.0 | 33.4 | 0 | -0.8 | 0.1 |
| 108 | 46.71-53.41 | 1.595 | 517.51 | 50.00 | 206.00 | 24.5 | 5.7 | 29.3 | 0 | 0 | 0.1 |

* See Fig. 10

HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION AND MOMENTS OF INERTIA

RYAN

HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION AND MOMENTS OF INERTIA

HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION AND MOMENTS OF INERTIA

DATA FOR ONE SIDE ONLY

PANEL BOUNDARIES ARE BUTTOCK LINES PARALLEL TO CENTER LINE OF AIRPLANE

| PANEL NO. * | PANEL BOUNDARIES BUTTOCK LINE | WEIGHT ONE SIDE POUNDS | $\bar{X}$ PANEL C.G. FUS STA | $\bar{Y}$ PANEL C.G. BUTT. LINE | $\bar{Z}$ PANEL C.G. WATER LINE | $I_y$ PITCH LB.IN$^2$ | $I_x$ ROLL LB.IN$^2$ | $I_z$ YAW LB.IN$^2$ | $I_{xz}$ PRODUCT LB.IN$^2$ | $I_{xy}$ PRODUCT LB.IN$^2$ | $I_{yz}$ PRODUCT LB.IN$^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEVATOR (Continued) | | | | | | | | | | | |
| 109 | 53.41-60.11 | 1.550 | 517.47 | 56.95 | 206.00 | 21.7 | 5.7 | 26.5 | 0 | -0.3 | 0.1 |
| 110 | 60.11-66.81 | 1.530 | 517.48 | 63.00 | 206.00 | 18.8 | 5.5 | 23.5 | 0 | 0 | 0.1 |
| 120 | 66.81-69.91 | 0.980 | 517.88 | 68.66 | 206.00 | 8.6 | 1.4 | 9.6 | 0 | 0.2 | 0.1 |
| TOTAL | | 20.350 | 517.50 | 31.98 | 206.00 | 342.3 | 8545.1 | 8875.0 | -0.1 | 22.66 | 0.7 |
| STABILIZER AND ELEVATOR | | | | | | | | | | | |
| 101 | 0-6.51 | 11.545 | 503.30 | 2.63 | 204.71 | 2593.9 | 278.4 | 2640.4 | 38.9 | 6.4 | 1.3 |
| 102 | 6.51-13.21 | 6.915 | 505.83 | 9.79 | 205.92 | 1373.2 | 34.9 | 1373.0 | 3.2 | -12.7 | 0.6 |
| 103 | 13.21-19.91 | 5.260 | 504.04 | 17.00 | 206.00 | 1030.6 | 30.0 | 1025.0 | 0.4 | 0 | 1.2 |
| 104 | 19.91-26.61 | 4.940 | 504.61 | 23.14 | 205.99 | 906.6 | 29.4 | 901.8 | 0.2 | 7.6 | 1.1 |
| 105 | 26.61-33.31 | 4.960 | 504.81 | 30.03 | 206.00 | 824.3 | 27.3 | 822.0 | -0.1 | 0.7 | 1.7 |
| 106 | 33.31-40.01 | 5.105 | 509.42 | 36.98 | 206.05 | 586.0 | 17.3 | 590.0 | 1.9 | 2.0 | 0.9 |
| 107 | 40.01-46.71 | 3.915 | 508.88 | 43.10 | 206.00 | 434.8 | 16.8 | 438.6 | 0 | 2.5 | 0.9 |
| 108 | 46.71-53.41 | 3.660 | 509.35 | 50.00 | 206.00 | 370.5 | 15.5 | 374.4 | 0.1 | 0 | 1.0 |
| 109 | 53.41-60.11 | 3.425 | 510.04 | 56.98 | 206.00 | 306.1 | 14.6 | 310.1 | 0 | -0.9 | 1.1 |
| 110 | 60.11-66.81 | 3.300 | 510.73 | 63.02 | 206.00 | 255.2 | 13.5 | 259.5 | 0 | -0.4 | 1.2 |
| 120 | 66.81-79.10 | 4.920 | 511.30 | 71.03 | 206.00 | 349.4 | 41.8 | 369.9 | 0 | -10.9 | 0.6 |
| TOTAL | | 57.945 | 506.71 | 30.09 | 205.74 | 9538.8 | 29884.0 | 38947.0 | 96.6 | 3521.9 | 27.9 |

* See Fig. 10

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RYAN

HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION

## HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION

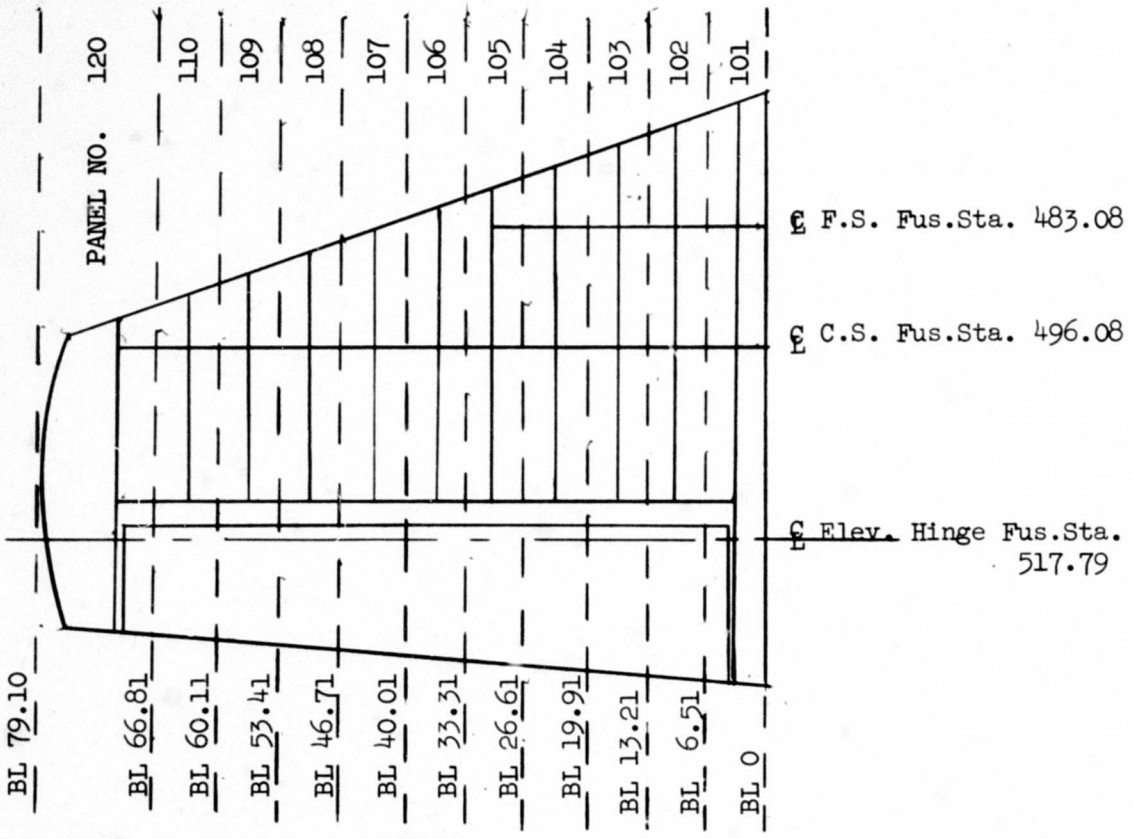
DATA FOR ONE SIDE ONLY
PANEL BOUNDARIES ARE BUTTOCK LINES PARALLEL TO CENTER LINE OF AIRPLANE

| PANEL NO. * | PANEL BOUNDARIES BUTTOCK LINE | WEIGHT ONE SIDE POUNDS | $\bar{X}$ FUS.STA. | $\bar{Y}$ BUTT.LINE | $\bar{Z}$ WATER LINE | |
|---|---|---|---|---|---|---|
| BALANCE WEIGHTS | | | | | | |
| 101 | 0-6.51 | .465 | 514.4 | 6.0 | 206.0 | |
| 102 | 6.51-13.21 | 1.480 | 514.4 | 9.3 | 206.0 | |
| 103 | 13.21-19.91 | .870 | 514.6 | 17.0 | 206.0 | |
| 104 | 19.91-26.61 | .810 | 514.7 | 23.7 | 206.0 | |
| 105 | 26.61-33.31 | .805 | 514.9 | 30.0 | 206.0 | |
| 106 | 33.31-40.01 | .680 | 515.0 | 37.0 | 206.0 | |
| 107 | 40.01-46.71 | .780 | 515.1 | 43.5 | 206.0 | |
| 108 | 46.71-53.41 | .675 | 515.3 | 50.0 | 206.0 | |
| 109 | 53.41-60.11 | .675 | 515.4 | 57.0 | 206.0 | |
| 110 | 60.11-66.81 | .670 | 515.6 | 63.0 | 206.0 | |
| 120 | 66.81-69.91 | .250 | 515.7 | 68.0 | 206.0 | |
| TOTAL | | 8.160 | 514.9 | 32.5 | 206.0 | |

* ... Fig. 10

HORIZONTAL STABILIZER

MASS PANELS




| SYMBOL | DEFINITION |
|---|---|
| $\bar{X}$ | HORIZONTAL CENTER OF GRAVITY OF ITEM |
| $\bar{Y}$ | SPANWISE CENTER OF GRAVITY OF ITEM |
| $\bar{Z}$ | VERTICAL CENTER OF GRAVITY OF ITEM |
| $I_x$ | MOMENT OF INERTIA ABOUT HORIZONTAL AXIS WITH RESPECT TO ITEM CENTER OF GRAVITY |
| $I_y$ | MOMENT OF INERTIA ABOUT SPANWISE AXIS WITH RESPECT TO ITEM CENTER OF GRAVITY |
| $I_z$ | MOMENT OF INERTIA ABOUT VERTICAL AXIS WITH RESPECT TO ITEM CENTER OF GRAVITY |
| $I_{xz}$ | PRODUCT OF INERTIA IN HORIZONTAL-VERTICAL PLANE WITH RESPECT TO ITEM CENTER OF GRAVITY |
| $I_{xy}$ | PRODUCT OF INERTIA IN HORIZONTAL-SPANWISE PLANE WITH RESPECT TO ITEM CENTER OF GRAVITY |
| $I_{yz}$ | PRODUCT OF INERTIA IN SPANWISE-VERTICAL PLANE WITH RESPECT TO ITEM CENTER OF GRAVITY |

Fig. 10

3.5 Vertical Tail Moment of Inertia

VERTICAL STABILIZER AND RUDDER MASS DISTRIBUTION AND MOMENTS OF INERTIA-PANEL BOUNDARIES ARE VERTICAL STABILIZER STATIONS PERPENDICULAR TO RUDDER HINGE LINE

| PANEL NO.* | PANEL BOUNDARIES STAB. STA. | WEIGHT POUNDS | $\bar{X}$ PANEL C.G. FUS. STA. | $\bar{Z}$ PANEL C.G. WATERLINE | $I_y$ PITCH LB. $IN^2$ | $I_x$ ROLL LB. $IN^2$ | $I_z$ YAW LB. $IN^2$ | $I_{xz}$ PRODUCT LB. $IN^2$ | |
|---|---|---|---|---|---|---|---|---|---|
| RUDDER INCLUDING BALANCE WEIGHTS | | | | | | | | | |
| 101 | 0-16.8 | 13.83 | 495.31 | 122.45 | 704.2 | 372.6 | 390.6 | - 94.5 | |
| 102 | 16.8-23.6 | 4.48 | 499.09 | 132.50 | 222.0 | 27.0 | 207.8 | - 39.1 | |
| 103 | 23.6-30.4 | 3.25 | 500.38 | 139.43 | 145.1 | 25.3 | 129.8 | - 33.6 | |
| 104 | 30.4-37.2 | 3.48 | 503.54 | 145.82 | 199.2 | 25.8 | 182.7 | - 40.4 | |
| 105 | 37.2-44.0 | 2.99 | 502.61 | 152.42 | 74.4 | 16.1 | 67.5 | - 10.5 | |
| 106 | 44.0-50.8 | 2.67 | 504.69 | 158.98 | 65.2 | 11.0 | 60.7 | - 6.0 | |
| 107 | 50.8-57.6 | 1.77 | 508.04 | 165.18 | 48.1 | 9.3 | 45.3 | - 6.1 | |
| 108 | 57.6-64.4 | 1.70 | 509.82 | 172.22 | 41.7 | 9.1 | 38.7 | - 5.3 | |
| 109 | 64.4-70.3 | 1.32 | 511.28 | 178.11 | 28.1 | 6.3 | 26.7 | - 4.6 | |
| 110 | 70.3-72.05 | 0.95 | 513.03 | 181.61 | 9.4 | 1.1 | 9.7 | - 1.2 | |
| TOTAL | | 36.44 | 500.63 | 140.52 | 15056.1 | 12997.9 | 2184.3 | 3301.2 | |
| STABILIZER AND RUDDER | | | | | | | | | |
| 101 | 0-16.8 | 26.90 | 481.68 | 127.27 | 11287.8 | 1681.2 | 9998.7 | -3020.8 | |
| 102 | 16.8-23.6 | 12.17 | 478.37 | 138.15 | 5796.6 | 541.8 | 5537.7 | -1340.7 | |
| 103 | 23.6-30.4 | 10.85 | 478.81 | 145.29 | 4642.9 | 441.5 | 4440.7 | -1061.6 | |
| 104 | 30.4-37.2 | 13.45 | 476.01 | 152.95 | 6475.5 | 551.2 | 6144.1 | -1515.7 | |
| 105 | 37.2-44.0 | 10.78 | 482.78 | 158.32 | 3771.0 | 391.6 | 3586.1 | - 806.8 | |
| 106 | 44.0-50.8 | 8.91 | 485.69 | 164.08 | 2852.3 | 274.7 | 2756.9 | - 612.9 | |
| 107 | 50.8-57.6 | 8.56 | 486.99 | 171.08 | 2431.6 | 235.4 | 2328.8 | - 526.7 | |
| 108 | 57.6-64.4 | 8.33 | 489.05 | 177.35 | 2129.8 | 199.2 | 2054.5 | - 442.2 | |
| 109 | 64.4-70.3 | 9.70 | 489.44 | 184.18 | 2158.1 | 201.2 | 2084.6 | - 435.7 | |
| 110 | 70.3-75.1 | 13.38 | 493.63 | 188.00 | 2876.3 | 253.5 | 2741.8 | - 626.8 | |
| 120 | 75.1-TOP | 31.14 | 492.59 | 196.52 | 4524.5 | 459.0 | 4215.2 | - 832.7 | |
| TOTAL | | 154.17 | 485.45 | 163.91 | 151166.0 | 101936.5 | 51402.5 | 8780.6 | |

* See Fig. 11

VERTICAL STABILIZER AND RUDDER MASS DISTRIBUTION AND MOMENTS OF INERTIA-PANEL BOUNDARIES ARE VERTICAL STABILIZER STATIONS PERPENDICULAR TO RUDDER HINGE LINE

| PANEL NO.* | PANEL BOUNDARIES STAB. STA. | WEIGHT POUNDS | $\bar{X}$ PANEL C.G. FUS. STA. | $\bar{Z}$ PANEL C.G. WATERLINE | $I_y$ PITCH LB. $IN^2$ | $I_x$ ROLL LB. $IN^2$ | $I_z$ YAW LB. $IN^2$ | $I_{xz}$ PRODUCT LB. $IN^2$ | |
|---|---|---|---|---|---|---|---|---|---|
| VERTICAL STABILIZER (EXCLUDING RUDDER) | | | | | | | | | |
| 101 | 0-16.8 | 13.07 | 467.26 | 132.37 | 4634.8 | 646.3 | 4321.4 | - 1055.2 | |
| 102 | 16.8-23.6 | 7.69 | 466.29 | 141.44 | 2303.6 | 288.6 | 2285.0 | - 471.7 | |
| 103 | 23.6-30.4 | 7.60 | 469.59 | 147.80 | 2179.7 | 256.7 | 2152.2 | - 441.3 | |
| 104 | 30.4-37.2 | 9.97 | 466.40 | 155.44 | 2478.8 | 286.4 | 2402.9 | - 553.3 | |
| 105 | 37.2-44.0 | 7.79 | 475.17 | 160.59 | 1925.3 | 231.4 | 1891.3 | - 312.0 | |
| 106 | 44.0-50.8 | 6.24 | 477.56 | 166.26 | 1311.7 | 164.7 | 1319.8 | - 237.7 | |
| 107 | 50.8-57.6 | 6.79 | 481.50 | 172.61 | 1316.8 | 148.4 | 1294.6 | - 243.6 | |
| 108 | 57.6-64.4 | 6.63 | 483.73 | 178.66 | 1110.6 | 133.7 | 1094.6 | - 209.1 | |
| 109 | 64.4-70.3 | 8.38 | 486.00 | 185.14 | 1344.7 | 138.7 | 1328.8 | - 228.6 | |
| 110 | 70.3-75.1 | 12.43 | 492.15 | 188.48 | 2440.4 | 210.6 | 2347.3 | - 499.0 | |
| 120 | 75.1-TOP | 31.14 | 492.59 | 196.52 | 4524.5 | 459.0 | 4215.2 | - 832.7 | |
| TOTAL | | 117.73 | 480.75 | 171.15 | 99005.3 | 62830.9 | 38221.3 | 22423.8 | |

* See Fig. 11

VERTICAL STABILIZER AND RUDDER MASS DISTRIBUTION AND MOMENTS OF INERTIA

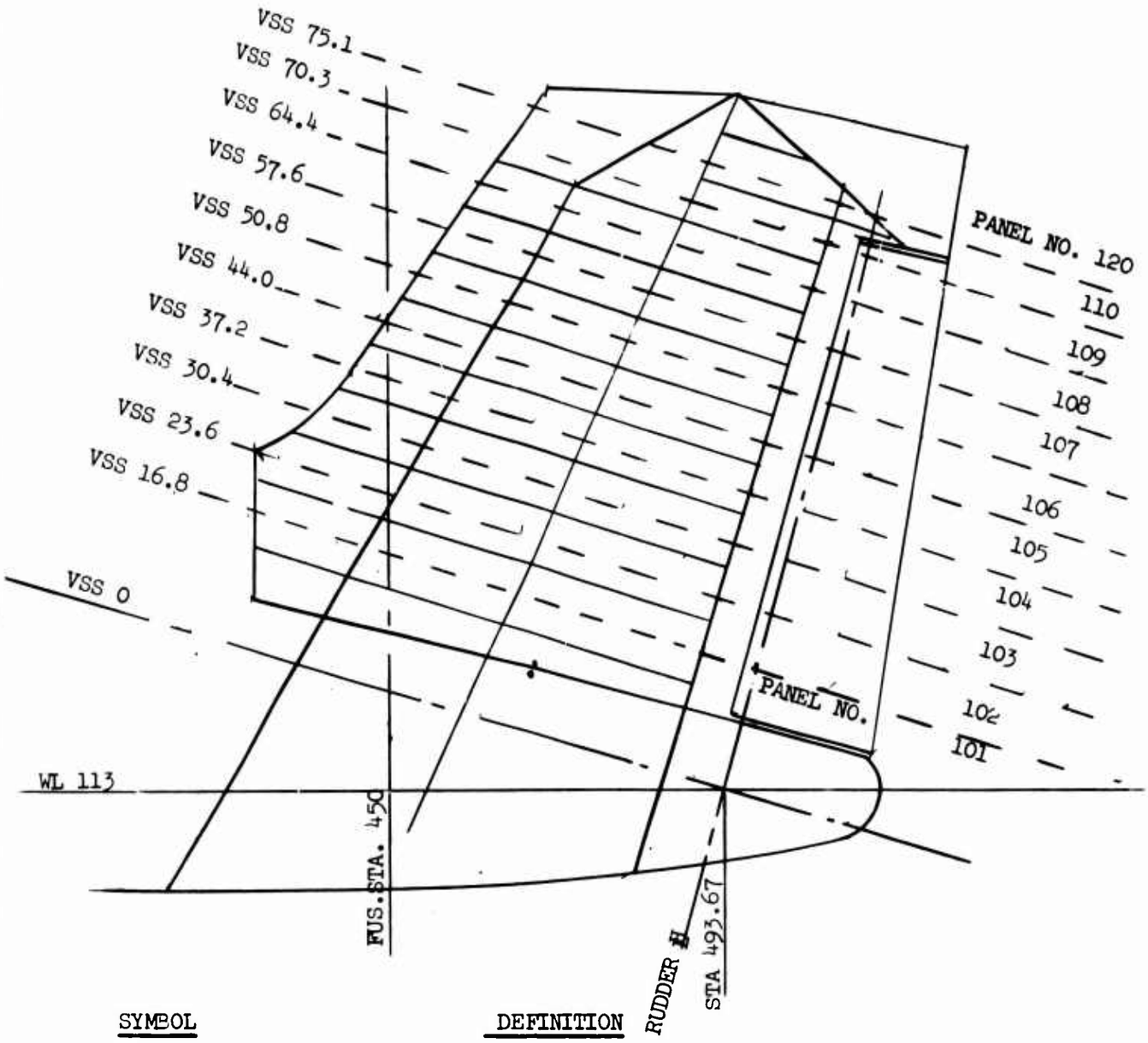
VERTICAL STABILIZER AND RUDDER MASS DISTRIBUTION
PANEL BOUNDARIES ARE VERTICAL STABILIZER
STATIONS PERPENDICULAR TO RUDDER HINGE LINE

| PANEL NO.* | PANEL BOUNDARIES STAB. STA. | WEIGHT POUNDS | $\bar{X}$ PANEL C.G. FUS. STA. | $\bar{Z}$ PANEL C.G. WATERLINE |
|---|---|---|---|---|
| BALANCE WEIGHTS | | | | |
| 101 | 0-16.8 | 1.87 | 492.0 | 129.0 |
| 102 | 16.8-23.6 | 1.88 | 493.5 | 133.4 |
| 103 | 23.6-30.4 | 1.49 | 495.8 | 141.0 |
| 104 | 30.4-37.2 | 1.56 | 497.9 | 147.4 |
| 105 | 37.2-44.0 | 1.66 | 499.9 | 153.0 |
| 106 | 44.0-50.8 | 1.41 | 501.8 | 159.2 |
| 107 | 50.8-57.6 | .52 | 503.9 | 166.0 |
| 108 | 57.6-64.4 | .52 | 506.0 | 173.0 |
| 109 | 64.4-70.3 | .45 | 508.1 | 179.0 |
| 110 | 70.3-72.05 | .11 | 509.1 | 182.0 |
| TOTAL | | 11.47 | 497.8 | 147.3 |

* See Fig. 11

VERTICAL STABILIZER

MASS PANELS




| SYMBOL | DEFINITION |
|---|---|
| $\bar{X}$ | Horizontal center of gravity of item (fuselage station). |
| $\bar{Y}$ | Longitudinal c.g. of item. Assumed to be Buttock Line Zero. |
| $\bar{Z}$ | Vertical Center of gravity of item (Water Line). |
| $I_x$ | Moment of inertia about horizontal axis with respect to item c.g. |
| $I_y$ | Moment of inertia about spanwise axis with respect to item c.g. |
| $I_z$ | Moment of inertia about vertical axis with respect to item c.g. |
| $I_{xz}$ | Product of inertia in horizontal-vertical plane with respect to item c.g. |

Fig. 11

3.6 Instrumentation Moment of Inertia

INSTRUMENTATION MOMENTS OF INERTIA

## INSTRUMENTATION MOMENTS OF INERTIA

| BREAKDOWN BY AREA | WEIGHT POUNDS | $\bar{X}$ FUS.STA. | $\bar{Z}$ WATER-LINE | $\bar{Y}$ BUTTOCK LINE | $I_x$ ROLL LB. $IN^2$ | $I_y$ PITCH LB. $IN^2$ | $I_z$ YAW LB. $IN^2$ |
|---|---|---|---|---|---|---|---|
| Wing | 28.41 | 250.27 | 100.90 | 70.65 | 25,144 | 14,698 | 39,752 |
| Fuselage | 458.11 | 147.88 | 101.76 | 0 | 124,314 | 2,490,045 | 2,546,841 |
| Horiz.Stab. | 1.88 | 498.50 | 194.13 | 35.26 | 3,257 | 1,918 | 1,553 |
| Vert. Stab. | 3.15 | 479.16 | 159.38 | 0 | 2,095 | 2,793 | 701 |
| Aileron | .07 | 317.70 | 102.00 | 126.00 | 0 | 0 | 0 |
| Rudder | .16 | 493.06 | 115.00 | 0 | 1 | 1 | 2 |
| Total Instru. | 491.78 | 157.41 | 102.44 | 0 | 326,395 | 3,386,973 | 3,585,300 |
| TOTAL INSTRU. MINUS PHOTO RECORDER, ACCELEROMETER INSTL. AND 2nd TELEMETRY PKG. | | | | | | | |
| Std. Config. | 404.22 | 160.04 | 102.37 | 0 | 310,710 | 2,617,941 | 2,813,730 |

# 4.0 SUPPLEMENTARY DATA

## 4.1 Component Weight Distribution

## COMPONENT WEIGHT DISTRIBUTION

The weight empty of this aircraft is comprised of the following:

| | |
|---|---|
| Ryan fabricated parts | 3289.99 lbs. |
| General Electric furnished components (including ejection seat) | 2792.28 lbs. |
| Purchased Parts | 1235.18 lbs. |
| Standard Parts (AN, NAS and MS) | 209.49 lbs. |

4.2 Material Breakdown

## SUMMARY OF RYAN FABRICATED PARTS

| | WEIGHT | * NO. OF PARTS |
|---|---|---|
| Aluminum | (1791.31) | (5320) |
| Sheet | 960.11 | 3915 |
| Extrusion | 46.45 | 205 |
| Chem-Milled | 132.50 | 41 |
| Honeycomb | 32.75 | 14 |
| Machined | 544.07 | 534 |
| Tubing | | |
| Hydraulic | 42.03 | 440 |
| Other | 33.40 | 171 |
| Magnesium | ( 224.75) | ( 327) |
| Sheet | 147.43 | 193 |
| Machined | 23.53 | 102 |
| Chem-Milled | 53.79 | 32 |
| Steel | ( 508.73) | (1006) |
| Sheet | 309.83 | 518 |
| Machined | 106.39 | 297 |
| Tubing | 83.38 | 166 |
| Wire | 2.27 | 20 |
| Control Cable | 6.86 | 5 |
| Titanium | ( 295.34) | ( 648) |
| Sheet | 240.22 | 559 |
| Machined | 16.27 | 78 |
| Chem-Milled | 38.85 | 11 |
| Fiberglass | 219.36 | 175 |
| Plastic | 1.83 | 21 |
| Rubber | 9.66 | 51 |
| Corefill | 1.35 | 1 |
| Finish Paint | 11.25 | |
| Min-K Insulation | 35.99 | 38 |
| Teflon | 1.71 | 16 |
| Copper Wire | 96.88 | |
| Copper Bar | .11 | 2 |
| Fabric | 1.02 | 8 |
| Hydraulic Fluid | 31.62 | |
| Brass | .88 | 9 |

SUMMARY OF RYAN FABRICATED PARTS (Continued)

| | WEIGHT | * NO. OF PARTS |
|---|---|---|
| Foam | 3.39 | 6 |
| Neoprene | .96 | 8 |
| Tungston | 31.37 | 11 |
| Superoilite | .74 | 6 |
| Adhesive | 11.62 | |
| TOTAL | 3289.99 | 7653 |

* NOTE: "Part" means one particular design
(I.E. There may be many "pieces" of one "part")
Left and right hand items are treated as separate parts.

## 4.3 Weighing Procedure

## WEIGHING PROCEDURE

1. PRE-WEIGHING INVENTORY

   A. Fwd and Aft Main Fuel tanks will be drained through sumps until only trapped fuel remains. Airplane is in level position for this operation.

   B. Engine oil tanks are serviced to the prescribed four quart level per tank.

   C. Hydraulic reservoirs should be serviced to the operational level.

   D. A wet battery installed.

   E. All access panels, canopies, etc. will be in place with full complement of fasteners.

   F. A visual count of all flight test equipment will be made to determine exact weight of configuration being used.

   G. A similar check will be made to assure that all basic airplane equipment is aboard.

   H. All control surfaces will be in a faired position and all louvers shut.

   I. A list will be made of ground locks, jack fittings, wheel chocks and any other tare item to be deducted from the scale weight.

2. POSITIONING AIRCRAFT ON SCALES

   A. When the portable platform type scales are used, it is recommended that the aircraft be towed until main gear wheels are each positioned on scales. Then jack airplane at the wing and tail positions until a scale can be rolled in from the side under the nose wheel. This is required because of limited clearance between the bottom of nose fuselage and high point of scale.

   B. The left or right hand main landing gear door sill - 143F060 at fuselage station 287 to 365, waterline 93.25 and buttock line 24 - may be used as reference plane to level aircraft.

3. REFERENCE MEASUREMENTS

   After measuring oleo extensions, the corresponding fuselage stations for the centerline points of the nose and main gear axles may be obtained from the tables on the next page. For an actual verification of this wheel base dimension the following procedure should be employed. Connect the main gear jacking lugs with a taut wire and measure the distance from the nose axle centerline along a line perpendicular to the wire. Because the lugs are offset from the main gear axle centerlines, an increment of .17 inches must be added in the C.T.O.L. position and .30 inches subtracted in the V.T.O.L. position.

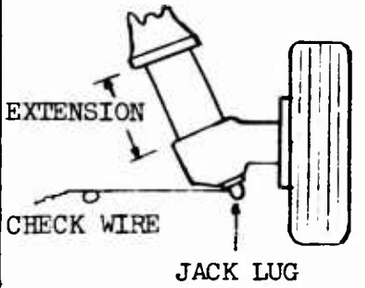
   Should electronic weighing cells be used, the wing jacking points are at fuselage station 226.5 and the tail jack is at 384.3.

NOSE GEAR EXTENSION
VS.
FUS. STA. AT ℄ OF AXLE

| | INCH | FUS.STA. |
|---|---|---|
| COMPR. | 0 | 136 11 |
| | 1 | 136.02 |
| | 2 | 135.93 |
| | 3 | 135.85 |
| | 4 | 135.76 |
| | 5 | 135.67 |
| STATIC | 5.3 | 135.61 |
| | 6 | 135.59 |
| | 7 | 135.50 |
| EXTEN. | 8 | 135.41 |

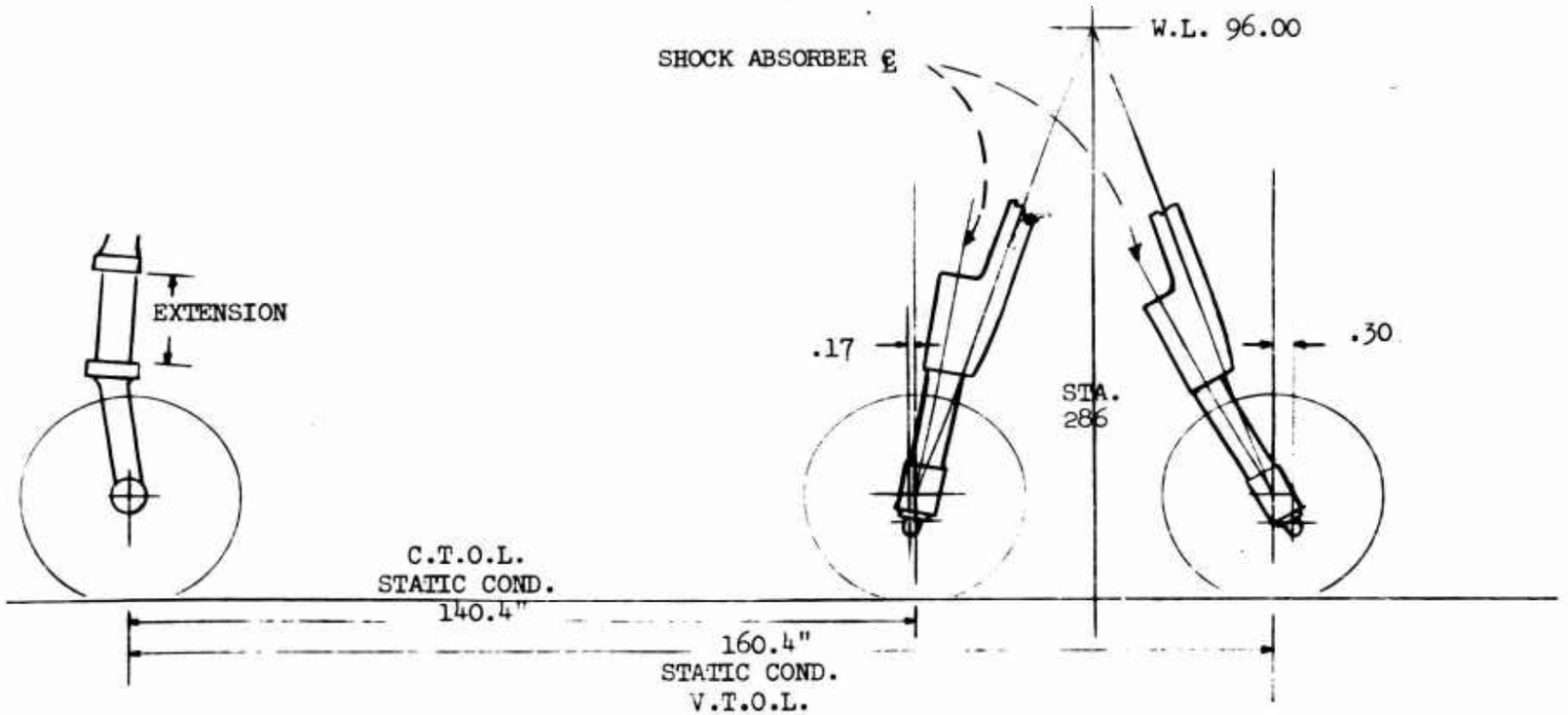
C.T.O.L. MAIN L.G. EXT.
VS.
FUS. STA. AT OF AXLE

| | INCH | FUS.STA. |
|---|---|---|
| COMPR. | 0 | 376.38 |
| | 1 | 276.26 |
| | 2 | 276.14 |
| STATIC | 3 | 276.02 |
| | 4 | 275.90 |
| | 5 | 275.78 |
| | 6 | 275.66 |
| | 7 | 275.53 |
| | 8 | 275.41 |
| EXTEN. | 9. | 275.29 |




V.T.O.L. MAIN L.G. EXT.
VS.
FUS. STA. AT OF AXLE

| | INCH | FUS.STA. |
|---|---|---|
| COMPR. | 0 | 295.32 |
| | 1 | 295.57 |
| | 2 | 295.81 |
| STATIC | 3 | 296.05 |
| | 4 | 296.29 |
| | 5 | 296.53 |
| | 6 | 296.78 |
| | 7 | 297.02 |
| | 8 | 297.26 |
| EXTEN. | 9 | 297.51 |



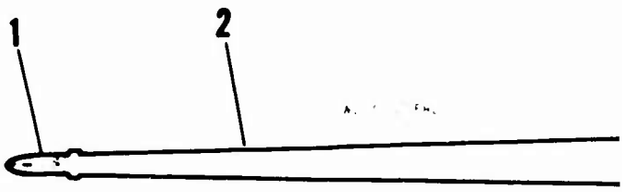

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1. FLOW DIRECTION INDICATOR AND PITOT STATIC TUBE
2. PITOT MAST
3. FIBERGLAS NOSE CONE
4. PITCH CONTROL FAN INLET BELLMOUTH
5. PITCH CONTROL FAN BELLMOUTH GUIDE VANE
6. GENERAL ELECTRIC X376 PITCH CONTROL FAN
7. PITCH CONTROL FAN SIDE MOUNT
8. PITCH CONTROL DOOR
9. PITCH CONTROL FAN SCROLL
10. PITCH CONTROL FAN AFT SUPPORT TRUSS
11. RUDDER PEDAL
12. THROTTLE CONTROL QUADRANT
13. PILOT'S CONTROL STICK
14. NOSE LANDING GEAR
15. PILOT'S EYE POSITION
16. PILOT'S EJECTION SEAT
17. AILERON CONTROL SYSTEM
18. PITCH CONTROL FAN DUCT, R.H.
19. HYDRAULIC EQUIPMENT BAY
20. ELECTRICAL EQUIPMENT BAY ACCESS DOOR
21. HYDRAULIC PUMP
22. FORWARD FUEL TANK SUMP
23. GENERATOR
24. FORWARD FUEL TANK
25. PITCH CONTROL FAN DUCT, L.H.
26. FIBERGLAS NACELLE AND INLET ASSEMBLY (REMOVABLE)
27. REMOVABLE CANOE
28. PITCH CONTROL FAN DUCT HANGER
29. WING ATTACH FITTING, FORWARD
30. FRONT ENGINE MOUNT
31. FIREWALL, ENGINE DIVIDER
32. GENERAL ELECTRIC J-85-5 E
33. LATERAL ENGINE MOUNT
34. ENGINE STARTING DUCT, R.H
35. ENGINE STARTING DUCT, L.H
36. DIVERTER VALVE ACTUATOR
37. DIVERTER VALVE, L.H.
38. MAIN ENGINE MOUNT
39. DIVIDER DUCT, L.H ENGINE
40. DIVIDER DUCT, R.H. ENGINE
41. FIREWALL, UPPER
42. FLEXIBLE SECTION, L.H.
43. FIREWALL, AFT
44. TAILPIPE SUPPORT LINK, FOI
45. TAILPIPE, L.H.
46. TAILPIPE SHROUD ASSEMBLY,
47. MAIN LANDING GEAR BAY
48. WING ATTACH FITTING, AFT
49. INTERMEDIATE FUEL TANK
50. AFT FUEL TANK
51. TAILPIPE SUPPORT LINK, AFT
52. THRUST ATTENUATOR DOOR
53. EXIT FAIRING
54. HORIZONTAL STABILIZER ACT
55. HORIZONTAL STABILIZER PIVO
56. HORIZONTAL STABILIZER
57. SPACE PROVISION FOR ANTI-S
58. RUDDER TRIM TAB
59. RUDDER



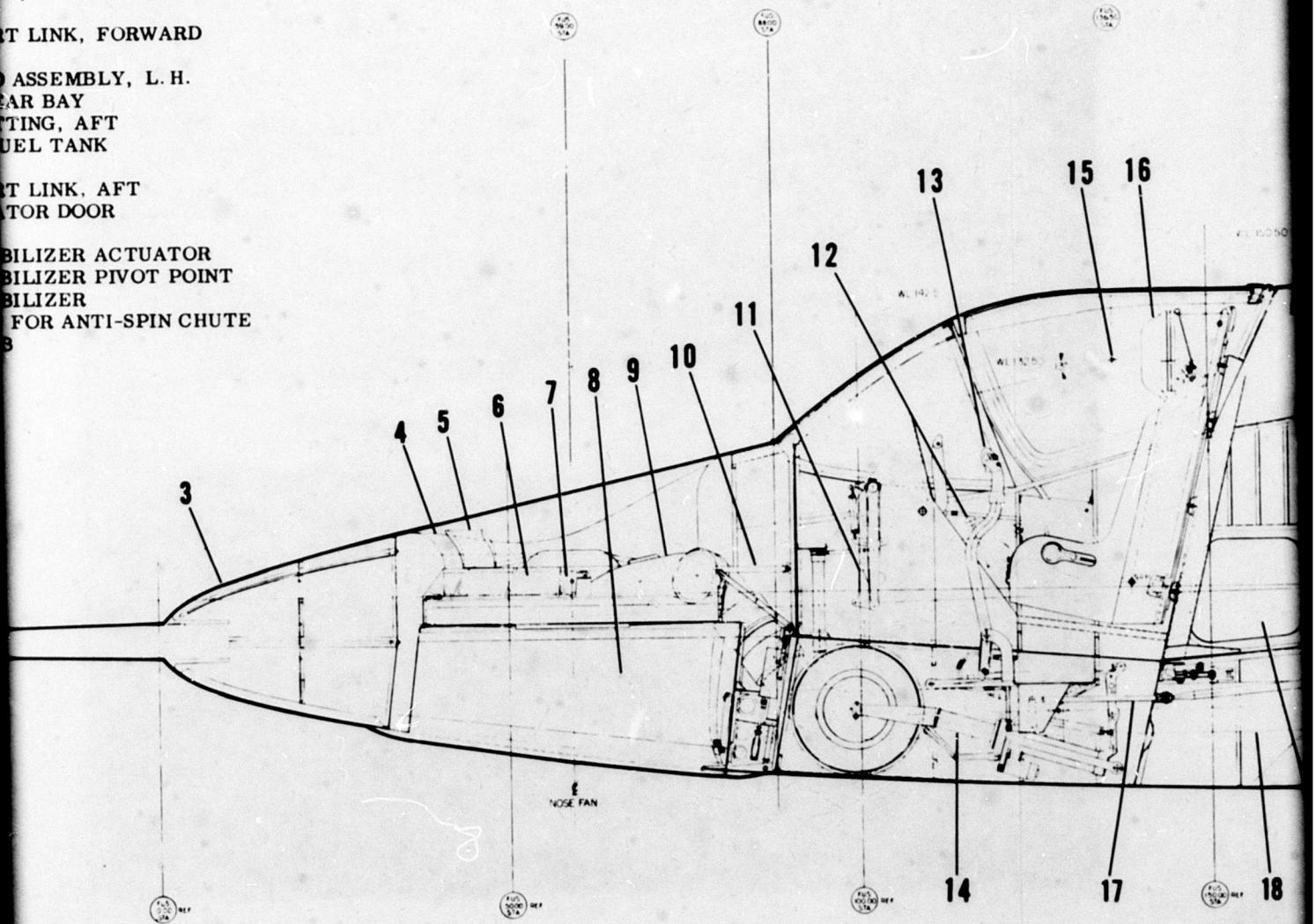
NE DIVIDER
RIC J-85-5 ENGINE, L.H.
MOUNT
G DUCT, R.H. ENGINE
G DUCT, L.H. ENGINE
ACTUATOR
, L.H.
UNT
.H. ENGINE
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R
ON, L.H.

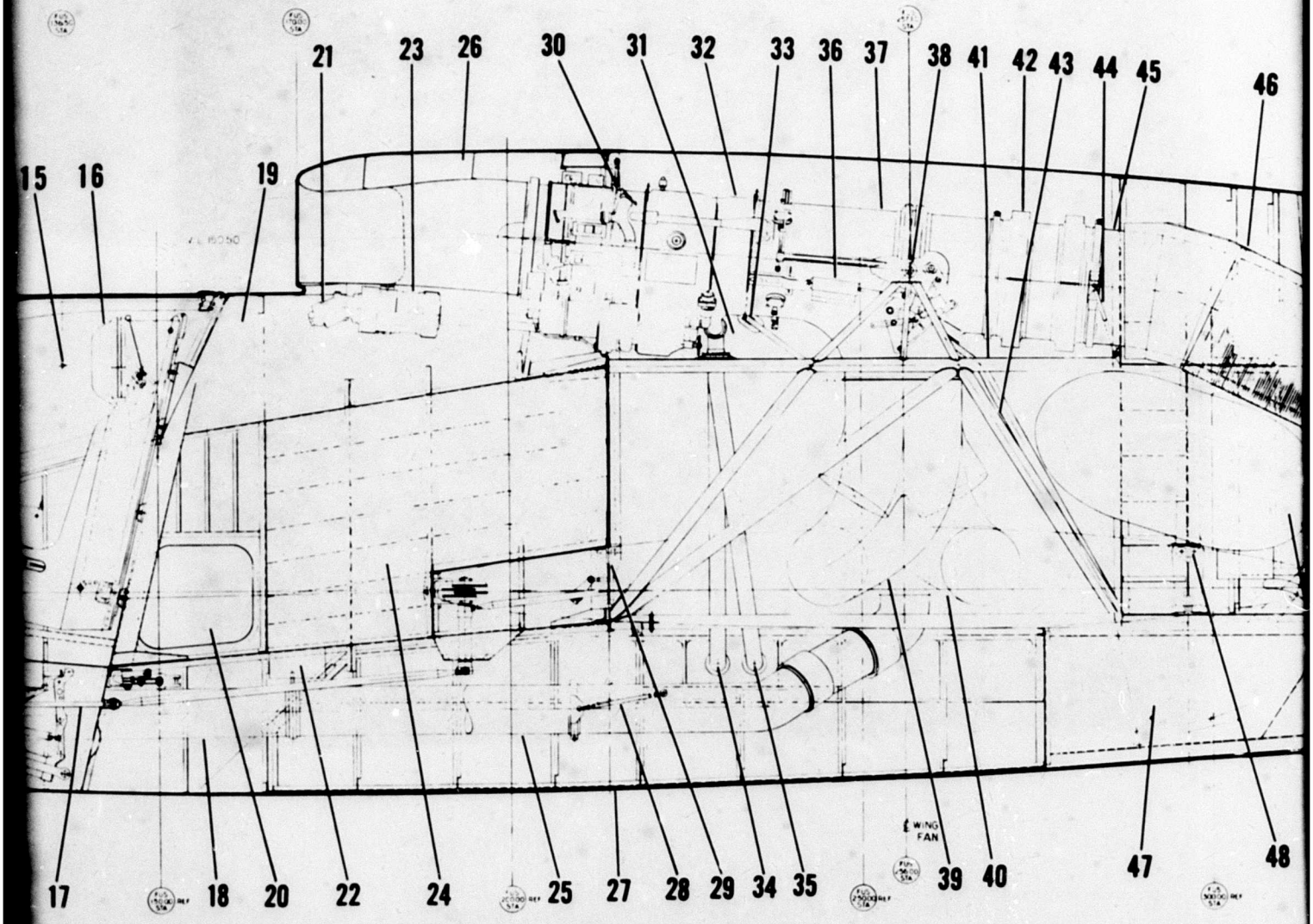
T LINK, FORWARD

ASSEMBLY, L.H.
AR BAY
TING, AFT
UEL TANK

T LINK, AFT
TOR DOOR

BILIZER ACTUATOR
BILIZER PIVOT POINT
BILIZER
FOR ANTI-SPIN CHUTE
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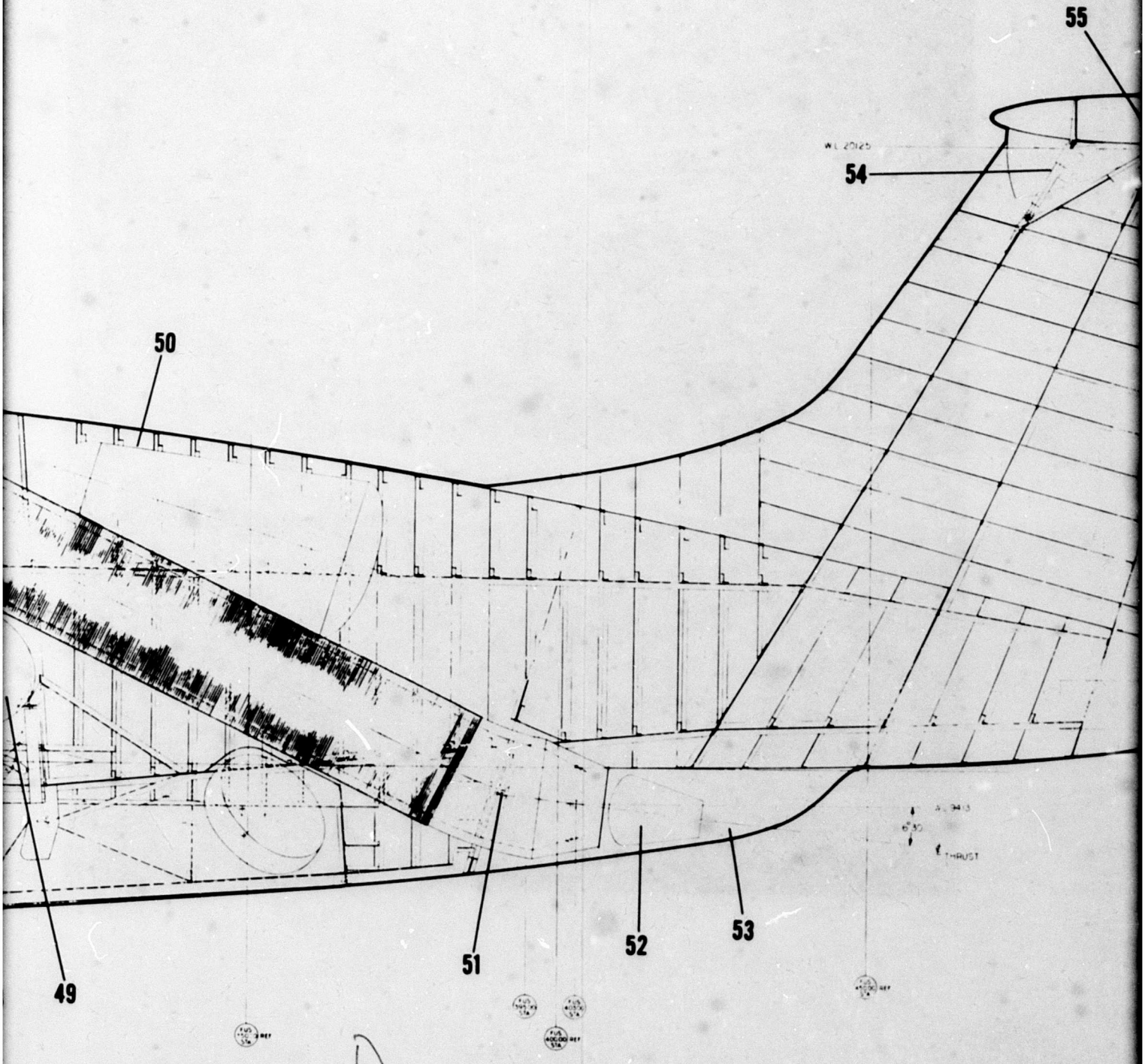



Figure 12 Inboard Profile

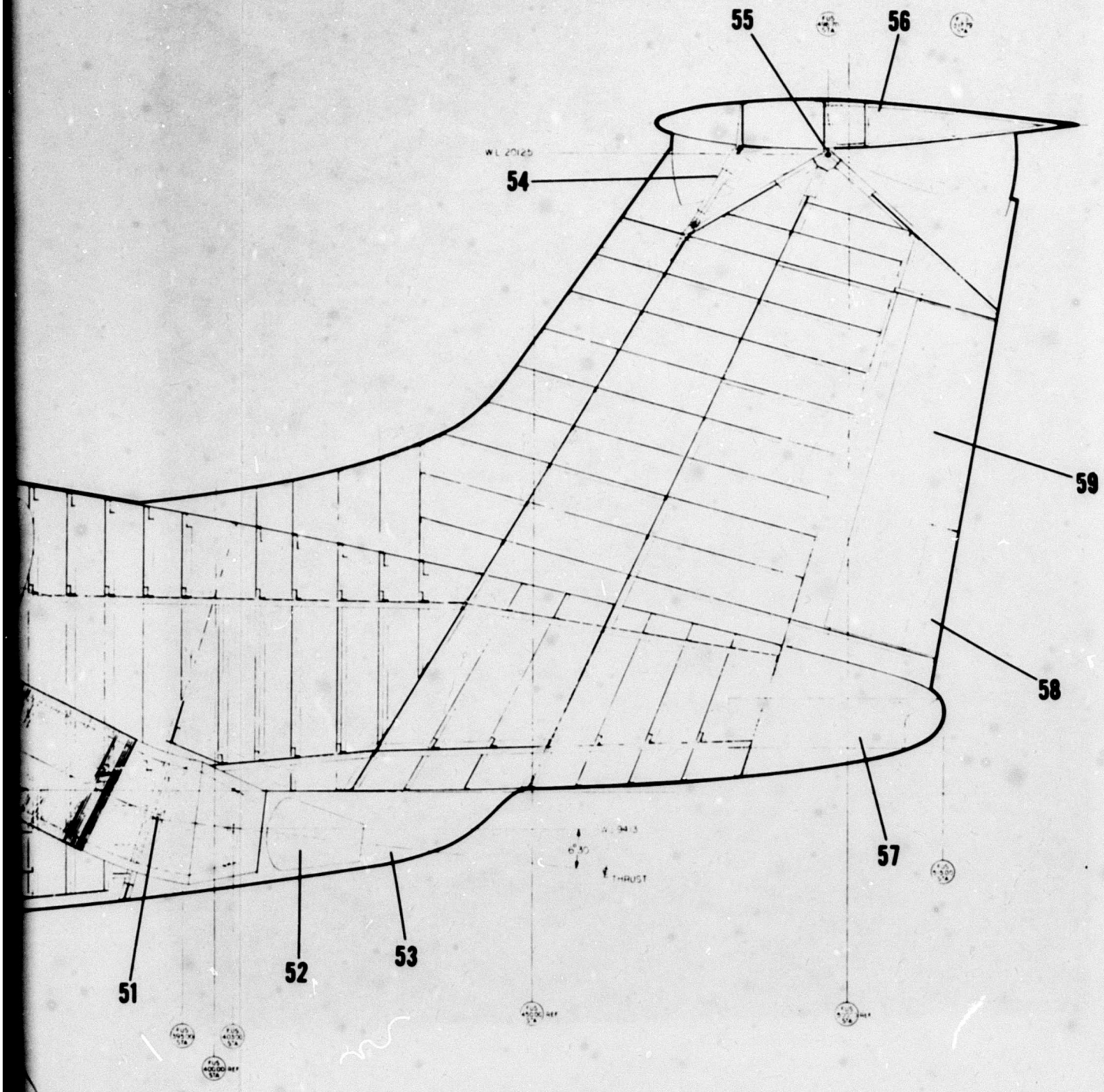



Figure 12 Inboard Profile