# 720

# AIRPLANE CHARACTERISTICS

## AIRPORT PLANNING

THE BOEING COMPANY
COMMERCIAL AIRPLANE DIVISION



D6-58323

## REVISIONS

## 720 AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

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| | 87-89 | |
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# 1.0 SCOPE AND INTRODUCTION

## 1.1 SCOPE

This document provides, in a standardized format, airplane characteristics data for general airport planning. Since operational practices vary among airlines, specific data should be coordinated with the using airlines prior to facility design. Boeing Commercial Airplanes should be contacted for any additional information required.

Content of the document reflects the results of the coordinated efforts by representatives from the following organizations:

- Aerospace Industries Association
- Airports Council International – North America
- Air Transport Association of America
- Air Transport Association of America
- International Air Transport Association

## 1.2 INTRODUCTION

This document conforms to NAS 3601. It provides characteristics of the Boeing Model 720 family of airplanes for airport operators, airlines, and engineering consultant organizations. Airplane changes and available options may alter model characteristics; the data presented herein reflect typical airplanes in each model category.

For additional information contact:

Boeing Commercial Airplanes
P.O. Box 3707
Seattle, WA 98124-2207
U.S.A.

Attention: Manager, Airport Technology
Mail Code: 20-93

## 1.3 A Brief Description and Comparison of the 720 and 720B Airplanes

The Model 720 and 720B airplanes are derivatives of the Model 707-100 series design which was, in turn, a derivative of the 707 prototype (Boeing Model 367-80). Both the 720 and 720B are passenger airplanes and are generally used on domestic routes although many 720B were built for overseas travel.

The 720 is essentially a lightened and shortened version of the 707-100 with lower takeoff and landing weights and less fuel capacity. The 720 wing is the same as that of the 707-100 except that additional leading-edge flaps were added to improve takeoff and landing performance. The same constant body section (height and width) used in the 707 family was used in the 720.

The 720B is the same as the 720 except that it has fan engines and a slightly greater fuel capacity, tail width, overall length and gross weight. Use of the fan engines resulted in a marked improvement in maximum payload, required takeoff field length, and design range.

The data on the following page provide an overall comparison of the 720, 720B, and 707-120B. (The 707-120B data are included because the 720 was a derivative of the 707-100 series.) Minor dimensional and/or performance differences may exist between airplanes of the same model as a result of customer option; however, the data presented reflects typical airplanes in each model category.

| MODEL | ENGINE TYPE | LENGTH | | SPAN | | BODY | | VERTICAL TAIL HEIGHT* | MAXIMUM RAMP WEIGHT |
|---|---|---|---|---|---|---|---|---|---|
| | | OVERALL | FUSELAGE | WING | TAIL | HEIGHT | WIDTH | | |
| | | FT IN. | FT IN. | FT IN. | FT IN. | FT IN. | FT IN. | FT IN. | LB |
| 720 | JT3C | 136 - 2 | 130 - 6 | 130 - 10 | 39 - 8 | 14 - 3 | 12 - 4 | 41 - 5 | 230,000 |
| 720B | JT3D | 136 - 9 | | | 43 - 4 | | | 41 - 2 | 235,000 |
| 707-120B** | JT3D | 145 - 1 | 138 - 10 | | | | | 41 - 8 | 258,000 |
| | | (METERS) | (METERS) | (METERS) | (METERS) | (METERS) | (METERS) | (METERS) | (KILOGRAMS) |
| 720 | JT3C | 41.50 | 39.78 | 39.88 | 12.10 | 4.33 | 3.76 | 12.62 | 104,400 |
| 720B | JT3D | 41.68 | | | 13.21 | | | 12.55 | 106,700 |
| 707-120B** | JT3D | 44.22 | 42.32 | | | | | 12.7 | 117,100 |

* HEIGHT ABOVE GROUND AT OPERATING EMPTY WEIGHT(O.E.W.)

** THE 707-120B IS SHOWN HERE FOR INFORMATION BECAUSE THE 720 IS A DERIVATIVE OF THE 707-100 SERIES.

707/720B COMPARISON

# 2.0 AIRPLANE DESCRIPTION

2.1 General Characteristics

2.2 General Dimensions

2.3 Ground Clearances

2.4 Interior Arrangements

2.5 Passenger Cabin Cross Section

2.6 **Lower Cargo Compartment Capacities**

2.7 Door Clearances

## 2.0 AIRPLANE DESCRIPTION

### 2.1 General Characteristics — Models 720 and 720B

(Definition of terms used on **Page 7**)

Maximum Ramp Weight. Maximum weight authorized for ground maneuver by the applicable government regulations, including taxi and runup fuel. Also designated in some manuals as maximum design taxi weight.

Maximum Landing Weight. Maximum weight authorized at touchdown by the applicable government regulations.

Maximum Takeoff Weight. Maximum weight authorized at takeoff brake release by the applicable government regulations and excludes taxi and runup fuel.

Operating Empty Weight. Weight of structure, power plant, furnishings, systems, unusable fuel and other unusable propulsion agents, and other items of equipment that are considered an integral part of a particular aircraft configuration. Also included are certain standard items, personnel, equipment, and supplies necessary for full operation, excluding fuel and payload.

Zero Fuel Weight. Maximum airplane weight less usable fuel, engine injection fluid, and other consumable propulsion agents. It may include usable fuel in specified tanks when carried in lieu of payload. The addition of usable and consumable items to the Zero Fuel Weight must be in accordance with the applicable government regulations so that airplane structure and airworthiness requirements are not exceeded.

Maximum Structural Payload. Consists of the maximum design payload weight of passengers, passenger baggage and/or cargo.

Maximum Seating Capacity. The maximum number of passengers specifically certified or anticipated for certification.

Maximum Cargo Volume. The maximum space available for cargo.

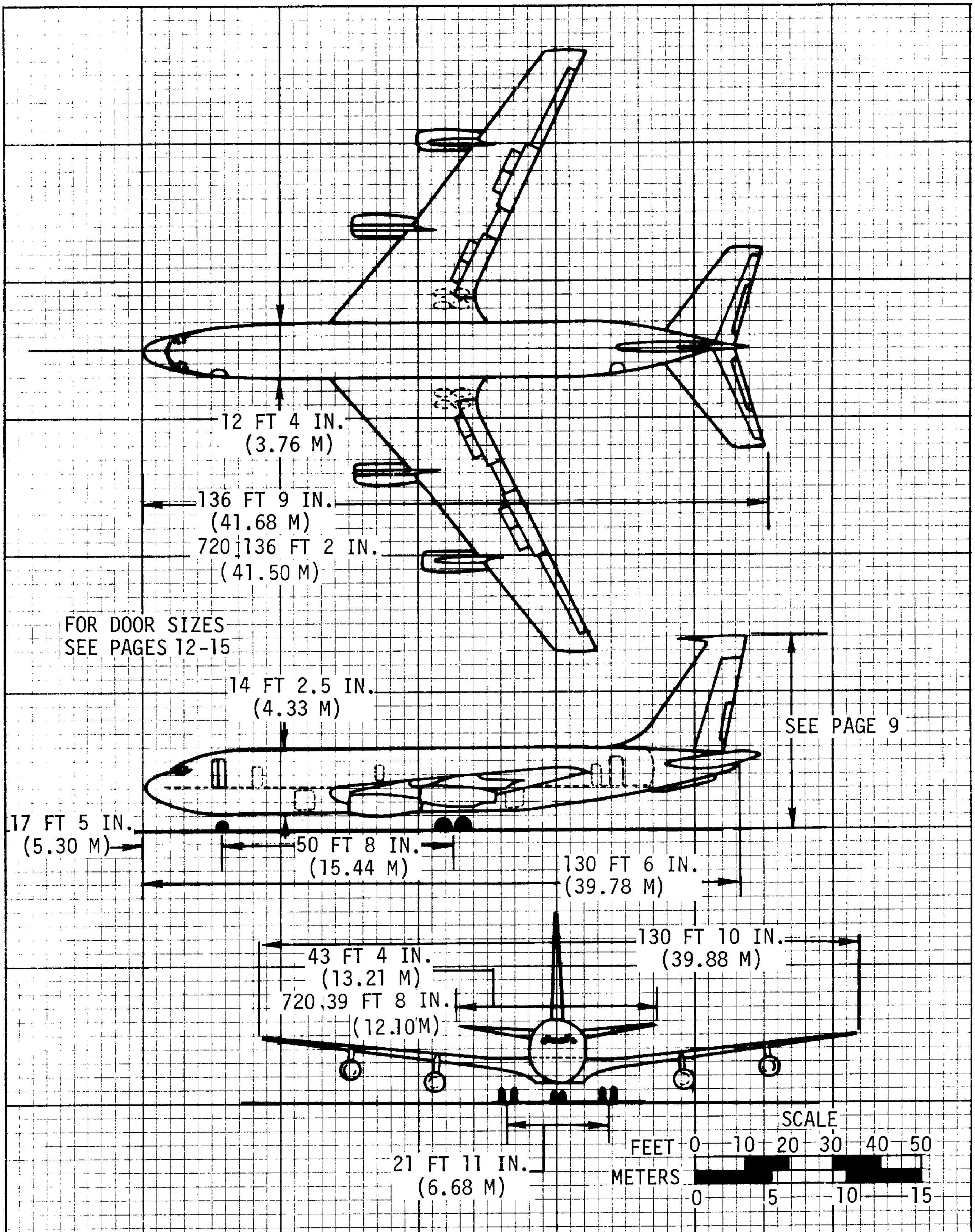
Usable Fuel Capacity. The volume of fuel carried for a particular operation less drainable unusable fuel and trapped fuel remaining after a fuel runout test has been accomplished.

| AIRPLANE CHARACTERISTICS | UNIT OF MEASURE | MODEL 720 | MODEL 720B |
|---|---|---|---|
| MAXIMUM RAMP WEIGHT | POUNDS<br>KILOGRAMS | 230,000<br>104,400 | 235,000<br>106,700 |
| MAXIMUM LANDING WEIGHT | POUNDS<br>KILOGRAMS | 175,000<br>79,500 | 175,000<br>79,500 |
| MAXIMUM TAKEOFF WEIGHT | POUNDS<br>KILOGRAMS | 229,300<br>104,000 | 234,300<br>106,200 |
| OPERATING EMPTY WEIGHT | POUNDS<br>KILOGRAMS | 110,800<br>50,300 | 115,000<br>52,200 |
| ZERO FUEL WEIGHT | POUNDS<br>KILOGRAMS | 139,000<br>63,000 | 156,000<br>70,800 |
| MAXIMUM STRUCTURAL PAYLOAD | POUNDS<br>KILOGRAMS | 28,200<br>12,710 | 41,000<br>18,610 |
| MAXIMUM SEATING CAPACITY See Page 10 | | 149* | 149* |
| MAXIMUM CARGO CAPACITY See Page 10 | CUBIC FEET<br>CUBIC METERS | 1,380<br>39.1 | 1,380<br>39.1 |
| USABLE FUEL CAPACITY | U.S. GALLONS<br>LITERS | 16,060<br>60,900 | 16,130<br>61,300 |

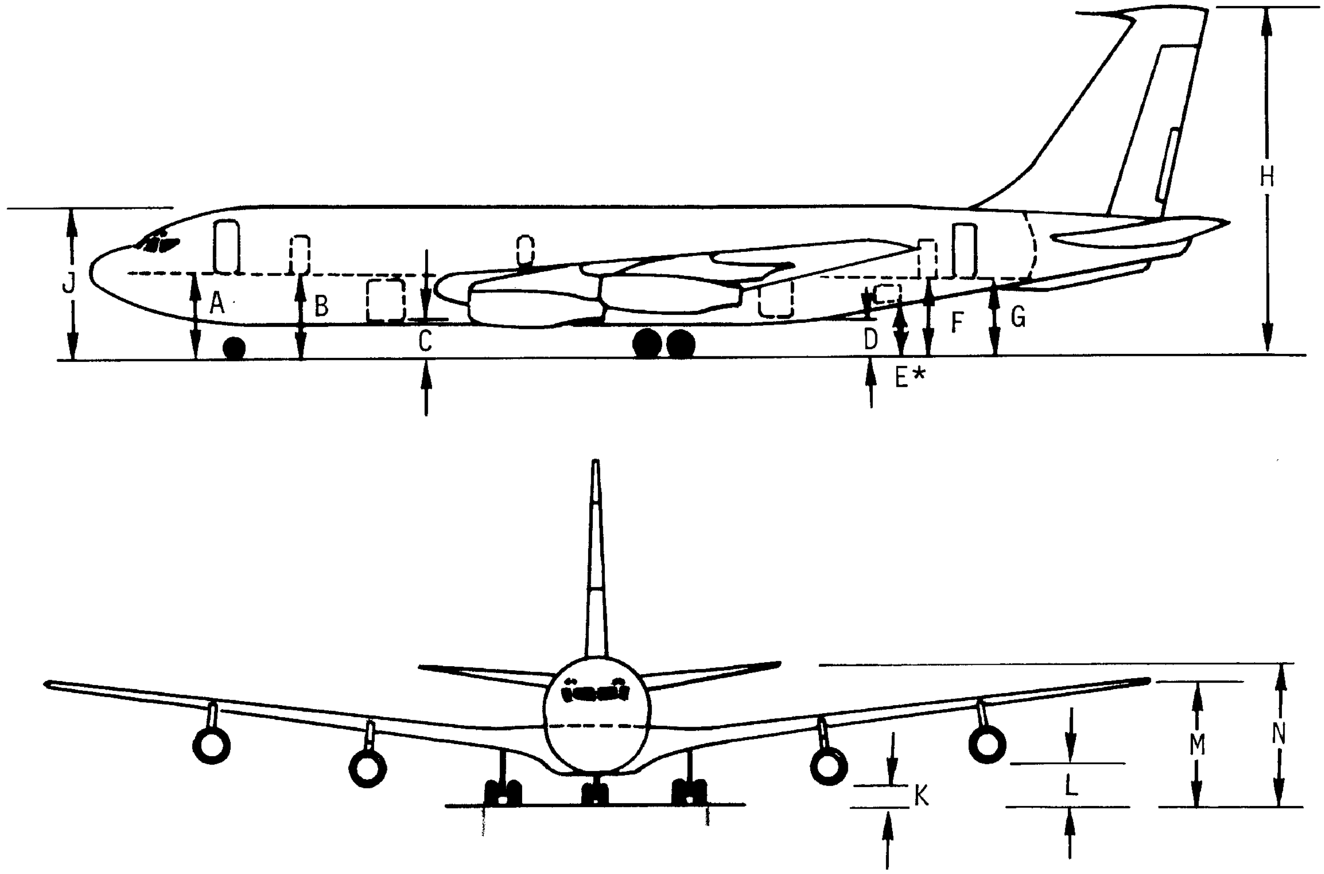
NOTE: OEW'S SHOWN ARE AN AVERAGE AIRLINE VALUE.
IF SPECIFIC FIGURES ARE REQUIRED, CONSULT USING AIRLINE.

*MAXIMUM SEATING CAPACITY IS 156 ON AIRPLANES WITH OPTION OF TWO ADDITIONAL TYPE III EMERGENCY EXITS (SEE PAGE 10)

## 2.1 GENERAL CHARACTERISTICS
MODELS 720, 720B



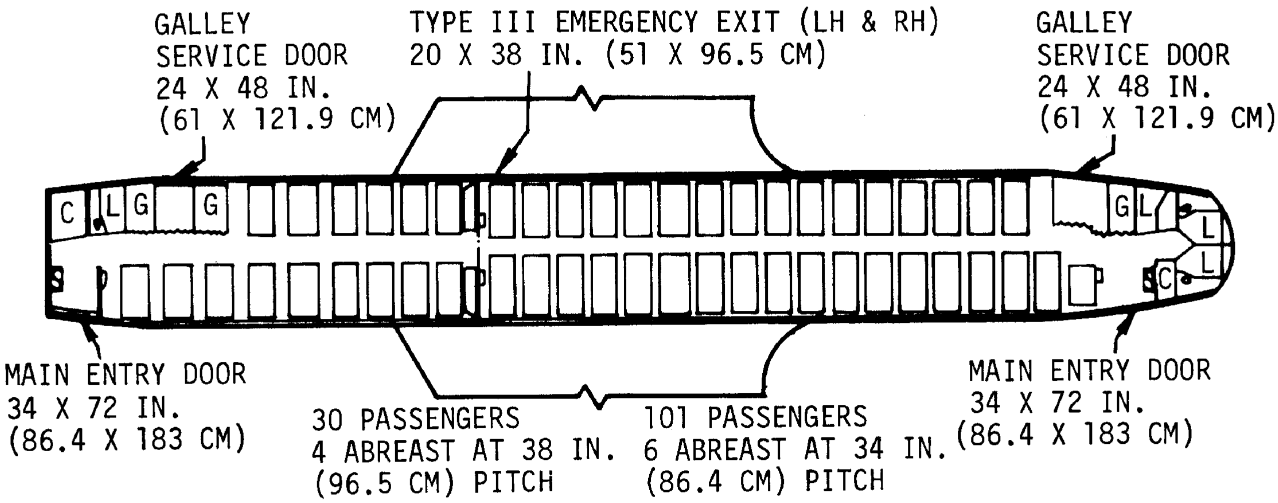

2.2 GENERAL DIMENSIONS
MODELS 720, 720B



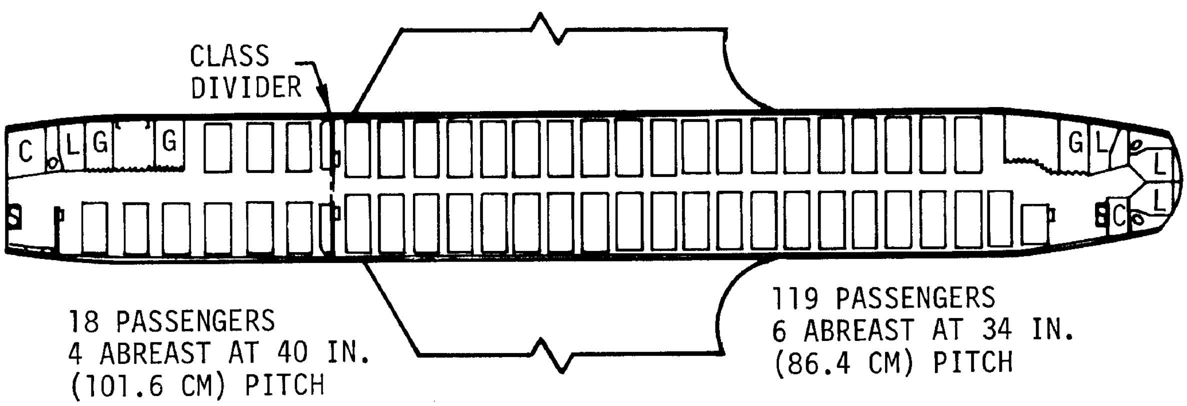

| VERTICAL CLEARANCES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | OPERATING EMPTY WEIGHT | | | | MAXIMUM RAMP WEIGHT | | | |
| | 720 | | 720B | | 720 | | 720B | |
| | FT - IN. | M | FT - IN. | M | FT - IN. | M | FT - IN. | M |
| A | 10 - 2 | 3.10 | 10 - 4 | 3.15 | 10 - 4 | 3.15 | 10 - 2 | 3.10 |
| B | 10 - 1 | 3.07 | 10 - 3 | 3.12 | 10 - 3 | 3.12 | 10 - 1 | 3.07 |
| C | 4 - 7 | 1.40 | 4 - 9 | 1.45 | 4 - 8 | 1.42 | 4 - 6 | 1.37 |
| D | 4 - 9 | 1.45 | 4 - 8 | 1.42 | 4 - 4 | 1.32 | 4 - 4 | 1.32 |
| E* | 5 - 9 | 1.75 | 5 - 10 | 1.78 | 5 - 4 | 1.63 | 5 - 5 | 1.65 |
| F | 10 - 0 | 3.05 | 9 - 10 | 3.0 | 9 - 4 | 2.85 | 9 - 4 | 2.85 |
| G | 10 - 0 | 3.05 | 9 - 10 | 3.0 | 9 - 4 | 2.85 | 9 - 4 | 2.85 |
| H | 41 - 5 | 12.62 | 41 - 2 | 12.55 | 40 - 6 | 12.34 | 40 - 7 | 12.37 |
| J | 18 - 2 | 5.54 | 18 - 4 | 5.59 | 18 - 3 | 5.56 | 18 - 2 | 5.54 |
| K | 2 - 10 | 0.86 | 2 - 6 | 0.76 | 2 - 7 | 0.79 | 2 - 1 | 0.64 |
| L | 4 - 11 | 1.50 | 4 - 6 | 1.37 | 4 - 3 | 1.30 | 3 - 9 | 1.14 |
| M | 12 - 2 | 3.71 | 12 - 1 | 3.68 | 10 - 10 | 3.30 | 10 - 10 | 3.30 |
| N | 16 - 4 | 4.98 | 16 - 2 | 4.93 | 15 - 4 | 4.67 | 15 - 9 | 4.80 |

* Optional Cargo Door

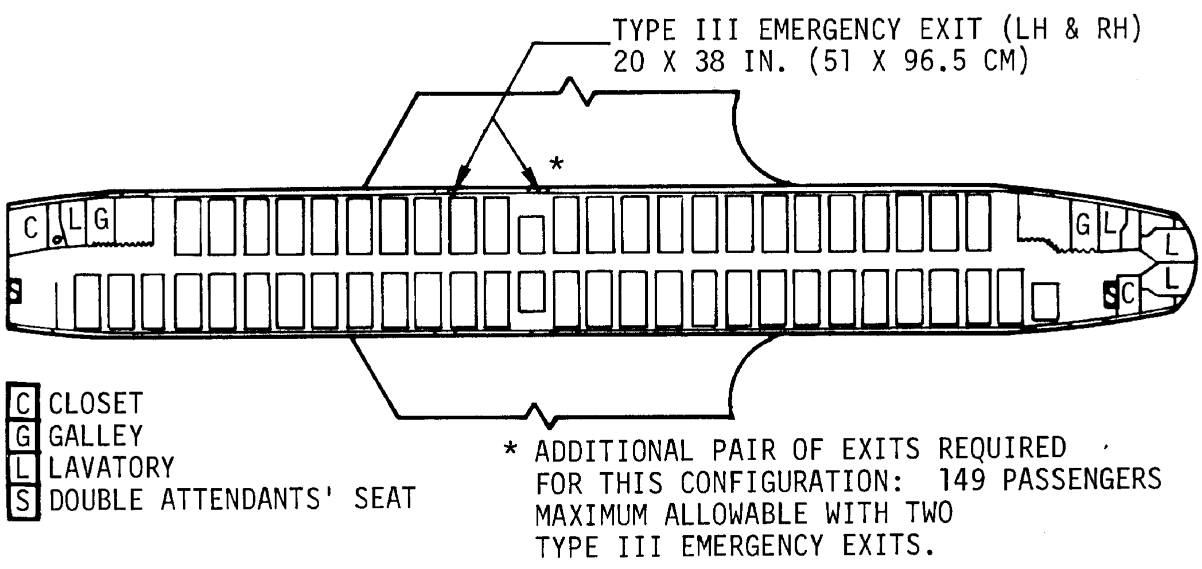
2.3 GROUND CLEARANCES
MODELS 720, 720B




131 PASSENGERS -- MIXED CLASS (DOMESTIC)

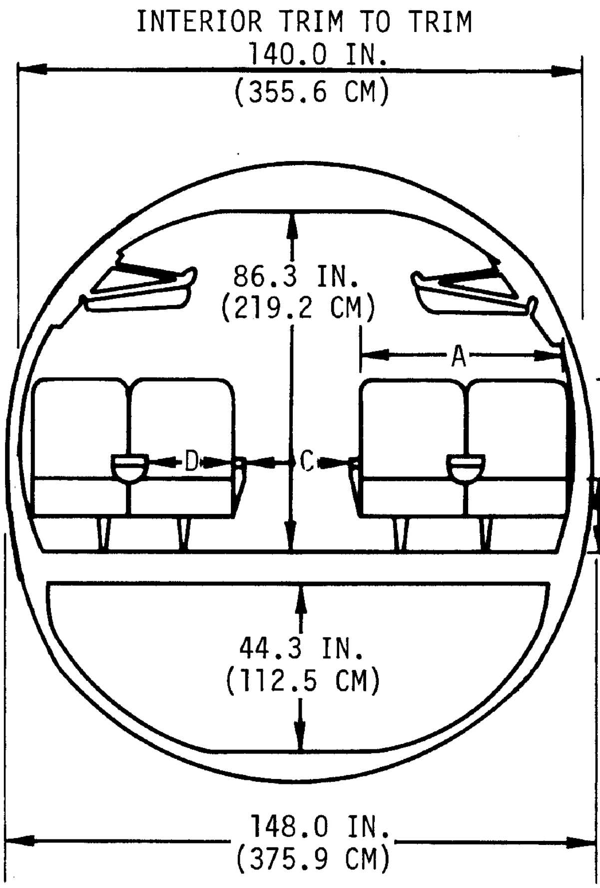



137 PASSENGERS -- MIXED CLASS (INTERNATIONAL)



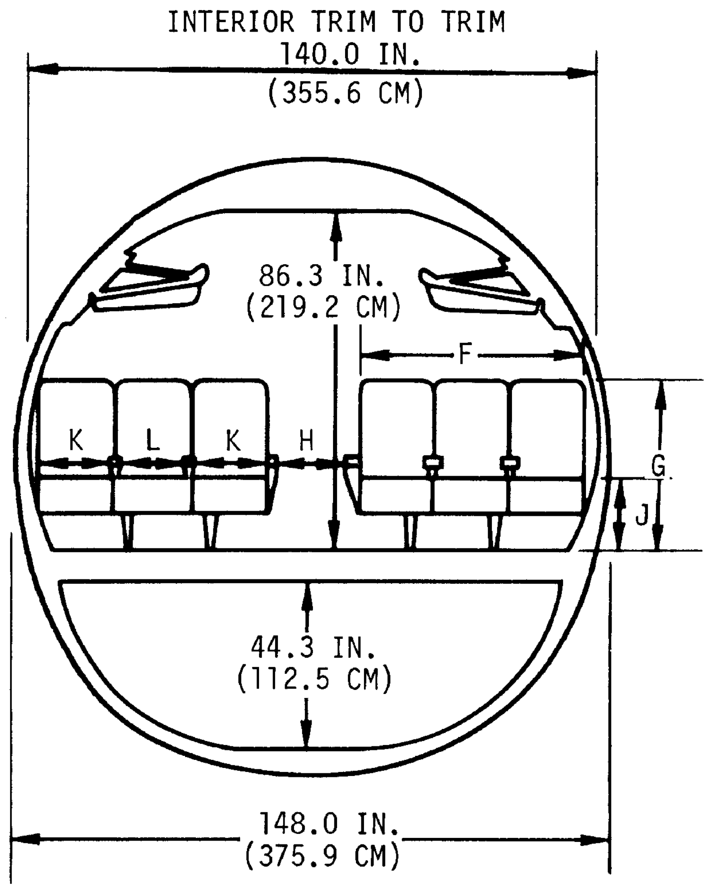

156*PASSENGERS -- 6 ABREAST AT 34 IN. (86.4)

2.4 INTERIOR ARRANGEMENTS — PASSENGER
MODELS 720, 720B




| | IN. | CM |
|---|---|---|
| A | 47.4 | 120.4 |
| B | 42.6 | 107.9 |
| C | 28.0 | 71.2 |
| D | 20.0 | 50.8 |
| E | 17.9 | 45.5 |

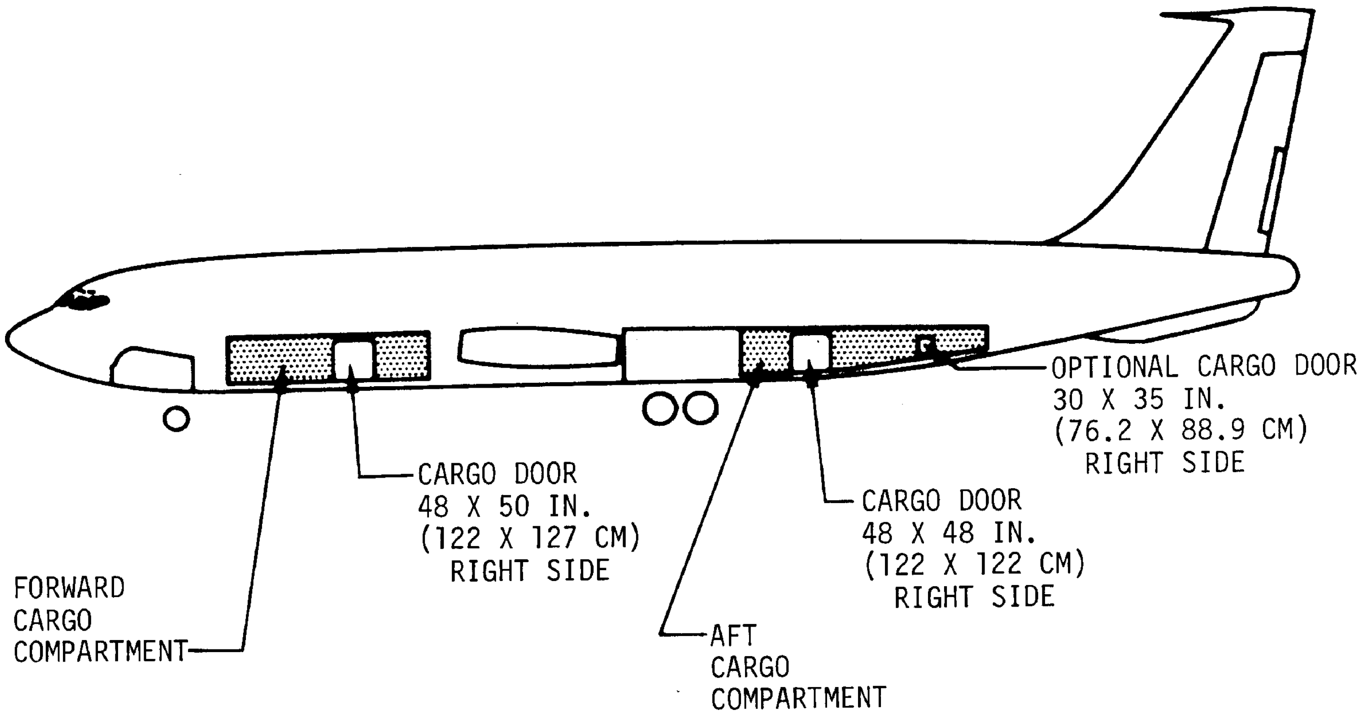
FIRST CLASS




| | IN. | CM |
|---|---|---|
| F | 54.4 | 138.2 |
| G | 42.6 | 107.9 |
| H | 18.0 | 45.7 |
| J | 17.9 | 45.5 |
| K | 16.5 | 41.9 |
| L | 17.6 | 44.7 |

TOURIST

2.5 PASSENGER CABIN CROSS SECTION
MODELS 720, 720B

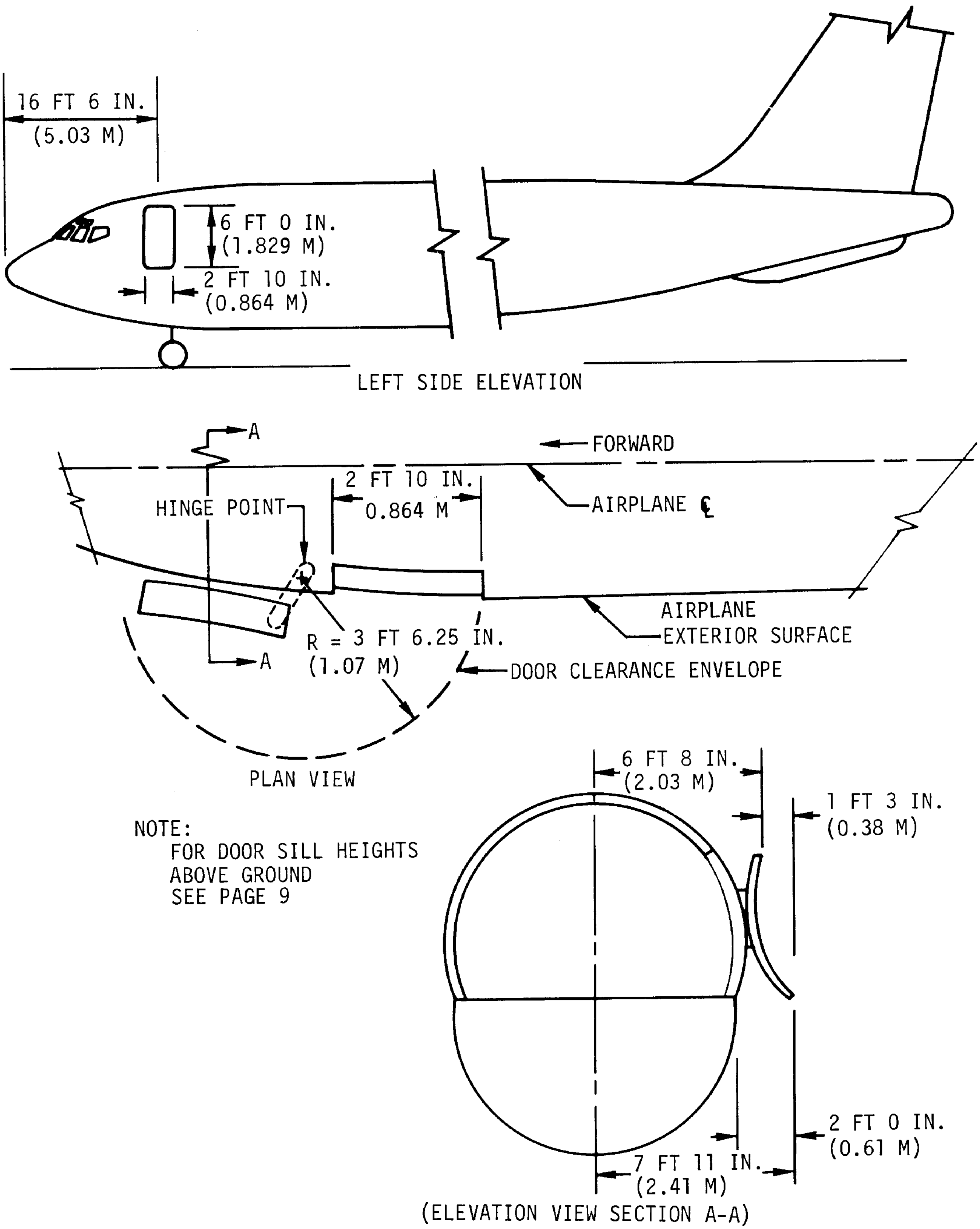



CAPACITY
LOWER CARGO COMPARTMENTS

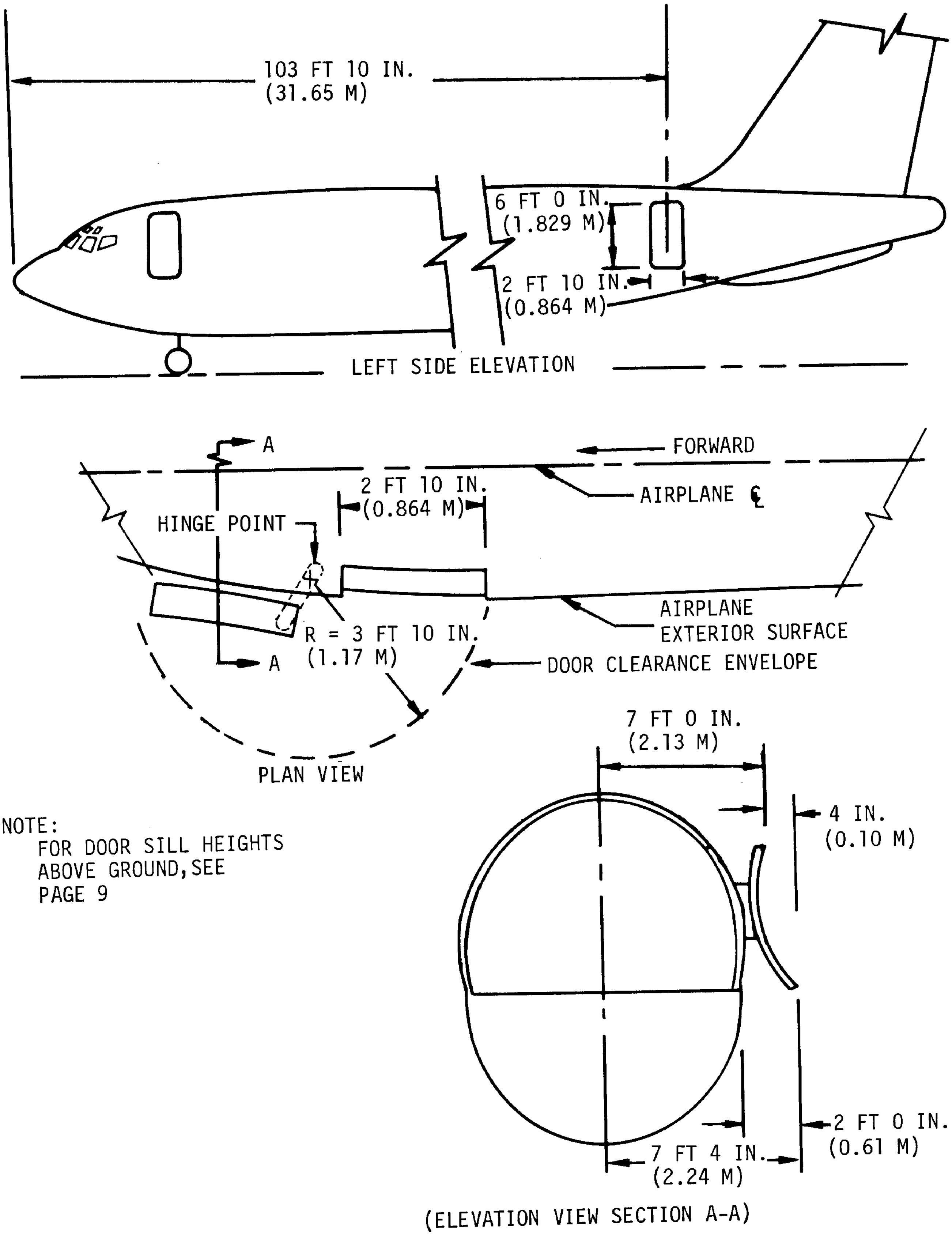
| FORWARD | | AFT | | TOTAL | |
|---|---|---|---|---|---|
| CU FT | CU M | CU FT | CU M | CU FT | CU M |
| 696 | 19.70 | 685 | 19.4 | 1,381 | 39.4 |

NOTE: CARGO IN LOWER COMPARTMENTS NOT USUALLY CONTAINERIZED; HOWEVER, INDIVIDUAL AIRLINES HAVE OPTION OF USING CONTAINERS.

**2.6 LOWER CARGO COMPARTMENT CAPACITIES MODELS 720, 720B**

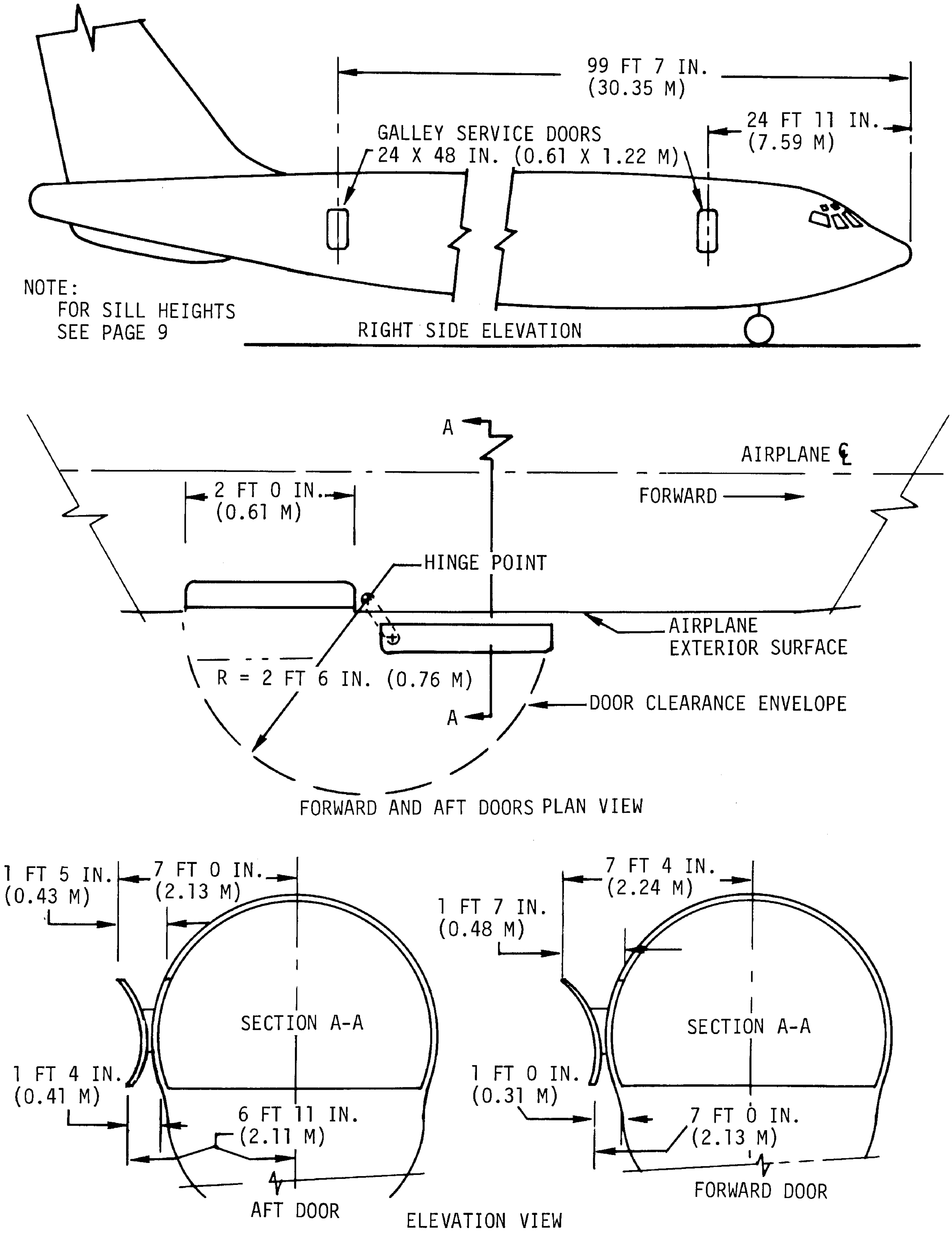



2.7 DOOR CLEARANCES — FORWARD PASSENGER ENTRY
MODELS 720, 720B

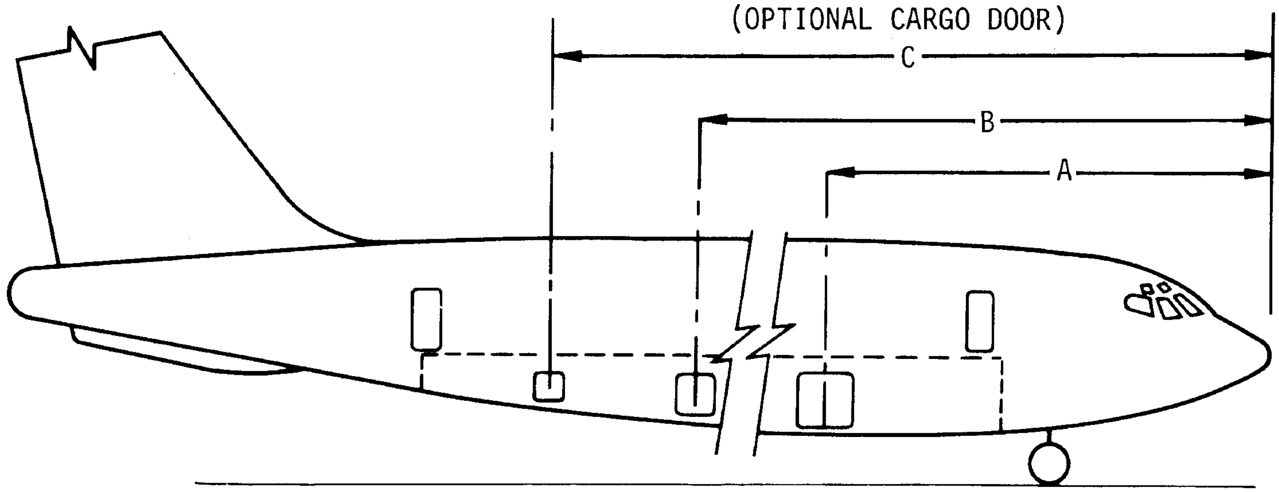



NOTE:
FOR DOOR SILL HEIGHTS ABOVE GROUND, SEE PAGE 9

DOOR CLEARANCES —AFT PASSENGER ENTRY
MODELS & 720, 720B




DOOR CLEARANCES — FORWARD AND AFT GALLEY SERVICE
MODELS 720, 720B




RIGHT SIDE ELEVATION

NOTE:
FOR SILL HEIGHTS
SEE PAGE 9

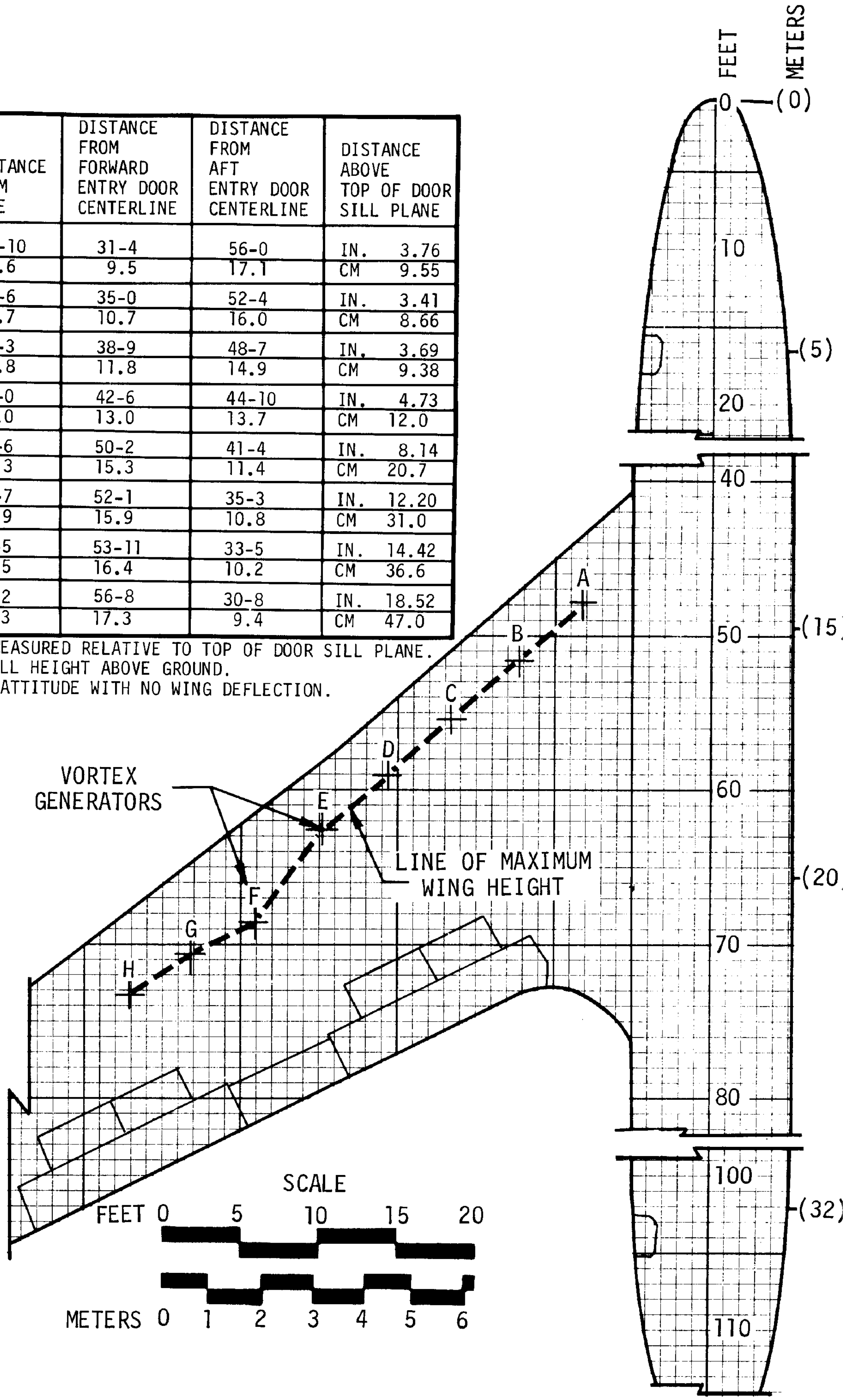
| DOOR | | FT - IN. | | M |
|---|---|---|---|---|
| FORWARD COMPARTMENT | | | | |
| 48 IN. WIDE X 50 IN. HIGH (1.22 X 1.27 M) | A | 35 | 4 | 10.77 |
| AFT COMPARTMENT | | | | |
| (FORWARD DOOR) 48 IN. WIDE X 49 IN. HIGH (1.22 X 1.24 M) | B | 81 | 4 | 24.79 |
| (AFT DOOR) 30 IN. WIDE X 35 IN. HIGH (0.76 X 0.89 M) | C | 92 | 3 | 28.12 |

NOTE:
LOWER CARGO COMPARTMENT DOORS DO NOT SWING OUT. TRACKS LOCATED ON INTERIOR SIDEWALL PERMIT DOOR TO SLIDE BACK FROM DOOR OPENING.

DOOR CLEARANCES — LOWER CARGO
MODELS 720, 720B

| WING HIGH POINT | | DISTANCE FROM AIRPLANE CENTERLINE | DISTANCE FROM NOSE | DISTANCE FROM FORWARD ENTRY DOOR CENTERLINE | DISTANCE FROM AFT ENTRY DOOR CENTERLINE | DISTANCE ABOVE TOP OF DOOR SILL PLANE | |
|---|---|---|---|---|---|---|---|
| A | FT-IN. | 8-4 | 47-10 | 31-4 | 56-0 | IN. | 3.76 |
| | M | 2.54 | 14.6 | 9.5 | 17.1 | CM | 9.55 |
| B | FT-IN. | 12-6 | 51-6 | 35-0 | 52-4 | IN. | 3.41 |
| | M | 3.81 | 15.7 | 10.7 | 16.0 | CM | 8.66 |
| C | FT-IN. | 16-8 | 55-3 | 38-9 | 48-7 | IN. | 3.69 |
| | M | 5.08 | 16.8 | 11.8 | 14.9 | CM | 9.38 |
| D | FT-IN. | 20-10 | 59-0 | 42-6 | 44-10 | IN. | 4.73 |
| | M | 6.35 | 18.0 | 13.0 | 13.7 | CM | 12.0 |
| E | FT-IN. | 25-0 | 62-6 | 50-2 | 41-4 | IN. | 8.14 |
| | M | 7.62 | 20.3 | 15.3 | 11.4 | CM | 20.7 |
| F | FT-IN. | 29-2 | 68-7 | 52-1 | 35-3 | IN. | 12.20 |
| | M | 8.89 | 20.9 | 15.9 | 10.8 | CM | 31.0 |
| G | FT-IN. | 33-4 | 70-5 | 53-11 | 33-5 | IN. | 14.42 |
| | M | 10.16 | 21.5 | 16.4 | 10.2 | CM | 36.6 |
| H | FT-IN. | 37-6 | 73-2 | 56-8 | 30-8 | IN. | 18.52 |
| | M | 11.43 | 22.3 | 17.3 | 9.4 | CM | 47.0 |

NOTE: WING CLEARANCES ARE MEASURED RELATIVE TO TOP OF DOOR SILL PLANE.
SEE PAGE 9 FOR DOOR SILL HEIGHT ABOVE GROUND.
AIRPLANE IS IN LEVEL ATTITUDE WITH NO WING DEFLECTION.




**DOOR SILL/WING CLEARANCE — CRITICAL INTERFERENCE PATH**
**MODEL 720, 720B**

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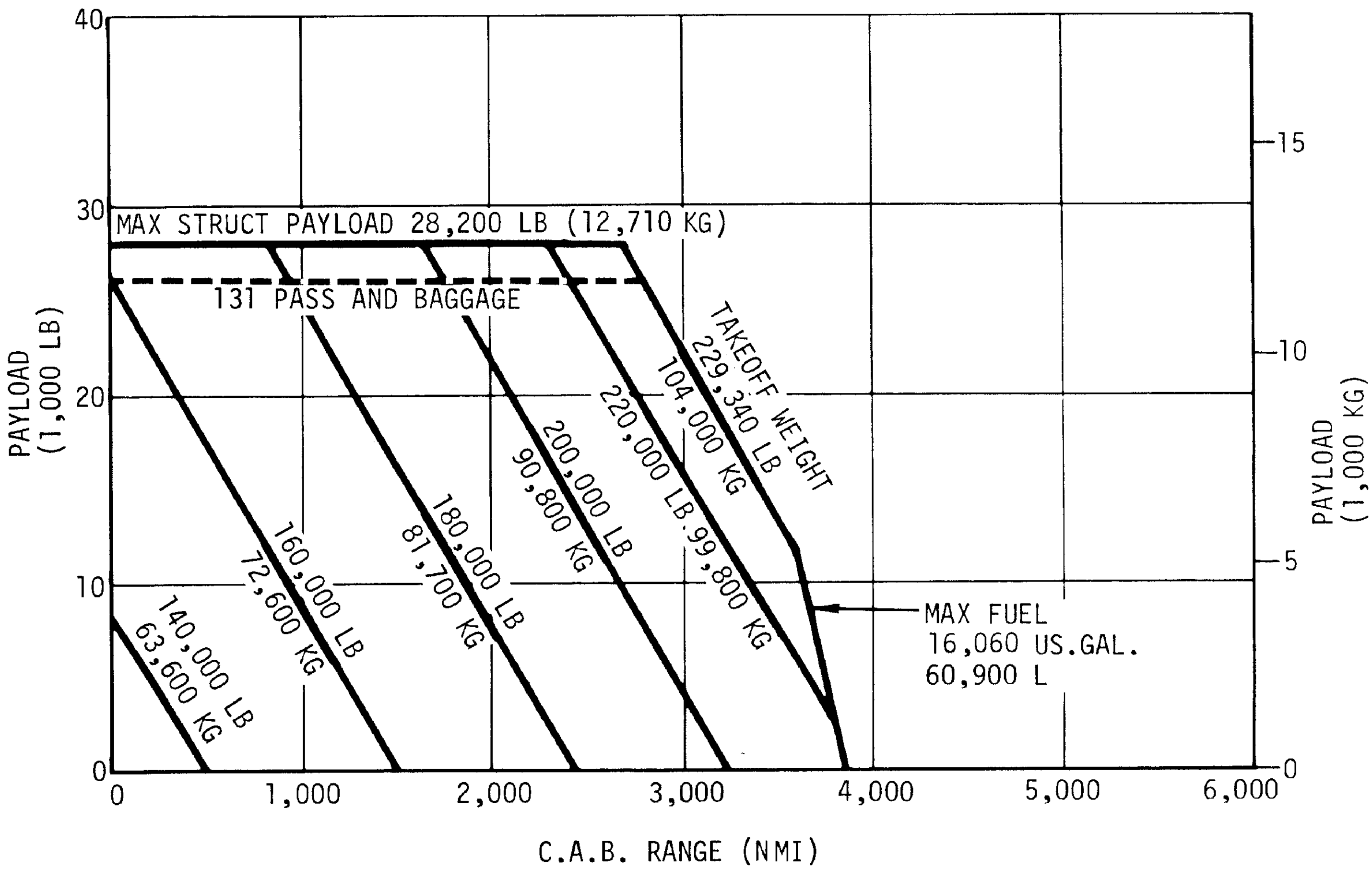
3.0 AIRPLANE PERFORMANCE

NOTES:
OEW - 110,800 LB (50,300 KG) OEW SHOWN IS AN AVERAGE AIRLINE VALUE.
IF SPECIFIC FIGURES ARE REQUIRED, CONSULT USING AIRLINE.

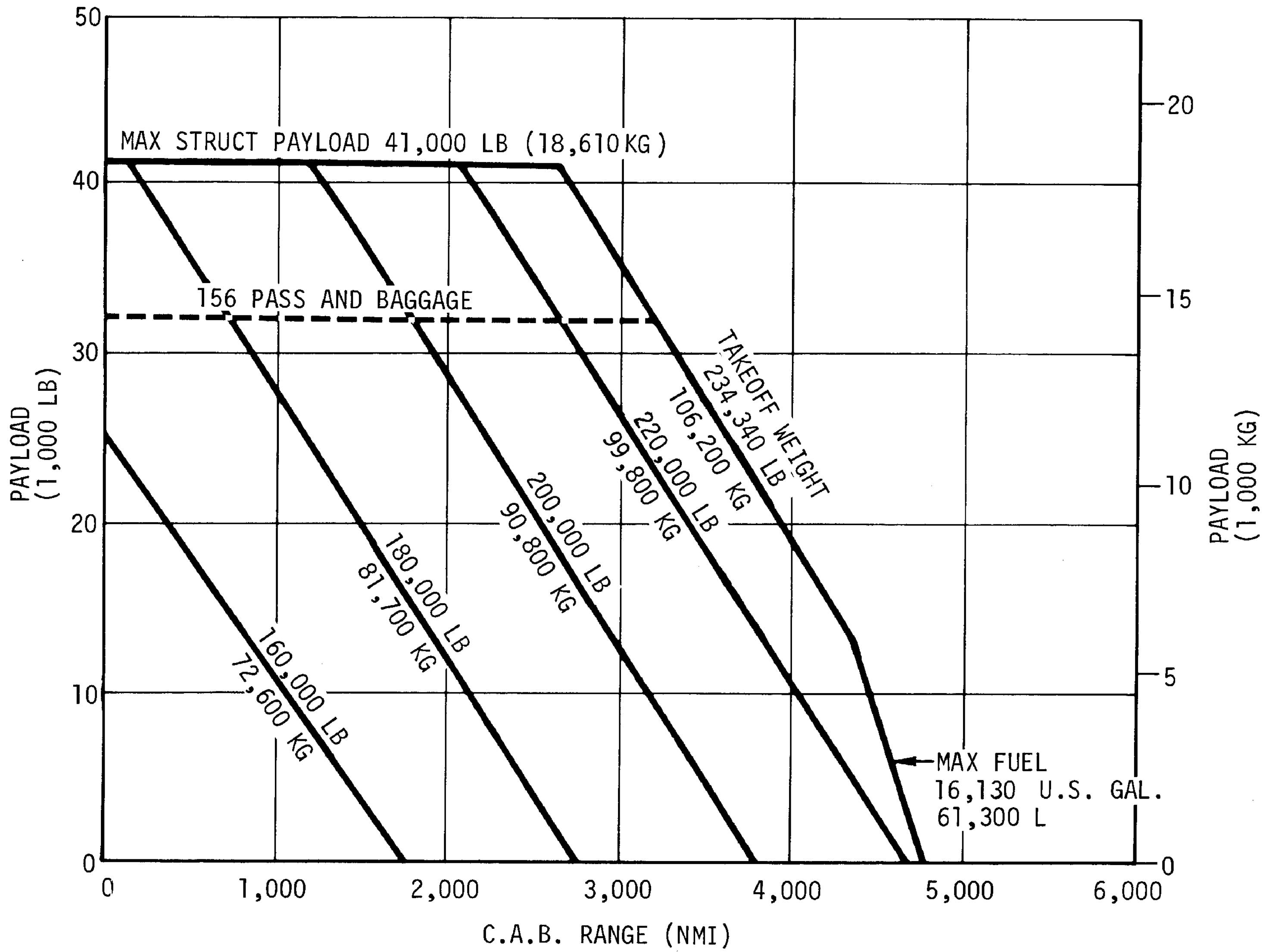
- ENGINES JT3C-7
- STANDARD DAY---ZERO WIND
- ATA DOMESTIC FUEL RESERVES - 200 NAUTICAL MILE ALTERNATE



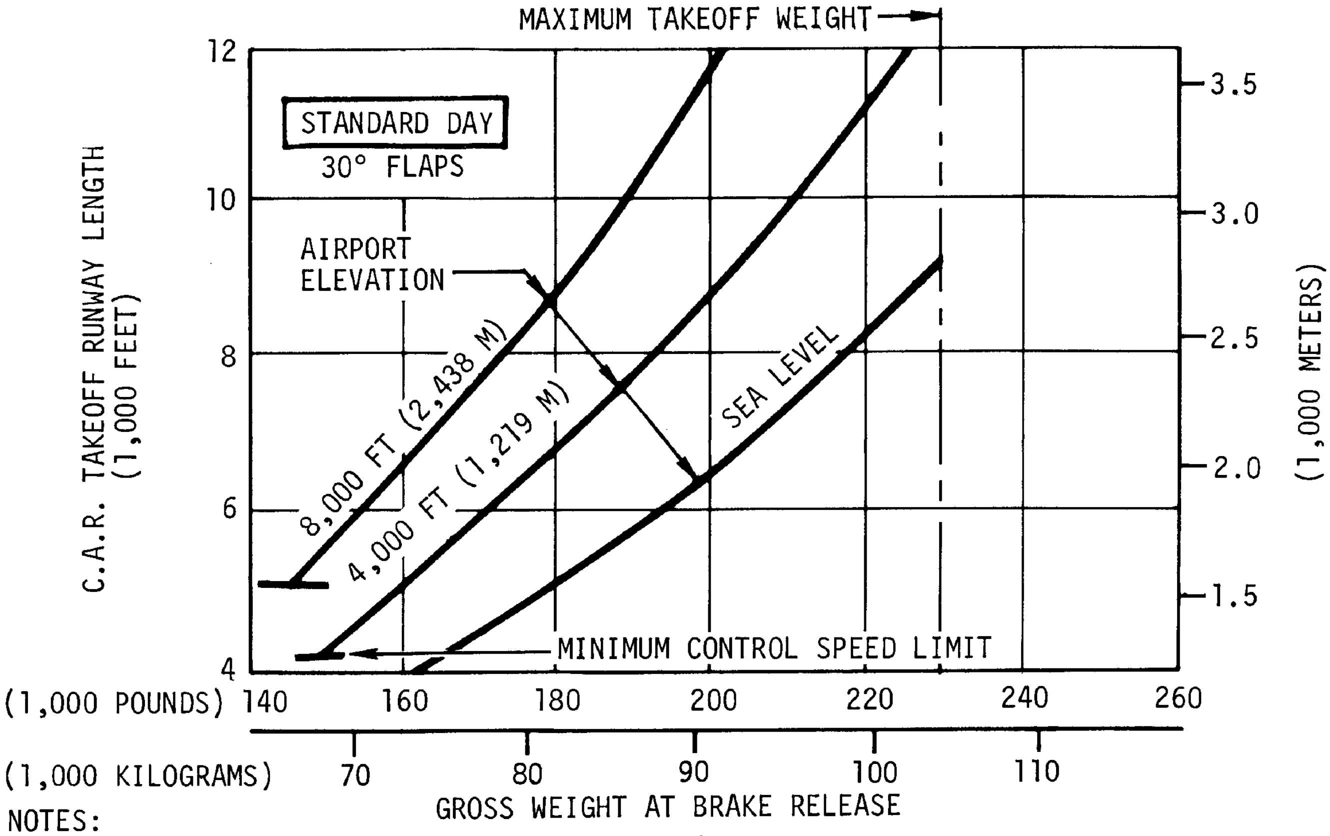

**3.1 PAYLOAD/RANGE FOR LONG RANGE STEP CLIMB CRUISE MODEL 720**

NOTES:

- OEW - 115,000 LB (52,200 KG). OEW SHOWN IS AN AVERAGE AIRLINE VALUE IF SPECIFIC FIGURES ARE REQUIRED, CONSULT USING AIRLINE.
- ENGINES JT3D-1
- STANDARD DAY---ZERO WIND
- ATA DOMESTIC FUEL RESERVES - 200 NAUTICAL MILE ALTERNATE

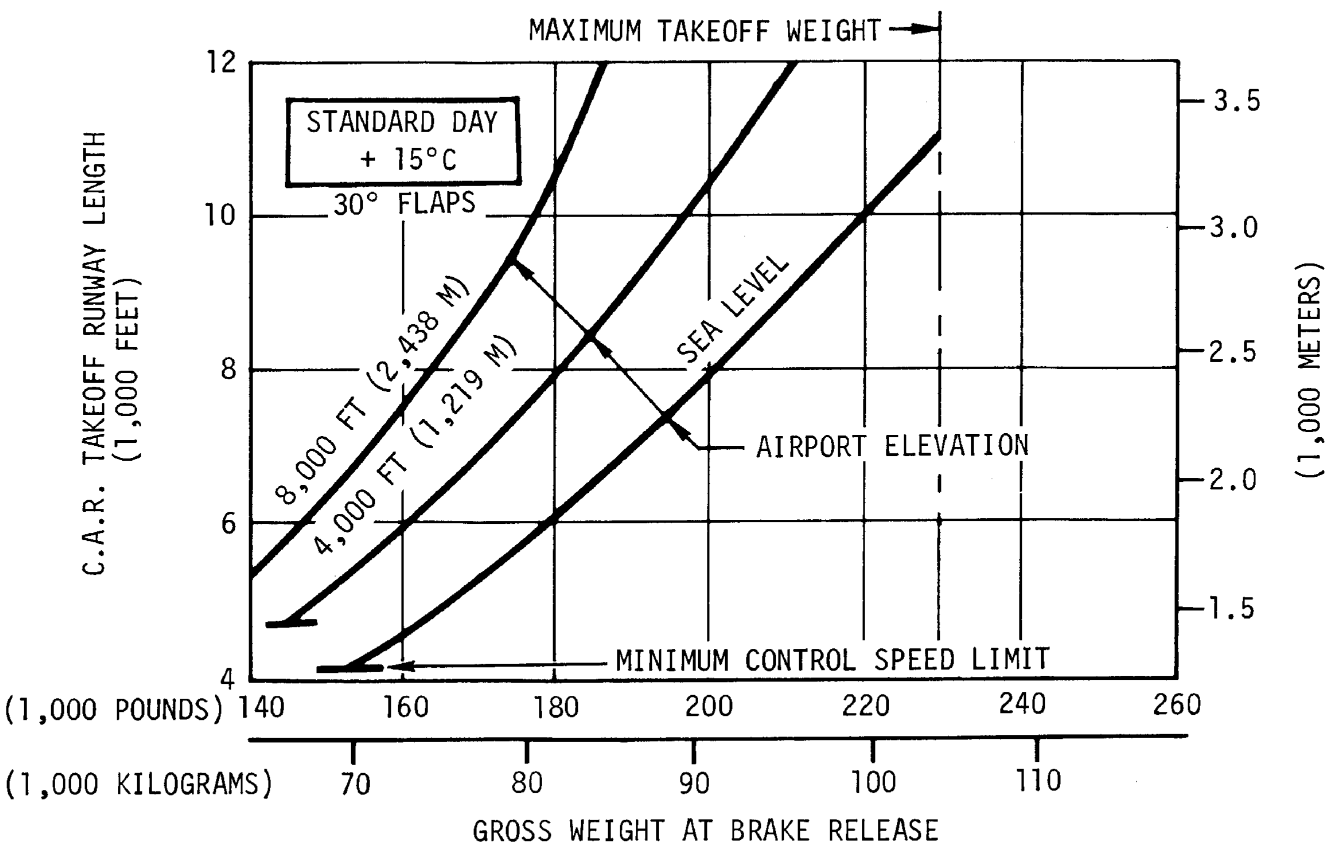



**PAYLOAD/RANGE FOR LONG RANGE STEP CLIMB CRUISE**
**MODEL 720B**

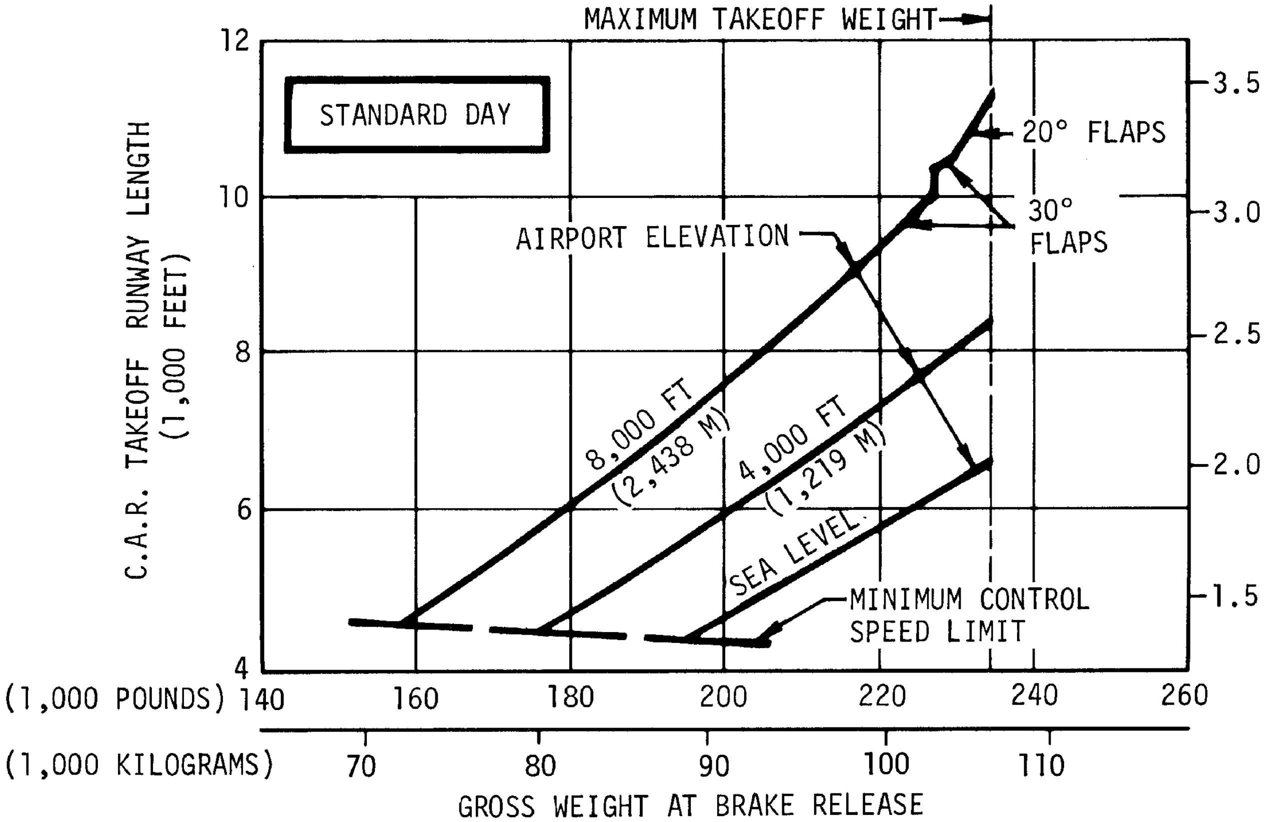



NOTES:

- JT3C-7 ENGINE (DRY) TWO TURBO COMPRESSORS
- TAKEOFF NET THRUST = 12,000 POUNDS (5,448 KILOGRAMS) SEA LEVEL, STATIC RATING
- ZERO RUNWAY GRADIENT
- CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN

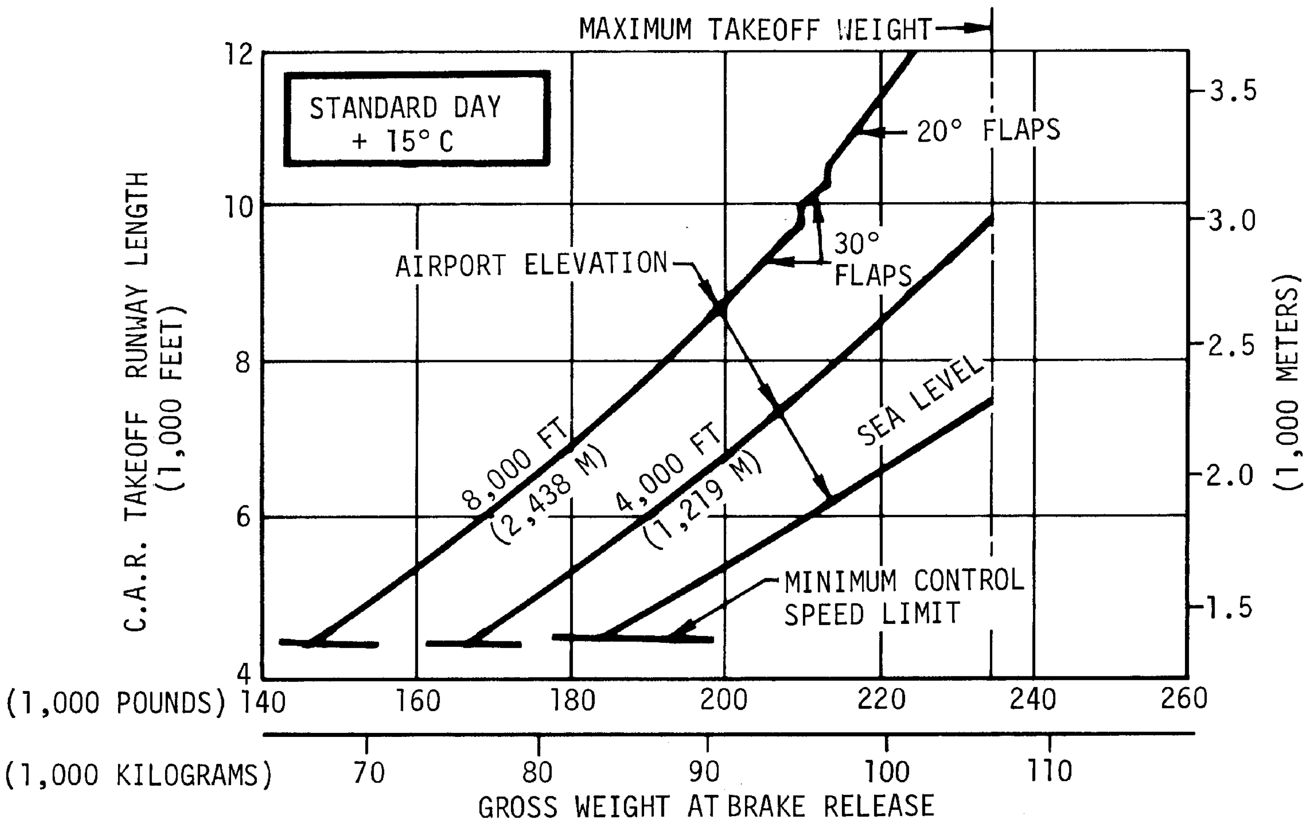



3.2 C.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS MODEL 720 (JT3C-7 ENGINE)

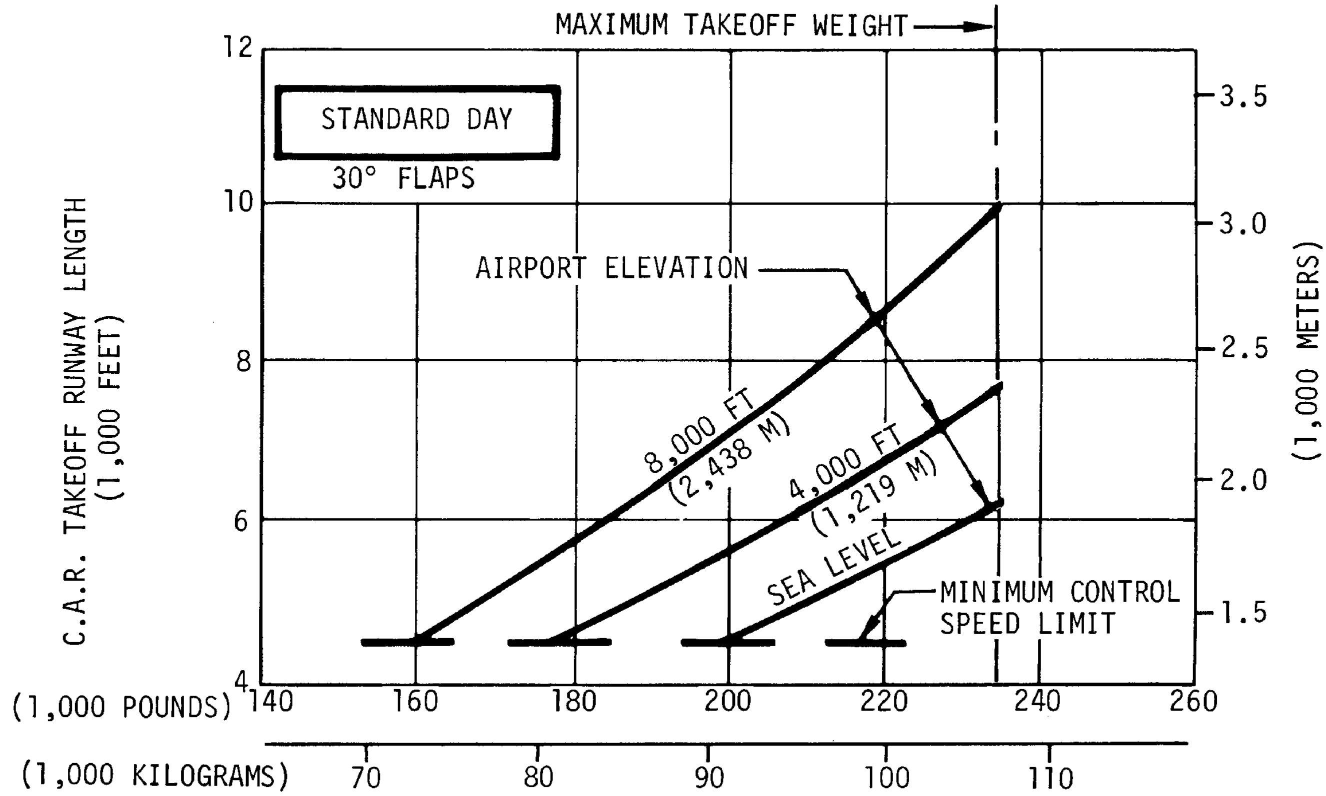



NOTES:

- JT3D-1 ENGINE (DRY) TWO TURBO COMPRESSORS
- TAKEOFF NET THRUST = 17,000 POUNDS (7,718 KILOGRAMS) SEA LEVEL, STATIC RATING
- ZERO RUNWAY GRADIENT
- CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN

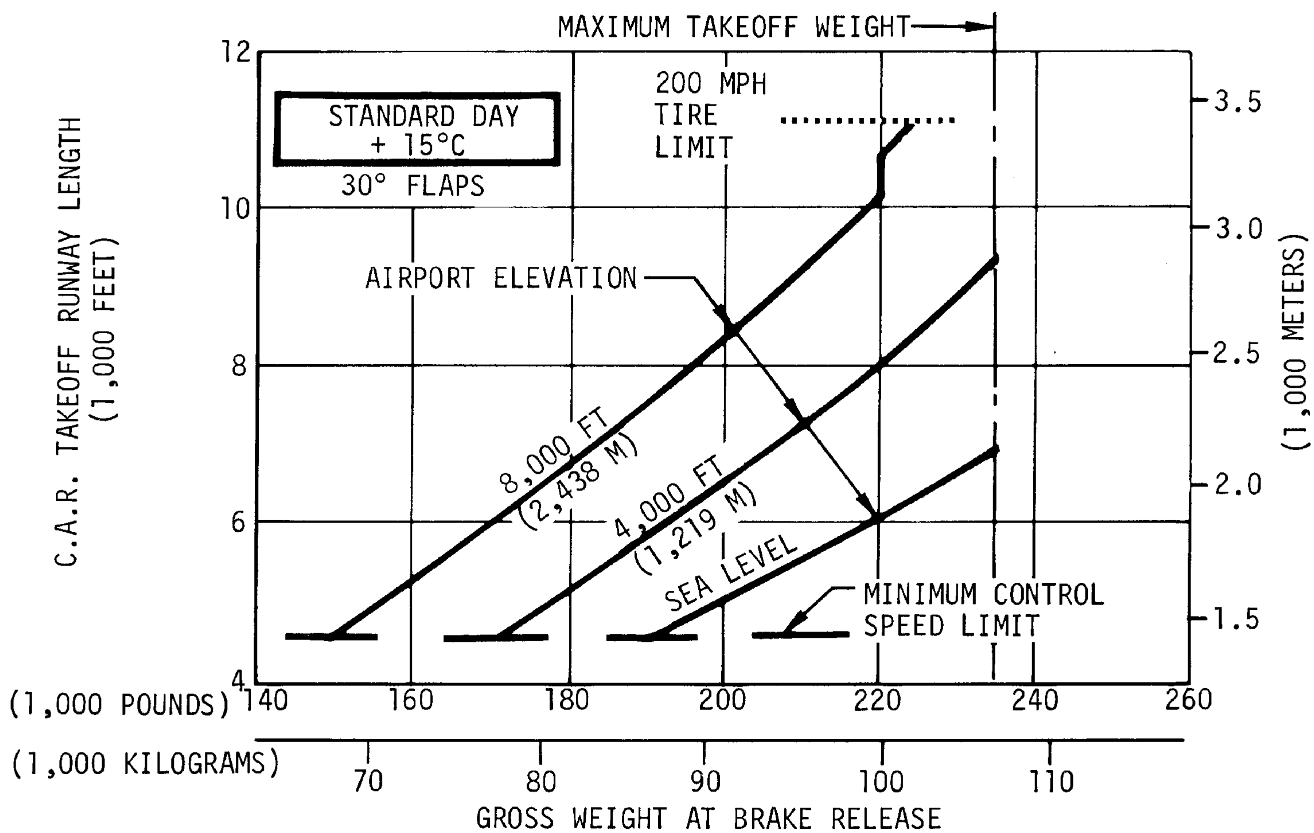



C.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS
MODEL 720B (JT3D-1 ENGINE)

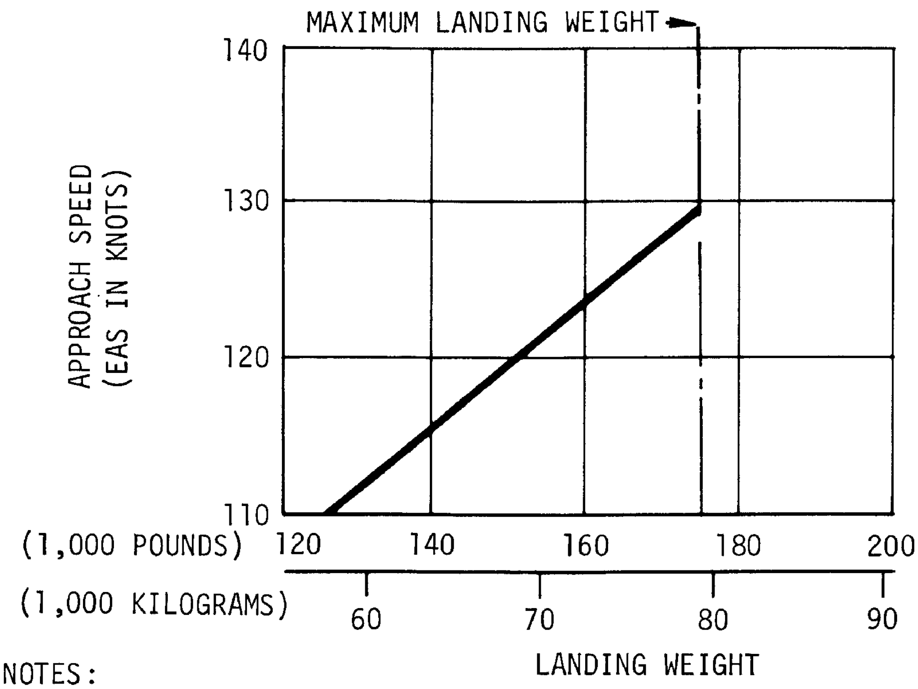



NOTES:

- JT3D-3 ENGINE (DRY) TWO TURBO COMPRESSORS
- TAKEOFF NET THRUST = 18,000 POUNDS (8,172 KILOGRAMS) SEA LEVEL, STATIC RATING
- ZERO RUNWAY GRADIENT
- CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN



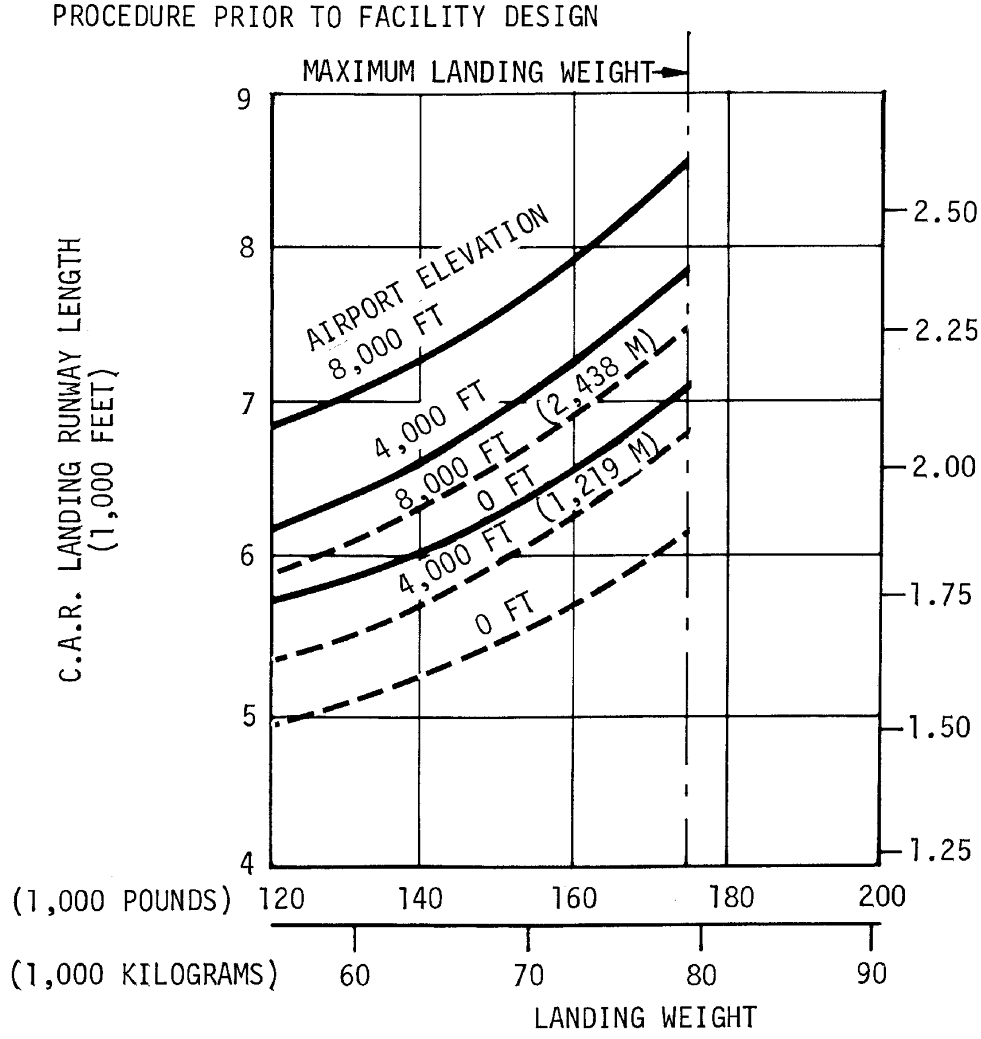

C.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS
MODEL 720B (JT3D-3 ENGINE)



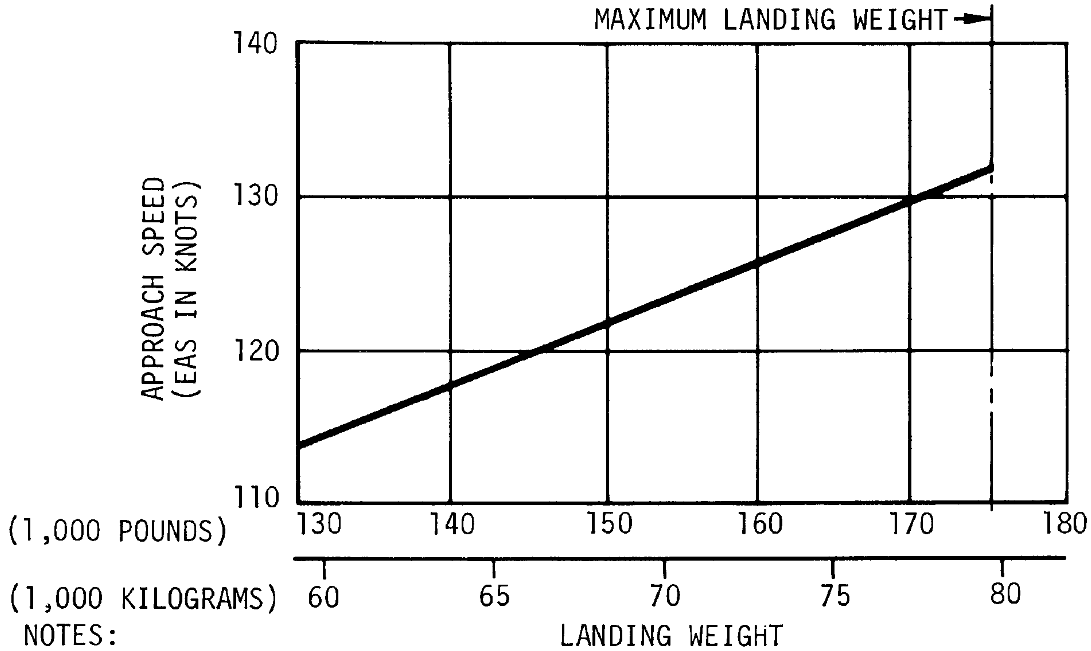

NOTES:

- STANDARD DAY
- ZERO RUNWAY GRADIENT
- CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN

LEGEND:
—— WET RUNWAY
– – – DRY RUNWAY




3.3 C.A.R. LANDING RUNWAY LENGTH REQUIREMENTS
MODEL 720

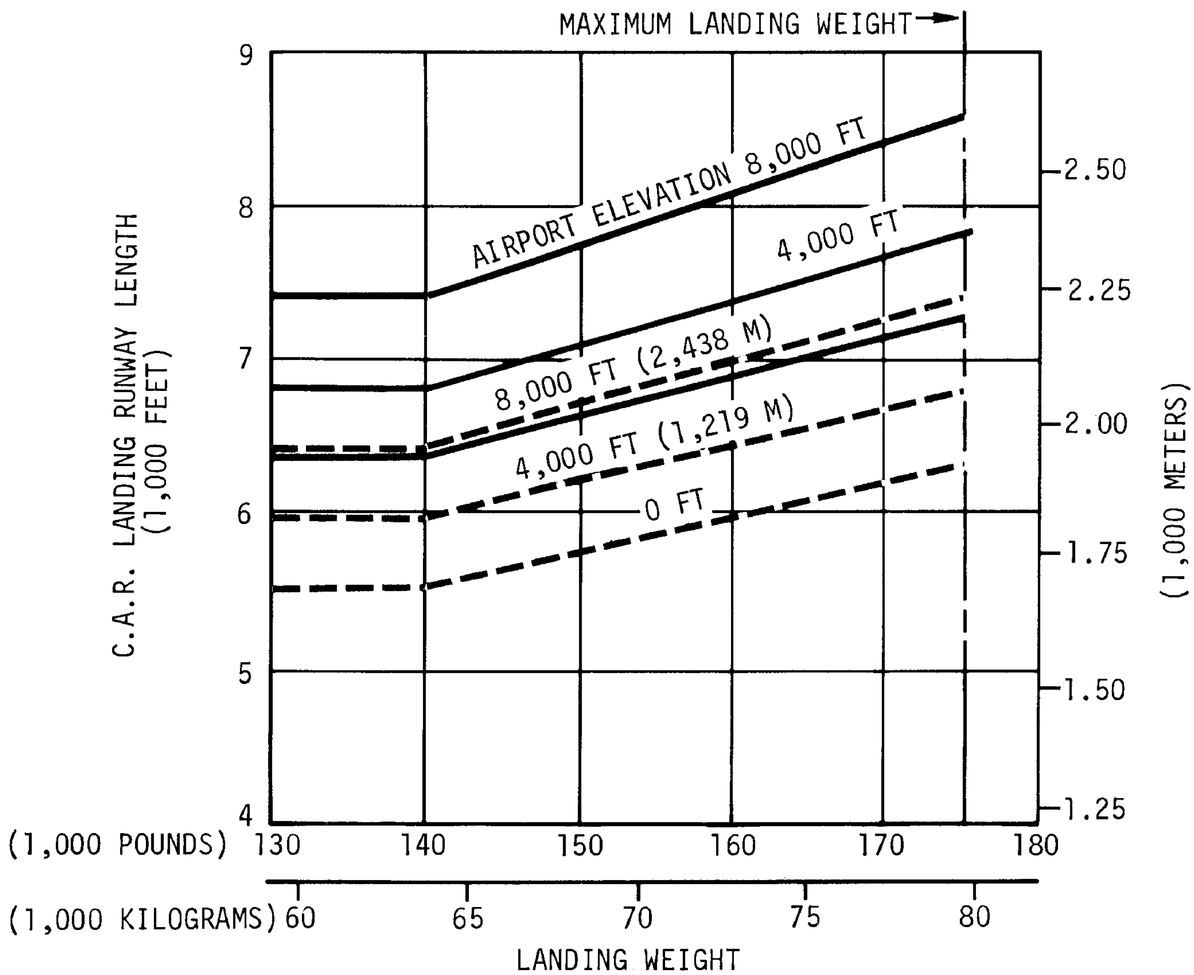



NOTES:

- STANDARD DAY
- ZERO RUNWAY GRADIENT
- CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN

LEGEND

- WET RUNWAY
- DRY RUNWAY




C.A.R. LANDING RUNWAY LENGTH REQUIREMENTS
MODEL 720B

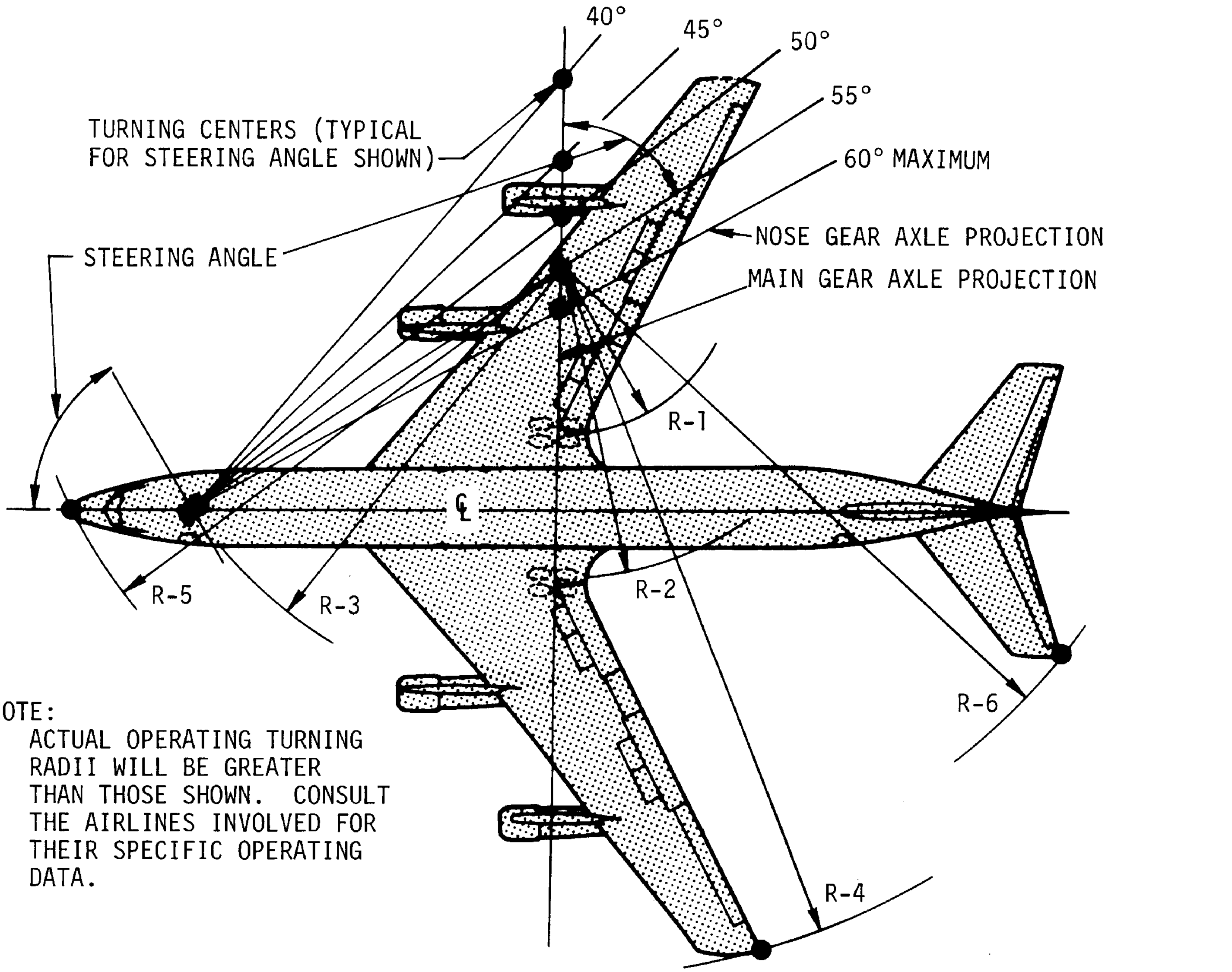
## 4.0 GROUND MANEUVERING

4.1 Turning Radii

4.2 Runway and Taxiway Turn Paths

4.3 Runway Holding Apron

4.4 Typical Parking Space Requirements

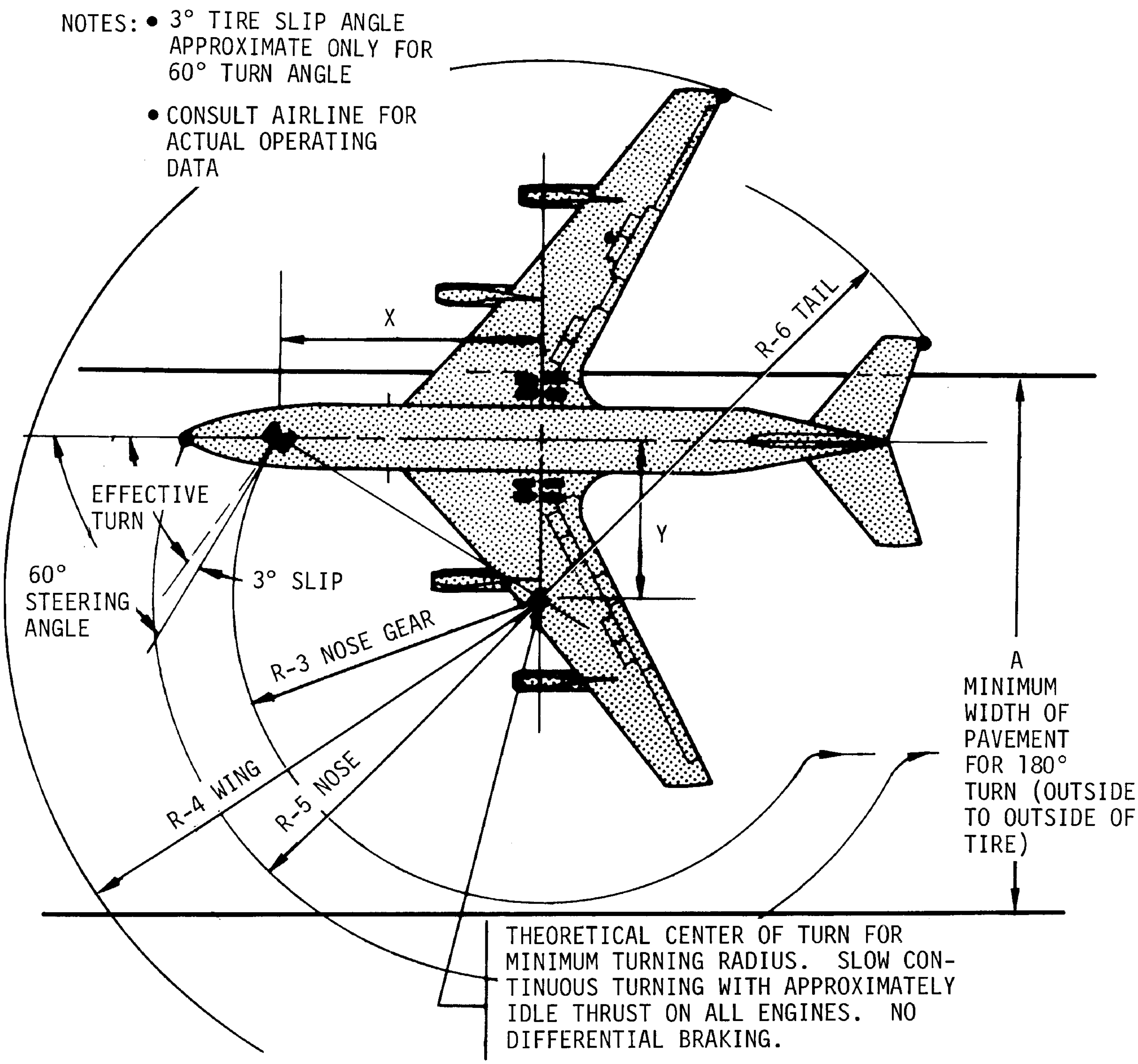



NOTE:
ACTUAL OPERATING TURNING RADII WILL BE GREATER THAN THOSE SHOWN. CONSULT THE AIRLINES INVOLVED FOR THEIR SPECIFIC OPERATING DATA.

DIMENSIONS ROUNDED TO NEAREST FOOT AND 0.1 METER

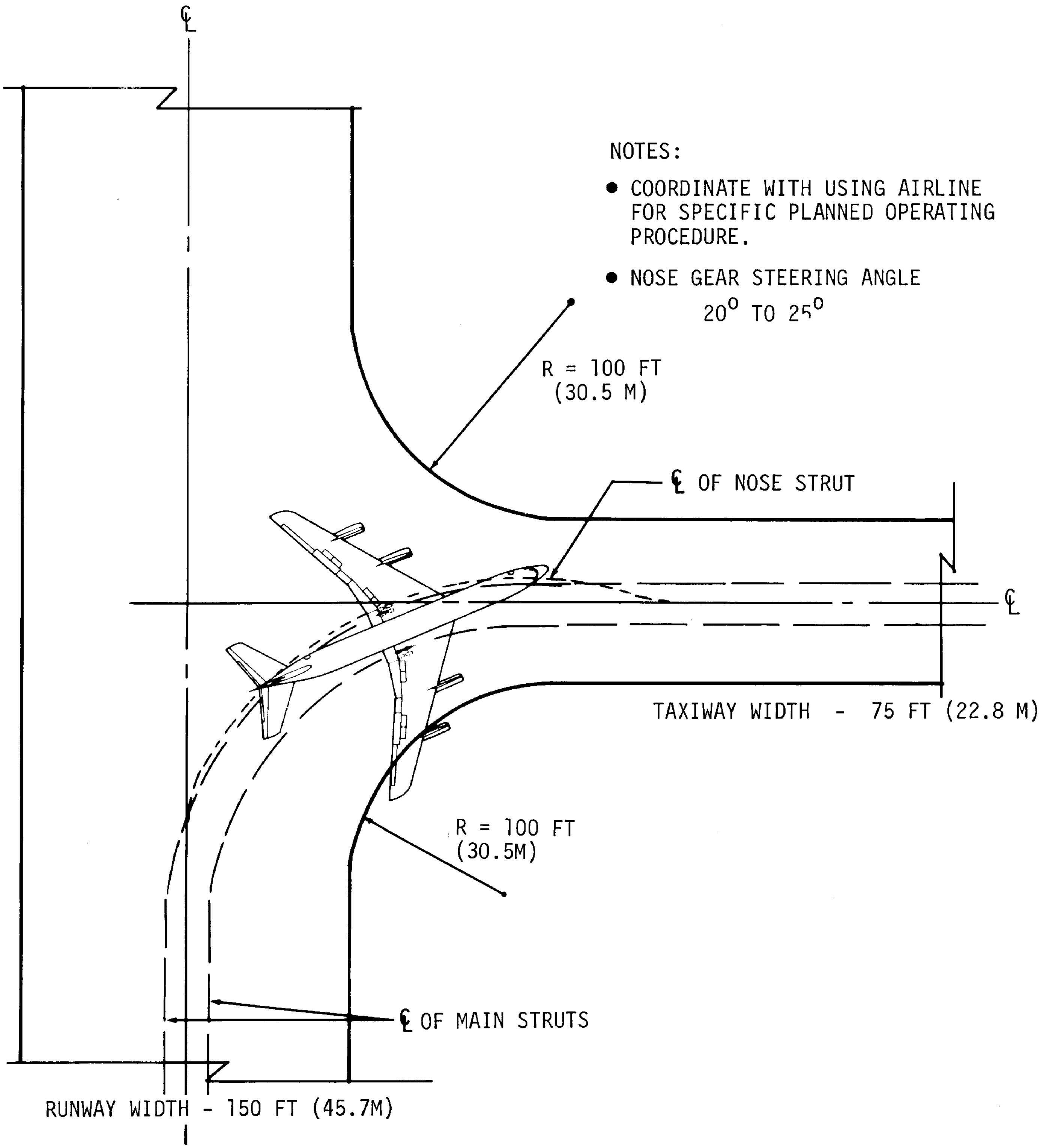
| STEERING ANGLE (DEGREES) | R-1 INNER GEAR | | R-2 OUTER GEAR | | R-3 NOSE GEAR | | R-4 WING TIP | | R-5 NOSE | | R-6 TAIL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FT | M | FT | M | FT | M | FT | M | FT | M | FT | M |
| 30 | 77 | 23.5 | 99 | 30.2 | 102 | 31.1 | 157 | 47.9 | 112 | 34.1 | 130 | 39.6 |
| 35 | 62 | 18.9 | 84 | 25.6 | 89 | 27.1 | 142 | 43.3 | 100 | 30.5 | 117 | 35.7 |
| 40 | 50 | 15.2 | 72 | 21.9 | 79 | 24.1 | 129 | 39.3 | 91 | 27.7 | 107 | 32.6 |
| 45 | 40 | 12.2 | 62 | 18.9 | 72 | 21.9 | 120 | 36.6 | 85 | 25.9 | 100 | 30.5 |
| 50 | 32 | 9.8 | 54 | 16.5 | 66 | 20.1 | 112 | 34.1 | 80 | 24.4 | 94 | 28.7 |
| 55 | 25 | 7.6 | 47 | 14.3 | 62 | 18.9 | 105 | 32.0 | 77 | 23.5 | 90 | 27.4 |
| 60 MAXIMUM | 18 | 5.5 | 40 | 12.2 | 59 | 18.0 | 99 | 30.2 | 74 | 22.6 | 86 | 26.2 |

4.1 TURNING RADII — NO SLIP ANGLE
MODELS 720, 720B

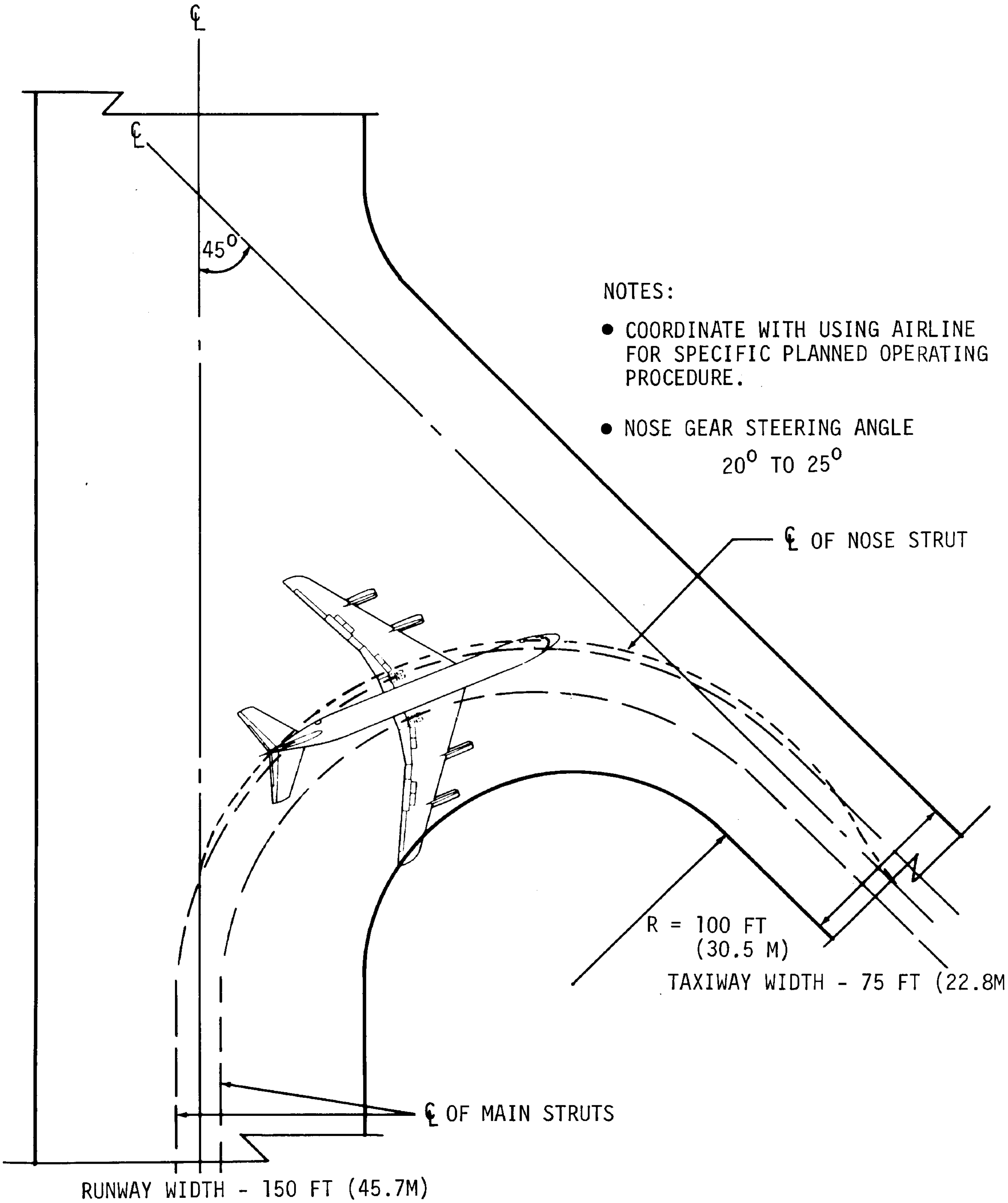



| EFFECTIVE TURN ANGLE 57° | X | Y | A | R-3 | R-4 | R-5 | R-6 |
|---|---|---|---|---|---|---|---|
| FT-IN. | 50-7 | 32-9 | 107-8 | 60-5 | 102-5 | 75-5 | 88-0 |
| METERS | 15.5 | 10.0 | 32.9 | 18.4 | 31.2 | 23.0 | 26.8 |

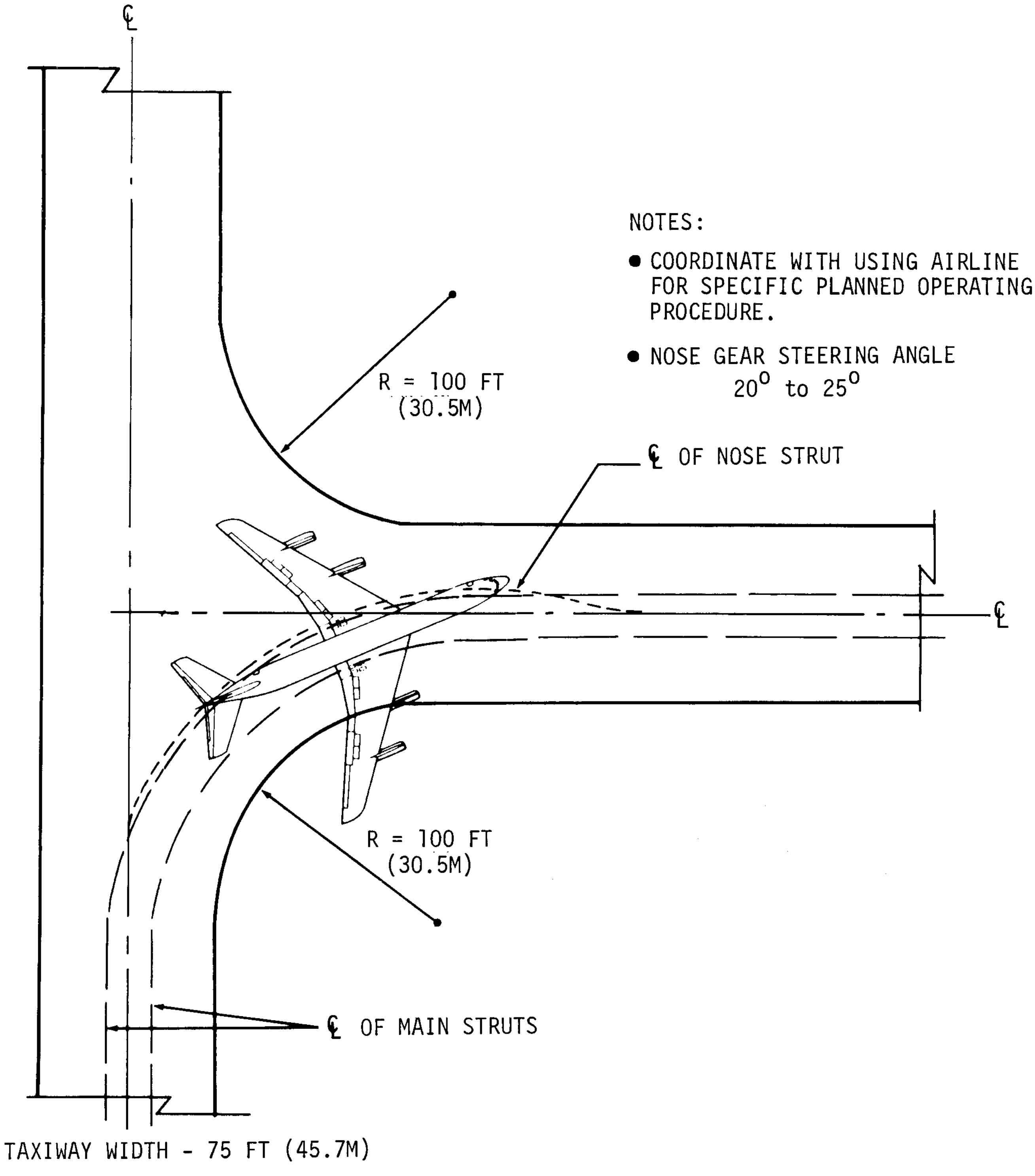
MINIMUM TURNING RADII
MODELS 720, 720B




4.2 RUNWAY AND TAXIWAY TURN PATHS
90° TURN, RUNWAY TO TAXIWAY
MODELS 720, 720B



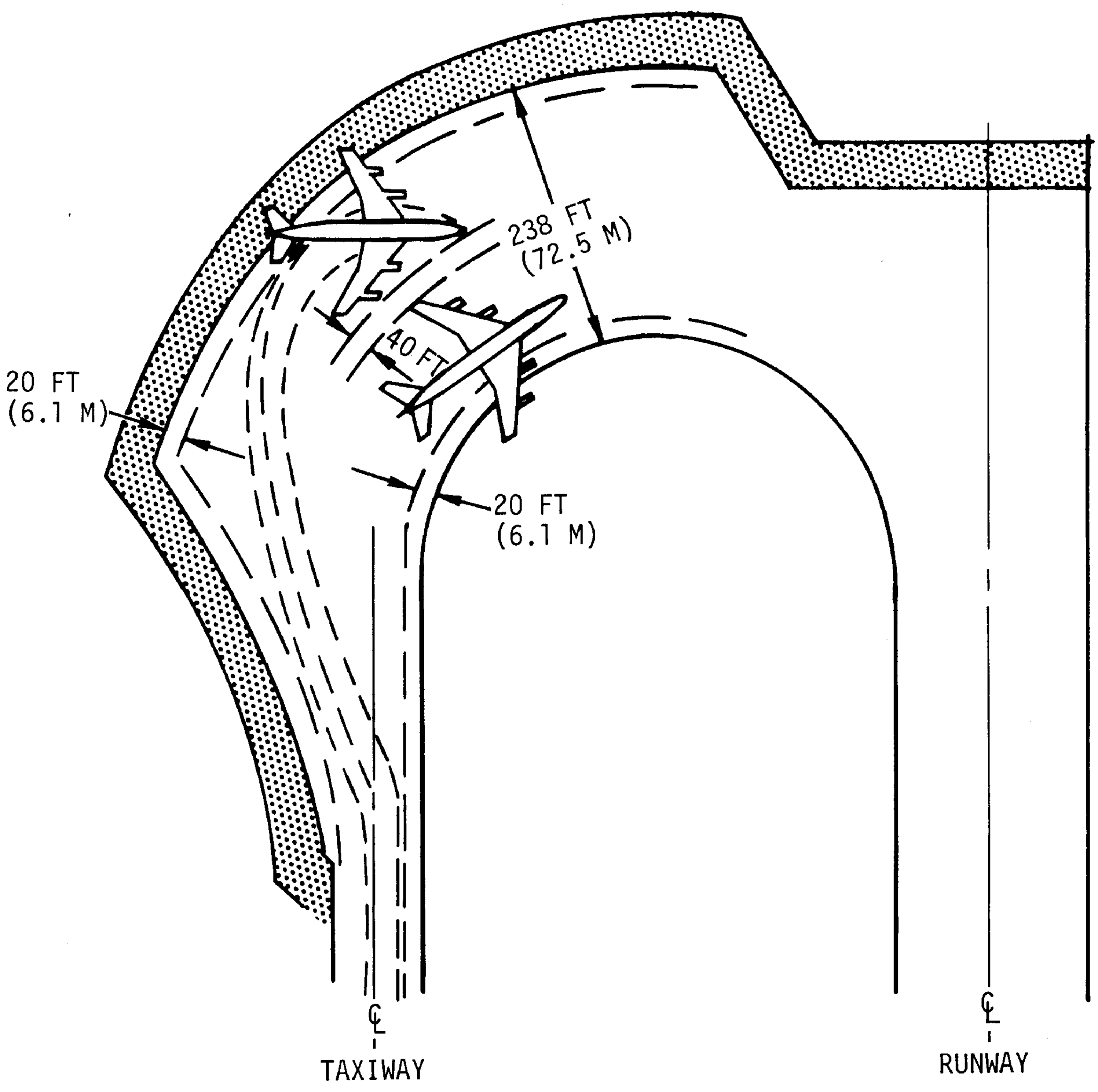

RUNWAY AND TAXIWAY TURN PATHS
RUNWAY TO TAXIWAY TURN—MORE THAN 90°
MODELS 720, 720B



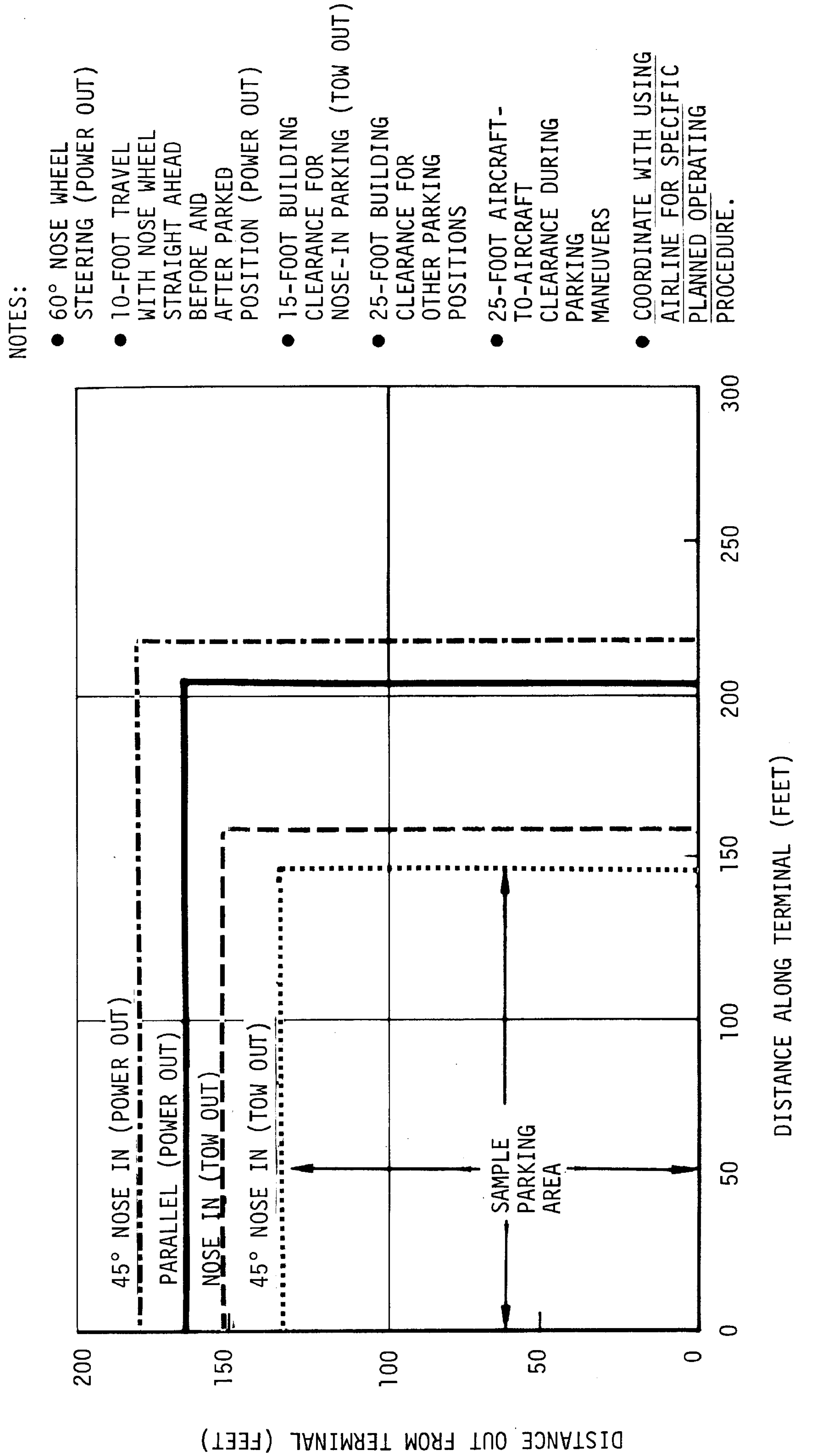

**RUNWAY AND TAXIWAY TURN PATHS**
**TAXIWAY TO TAXIWAY TURN - 90°**
**MODELS 720, 720B**

NOTES:

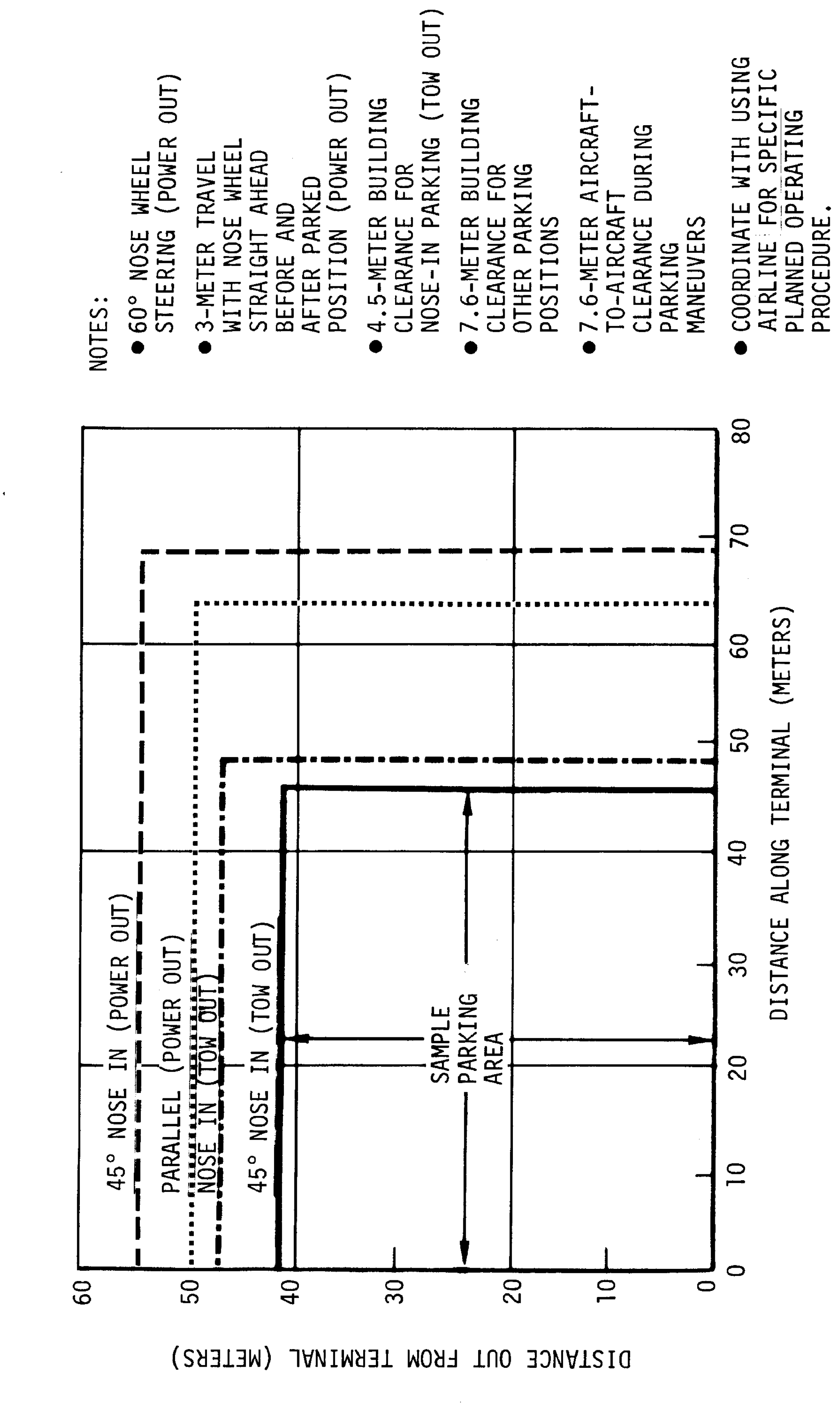
- COORDINATE WITH USING AIRLINE FOR SPECIFIC PLANNED OPERATING PROCEDURE.
- MINIMUM CLEARANCE FOR MOVING AIRCRAFT, 40 FT (12.2 M)




4.3 RUNWAY HOLDING APRON
MODELS 720, 720B




4.4 MINIMUM PARKING SPACE REQUIREMENTS — U.S. MEASUREMENT MODELS 720, 720B




MINIMUM PARKING SPACE REQUIREMENTS — METRIC
MODELS 720, 720B

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# 5.0 TERMINAL SERVICING

5.1 Airplane Servicing Arrangement (Typical)

5.2 Terminal Operations, Turnaround Station

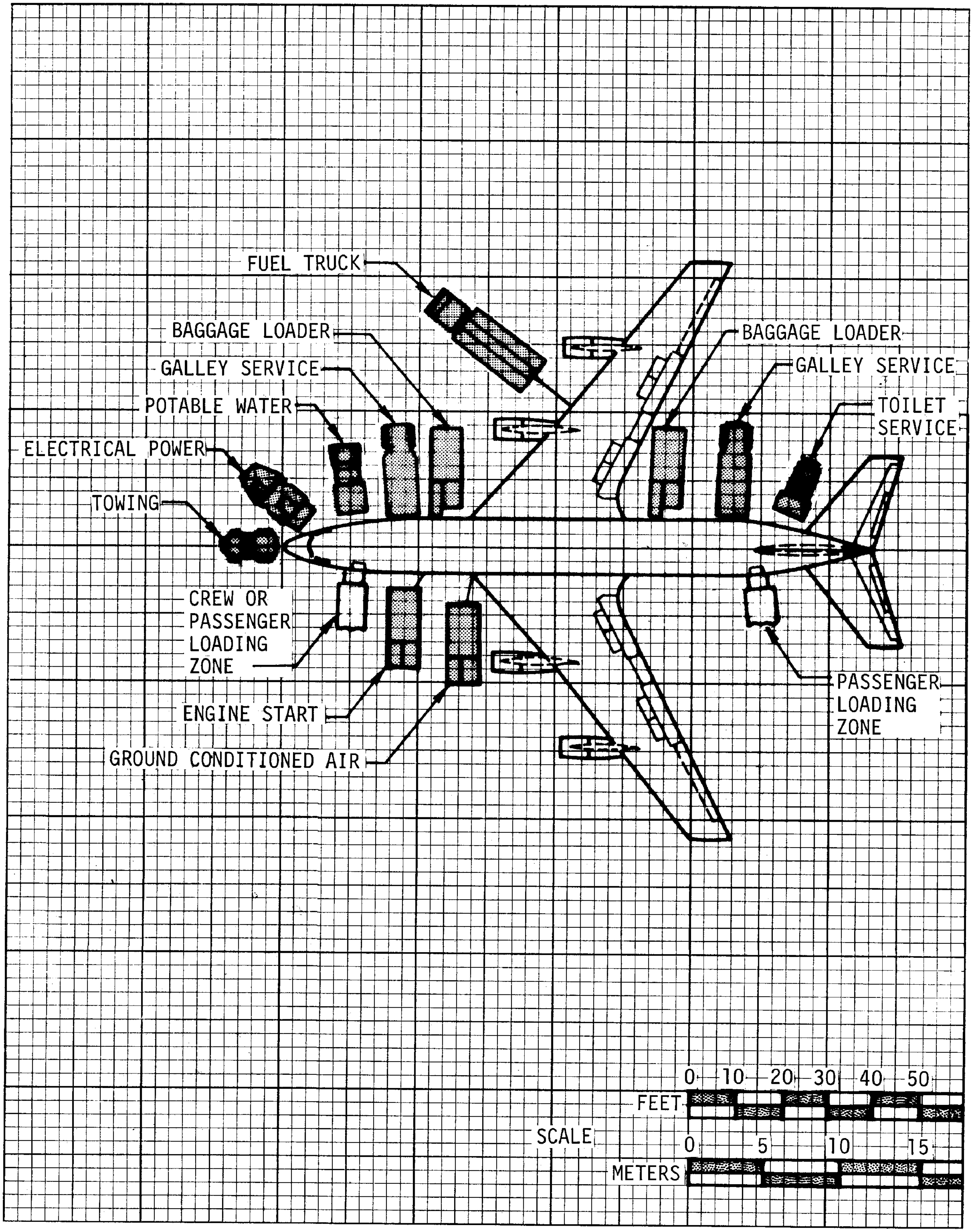
5.3 Terminal Operations, Enroute Station

5.4 Ground Service Connections

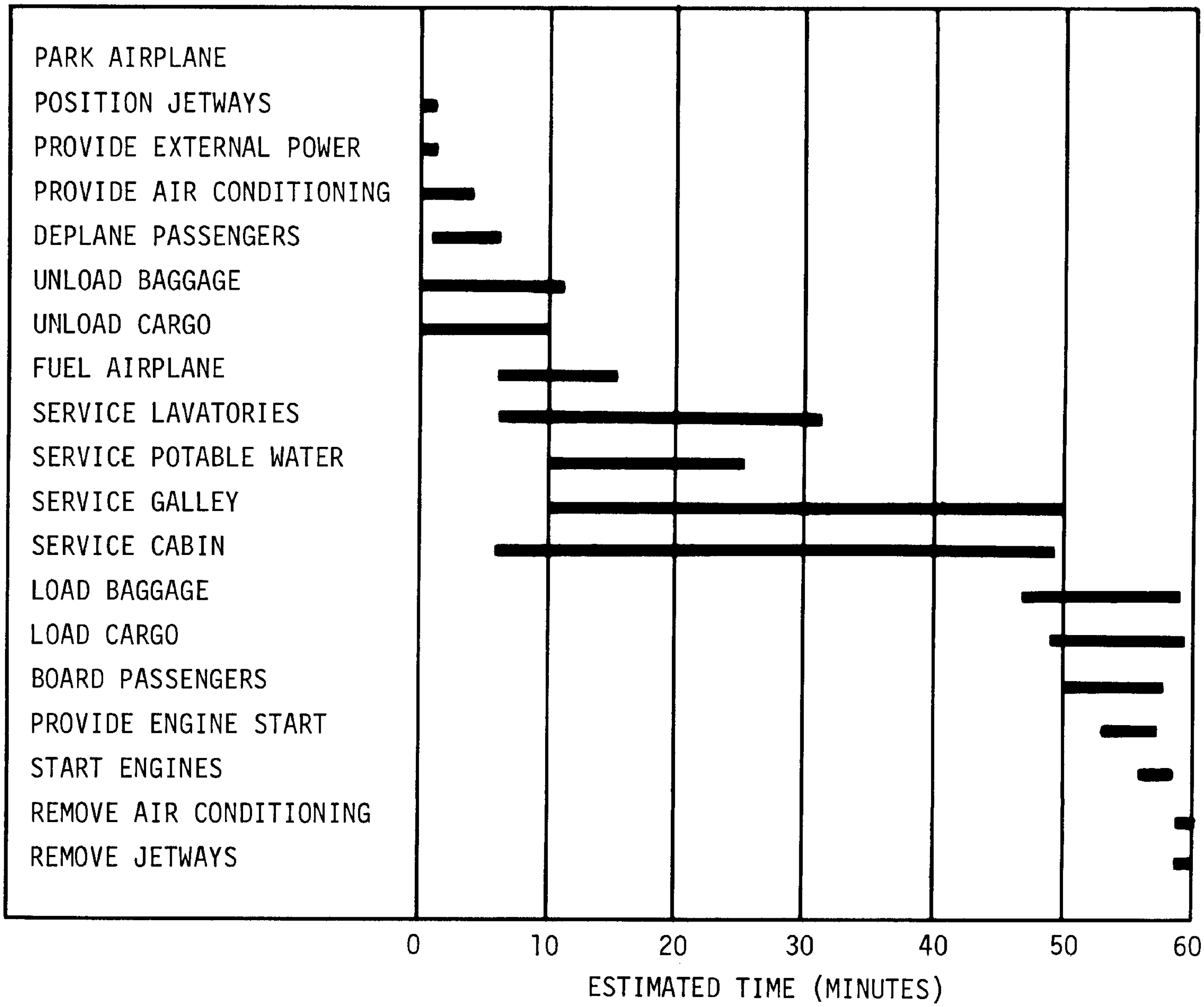
5.5 Engine Starting Pneumatic Requirements

5.6 Air Conditioning Requirements

5.7 Ground Towing Requirements



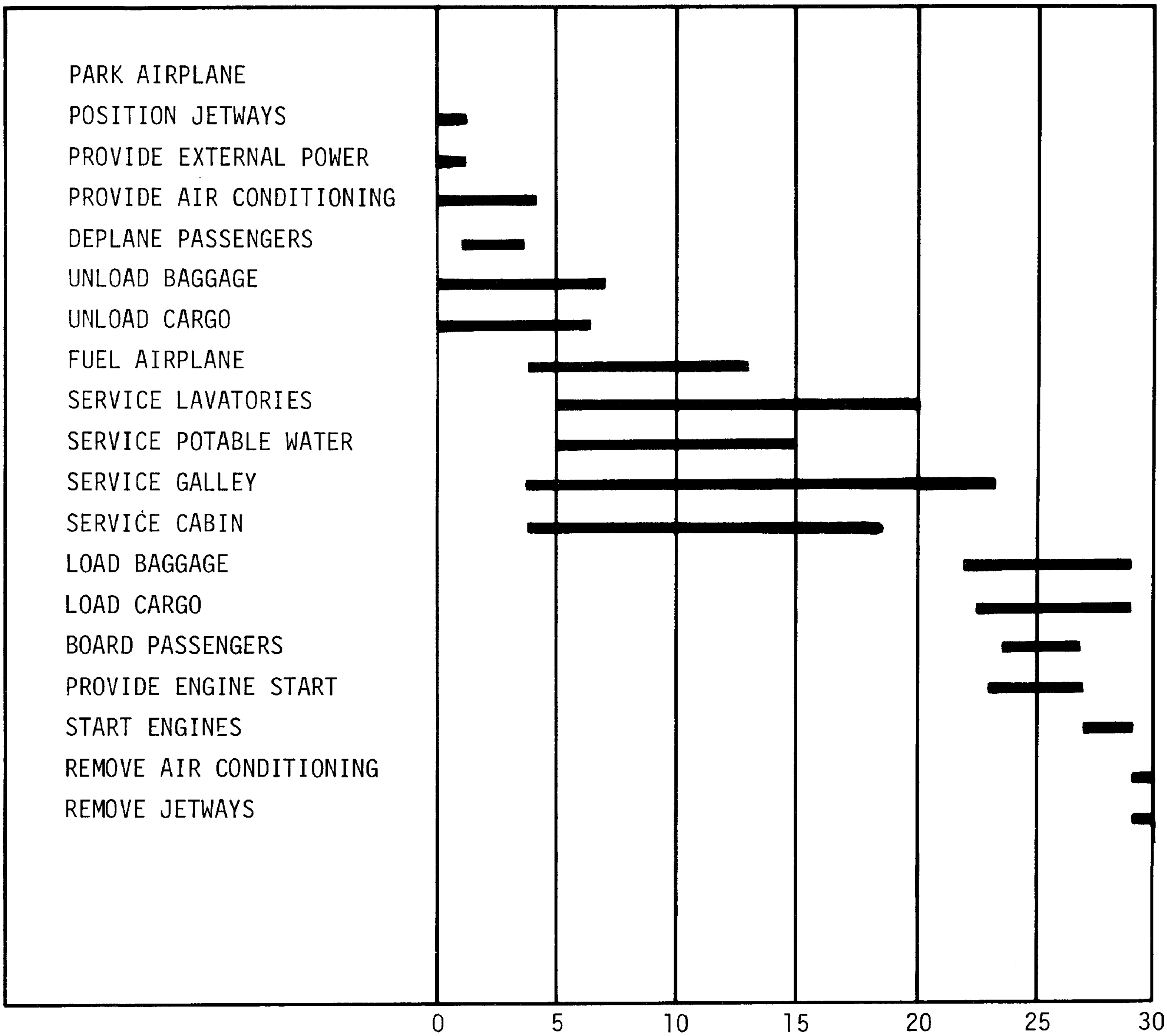

5.1 AIRPLANE SERVICING ARRANGEMENT (TYPICAL)
MODELS 720, 720B




GROUND RULES:

- MIXED CLASS
  (30 FIRST CLASS PLUS 101 TOURIST CLASS)
- DEPLANE ALL
  PASSENGERS AND CARGO
- FUEL=ROUTELEG PLUS RESERVES
- REFUEL AT 1,200 GPM
  (4,542 LPM)
- FLIGHT ROUTE
  JFK-ORD-SFO

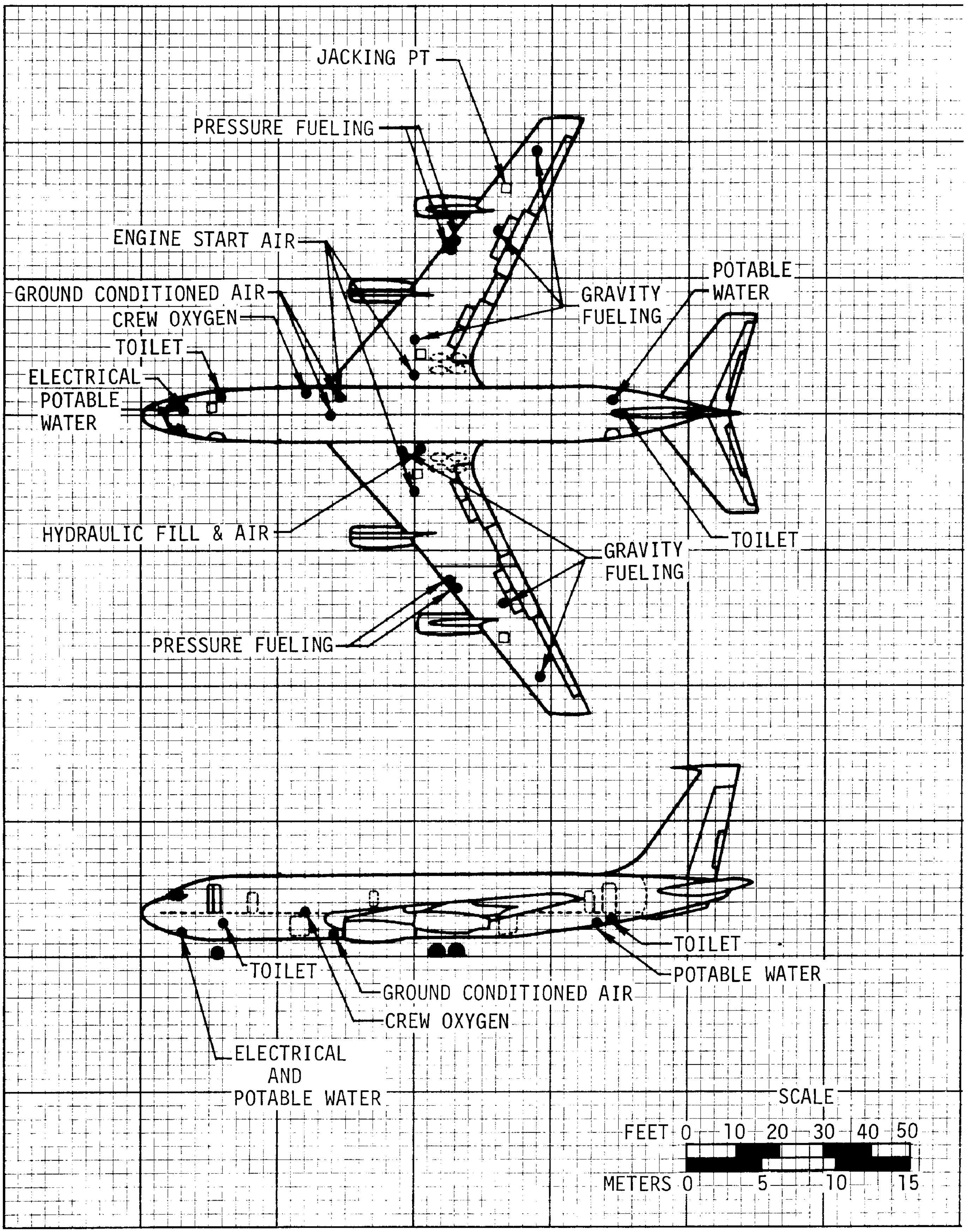
5.2 TERMINAL OPERATIONS, TURNAROUND STATION
MODELS 720, 720B




GROUND RULES:

- MIXED CLASS (30 FIRST CLASS PLUS 101 TOURIST CLASS)
- DEPLANE 1/2 PASSENGERS AND 1/2 CARGO
- REFUEL AT 1,200 GPM (4,542 LPM)
- FUEL=ROUTELEG PLUS RESERVES
- FLIGHT ROUTE JFK-ORD-SFO

5.3 TERMINAL OPERATIONS, ENROUTE STATION
MODELS 720, 720B




5.4 GROUND SERVICE CONNECTIONS
MODELS 720, 720B

| SYSTEM | DISTANCE AFT OF NOSE | | DISTANCE FROM AIRPLANE CENTERLINE | | | | HEIGHT FROM GROUND | |
|---|---|---|---|---|---|---|---|---|
| | | | LEFT SIDE | | RIGHT SIDE | | | |
| | FEET | METERS | FEET | METERS | FEET | METERS | FEET | METERS |
| ELECTRICAL SYSTEM<br><br>ONE SERVICE CONNECTION<br><br>GROUND POWER REQUIRED-75 KW MAXIMUM AT 115/200 VOLTS, 400 CYCLES, 3 PHASE*.<br><br>* EXCEPT 720-023, -023B, -025, and -047B HAVE 2 SERVICE CONNECTIONS. MAXIMUM GROUND REQUIREMENT FOR THESE MODELS IS 160 KW. | 9 | 2.7 | | | 2 | 0.6 | 6 | 1.8 |

SERVICE CONNECTIONS
MODELS 720, 720B

| SYSTEM | DISTANCE AFT OF NOSE | | DISTANCE FROM AIRPLANE CENTERLINE | | | | HEIGHT FROM GROUND | |
|---|---|---|---|---|---|---|---|---|
| | | | LEFT SIDE | | RIGHT SIDE | | | |
| | FEET | METERS | FEET | METERS | FEET | METERS | FEET | METERS |
| FUEL SYSTEM | | | | | | | | |
| FOUR UNDERWING PRESSURE CONNECTIONS (2 EACH WING) | 68 | 20.7 | | | 34 | 10.4 | 9 | 2.7 |
| | 69 | 21.0 | | | 35 | 10.7 | 9 | 2.7 |
| | 68 | 20.7 | 34 | 10.4 | | | 9 | 2.7 |
| 50-PSI (3.52 KG/CM$^2$) MAXIMUM. | 69 | 21.0 | 35 | 10.7 | | | 9 | 2.7 |
| MAXIMUM FUELING RATE USING 4 CONNECTIONS IS APPROXIMATELY 1,500 U.S. GRM (5,678 LPM). | | | | | | | | |
| TOTAL USABLE TANK CAPACITY VARIES BETWEEN 11,859 U.S. GAL. (44,900 LITERS) AND 16,060 U.S. GAL. (60,800 LITERS) SUBJECT TO CUSTOMER OPTION. | | | | | | | | |
| SEVEN OVERWING GRAVITY CONNECTIONS: 4 ON LEFT WING; 3 ON RIGHT WING. | 59 | 18.0 | 9 | 2.7 | | | TOP OF WING | |
| | 62 | 18.9 | | | 17 | 5.2 | TOP OF WING | |
| | 80 | 24.4 | | | 42 | 12.8 | TOP OF WING | |
| | 87 | 26.5 | | | 55 | 16.8 | TOP OF WING | |
| | 62 | 18.9 | 17 | 5.2 | | | TOP OF WING | |
| | 80 | 24.4 | 42 | 12.8 | | | TOP OF WING | |
| | 87 | 26.5 | 55 | 16.8 | | | TOP OF WING | |

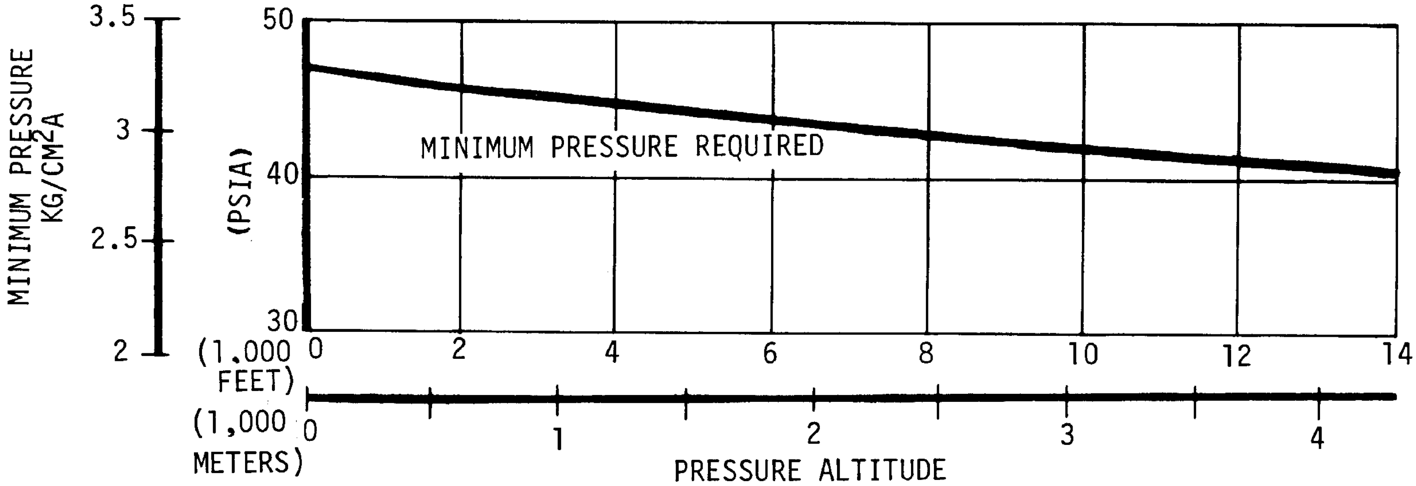
| SYSTEM | DISTANCE AFT OF NOSE | | DISTANCE FROM AIRPLANE CENTERLINE | | | | HEIGHT FROM GROUND | |
|---|---|---|---|---|---|---|---|---|
| | | | LEFT SIDE | | RIGHT SIDE | | | |
| | FEET | METERS | FEET | METERS | FEET | METERS | FEET | METERS |
| GROUND CONDITIONED AIR | | | | | | | | |
| TWO SERVICE CONNECTIONS (EITHER THE 8 IN. OR 3 IN. BELOW SUBJECT TO CUSTOMER OPTION): | | | | | | | | |
| 8 IN. (20.3 CM) CONDITIONED AIR CONNECTION. 40 IN. $H_2O$, 160°F MAXIMUM, 300 LB/MINUTE. (102.0 CM $H_2O$,71°C MAXIMUM, 136 KG/MINUTE) AT FITTING. | 42 | 12.8 | 0 | 0 | 0 | 0 | 4 | 1.2 |
| 3 IN. (7.6 CM) SERVICE AIR CONNECTION 40 PSIG, 450°F MAXIMUM, 350 LB/MINUTE (2.6 $KG/CM^2$, 232°C MAXIMUM, 159 KG/MINUTE) AT FITTING. | 44 | 13.4 | | | 3 | 0.9 | 5 | 1.5 |

| SYSTEM | DISTANCE AFT OF NOSE | | DISTANCE FROM AIRPLANE CENTERLINE | | | | HEIGHT FROM GROUND | |
|---|---|---|---|---|---|---|---|---|
| | | | LEFT SIDE | | RIGHT SIDE | | | |
| | FEET | METERS | FEET | METERS | FEET | METERS | FEET | METERS |
| HYDRAULIC SYSTEM | | | | | | | | |
| ONE SERVICE CONNECTION (LH WHEEL WELL) | | | | | | | | |
| 1-3/4 IN. (4.5 CM) FILLER NECK ON UTILITY RESERVOIR | 63 | 19.2 | 7 | 2.1 | | | 5 | 1.5 |
| OXYGEN SYSTEM* | | | | | | | | |
| CREW SYSTEM | | | | | | | | |
| ONE SERVICE CONNECTION: (FORWARD RH CARGO HOLD) | 38 | 11.6 | | | 5 | 1.5 | 9 | 2.7 |
| * PASSENGER SYSTEM OXYGEN BOTTLES MUST BE REMOVED FROM THE AIRPLANE TO BE RECHARGED | | | | | | | | |

| SYSTEM | DISTANCE AFT OF NOSE | | DISTANCE FROM AIRPLANE CENTERLINE | | | | HEIGHT FROM GROUND | |
|---|---|---|---|---|---|---|---|---|
| | | | LEFT SIDE | | RIGHT SIDE | | | |
| | FEET | METERS | FEET | METERS | FEET | METERS | FEET | METERS |
| PNEUMATIC AIR | | | | | | | | |
| ENGINE STARTING | | | | | | | | |
| TWO SERVICE CONNECTIONS: | | | | | | | | |
| 3000 PSIG (211 $KG/CM^2$) | 63 | 19.2 | | | 7 | 2.1 | 5 | 1.5 |
| 46 PSIG (3.2 $KG/CM^2$) 3 IN. (7.6 CM) FITTING. | 44 | 13.4 | | | 3 | 0.9 | 5 | 1.5 |
| UTILITY HYDRAULIC RESERVOIR | | | | | | | | |
| ONE SERVICE CONNECTION: | | | | | | | | |
| 45 PSIG (3.2 $KG/CM^2$) (LH WHEEL WELL) | 63 | 19.2 | 7 | 2.1 | | | 5 | 1.5 |
| TOILET SYSTEM | | | | | | | | |
| TWO SERVICE CONNECTIONS: 4 IN. (10.2 CM) OUTLET FOR EACH GROUP OF 2 OR 3 TOILETS. | 17<br>107 | 5.2<br>32.6 | <br>0 | <br>0 | 5<br>0 | 1.5<br>0 | 8<br>8 | 2.4<br>2.4 |
| TO SERVICE 5 OR 6 TOILETS: DRAIN 125-150 U.S. GAL. (474-568 L) OF WASTE. | | | | | | | | |
| FLUSH WITH 36 U.S. GAL. (137 L) OF WATER AND 24 U.S. GAL. (91 L) OF CHEMICAL. | | | | | | | | |
| RECHARGE EACH TOILET WITH 4 U.S. GAL. (15.2 L) OF CHEMICAL AFTER FLUSHING. | | | | | | | | |

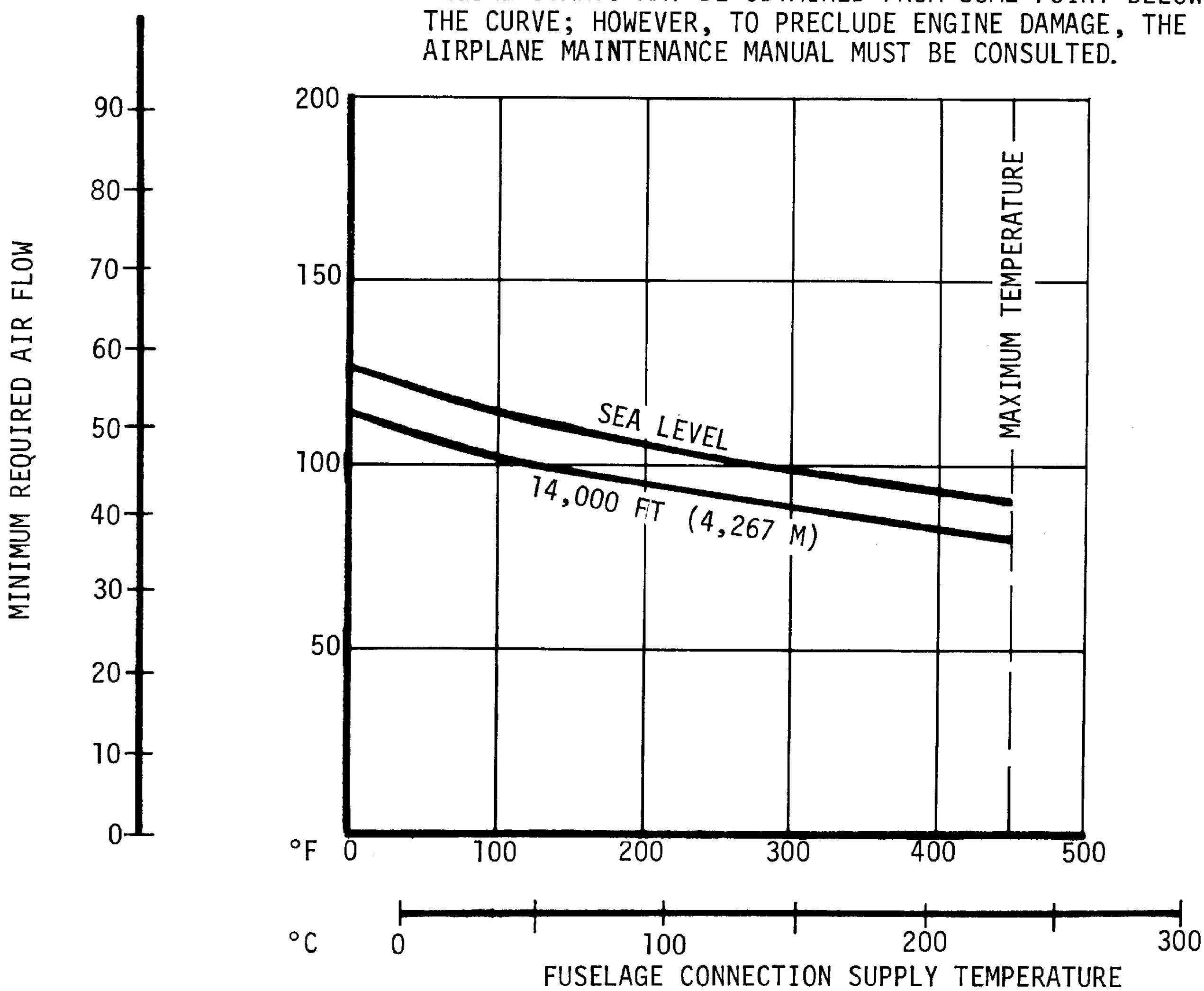
SERVICE CONNECTIONS
MODELS 720, 720B

| SYSTEM | DISTANCE AFT OF NOSE | | DISTANCE FROM AIRPLANE CENTERLINE | | | | HEIGHT FROM GROUND | |
|---|---|---|---|---|---|---|---|---|
| | | | LEFT SIDE | | RIGHT SIDE | | | |
| | FEET | METERS | FEET | METERS | FEET | METERS | FEET | METERS |
| WATER SYSTEM (POTABLE) | | | | | | | | |
| TWO SERVICE CONNECTIONS: | | | | | | | | |
| FWD TANK, 43 OR 60 U.S. GAL* (16.3 OR 22.7 L) | 9 | 2.7 | | | 20 IN. | 0.5 | 7 | 2.1 |
| AFT TANK, 43 OR 60 U.S. GAL* (16.3 OR 22.7 L) | 103 | 31.4 | | | 26 IN. | 0.7 | 8 | 2.4 |
| 1/2 OR 3/4 IN.(1.3 OR 1.91 GM) HOSE FITTING. FILL PRESSURE 20 TO 85 PSIG (1.4 TO 5.97 $KG/CM^2$). | | | | | | | | |
| * SUBJECT TO CUSTOMER PREFERENCE | | | | | | | | |
| WATER INJECTION SYSTEM | | | | | | | | |
| NONE ON MODELS 720 OR 720B | | | | | | | | |



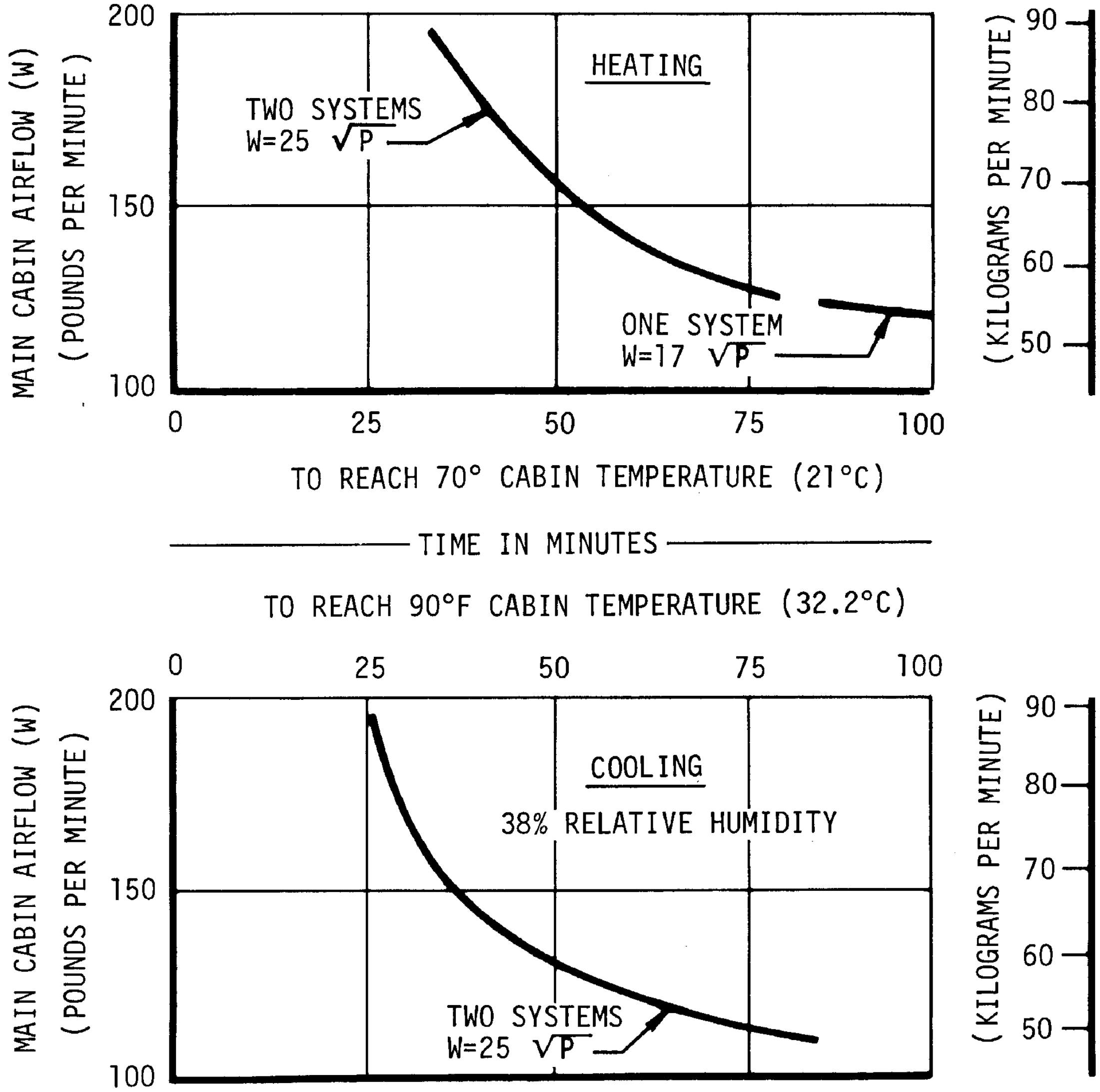

NOTES:

- MAXIMUM PRESSURE - NO AIR FLOW - 75 PSIA (5.2 KG/CM$^2$A)
- TO PROVIDE ADEQUATE ENGINE STARTING, THE PNEUMATIC SUPPLY MUST ALLOW OPERATION ON OR ABOVE THE CURVE.
- ENGINE STARTS MAY BE OBTAINED FROM SOME POINT BELOW THE CURVE; HOWEVER, TO PRECLUDE ENGINE DAMAGE, THE AIRPLANE MAINTENANCE MANUAL MUST BE CONSULTED.




5.5 ENGINE STARTING PNEUMATIC REQUIREMENTS
MODELS 720, 720B

INITIAL CABIN TEMPERATURE AT 0°F (-17.8°C). NO GALLEY LOAD. NO ELECTRICAL LOAD. NO CREW OR PASSENGERS. TEMPERATURE AT GROUND CONNECTION = 450°F (232.2°C).



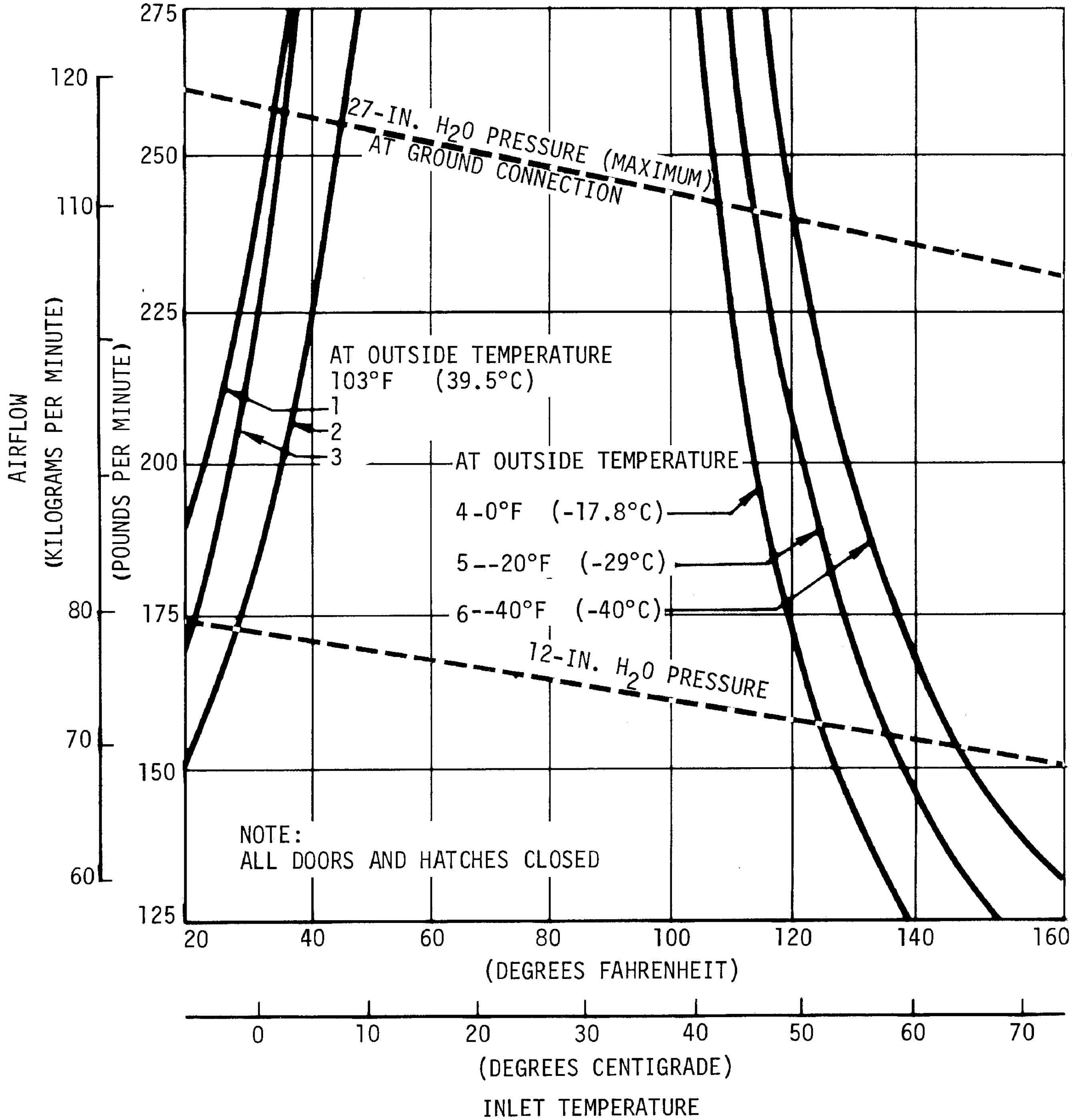

INITIAL CABIN TEMPERATURE AT 103°F (39.4°C). OUTSIDE AIR TEMPERATURE AT 103°F. SOLAR LOAD 4,600 BTU/HR (1,160 KG-CAL/HR). NO GALLEY LOAD. NO CREW OR PASSENGERS. NO ELECTRICAL LOAD. TEMPERATURE AT GROUND CONNECTION 450°F (232.2°C).

NOTES:

- P = ABSOLUTE PRESSURE AT GROUND CONNECTION
- ALL DOORS AND HATCHES CLOSED

5.6 AIR CONDITIONING REQUIREMENTS — PULL UP/PULL DOWN
MODELS 720, 720B

1—CABIN AT 75°F (24°C). PASSENGERS AND CREW 110. NO GALLEY LOAD. BRIGHT DAY SOLAR LOAD 4,600 BTU/HR (1,160 KG-CAL/HR). ELECTRICAL LOAD 7,000 BTU/HR (1,760 KG-CAL/HR).
2—CABIN AT 80°F (26.7°C). ALL OTHER CONDITIONS SAME AS 1.
3—CABIN AT 70°F (21°C). THREE CREW MEMBERS ONLY. GALLEY LOAD 7,400 BTU/HR (1,860 KG-CAL/HR). BRIGHT DAY SOLAR LOAD 4,600 BTU/HR (1,160 KG-CAL/HR). ELECTRICAL LOAD 7,600 BTU/HR (1,920 KG-CAL/HR).
4, 5 AND 6—CABIN AT 75°F (24°C). NO CREW OR PASSENGERS. NO OTHER HEAT LOAD.




AIR CONDITIONING REQUIREMENTS – PRECONDITIONED AIRPLANE
MODELS 720, 720B

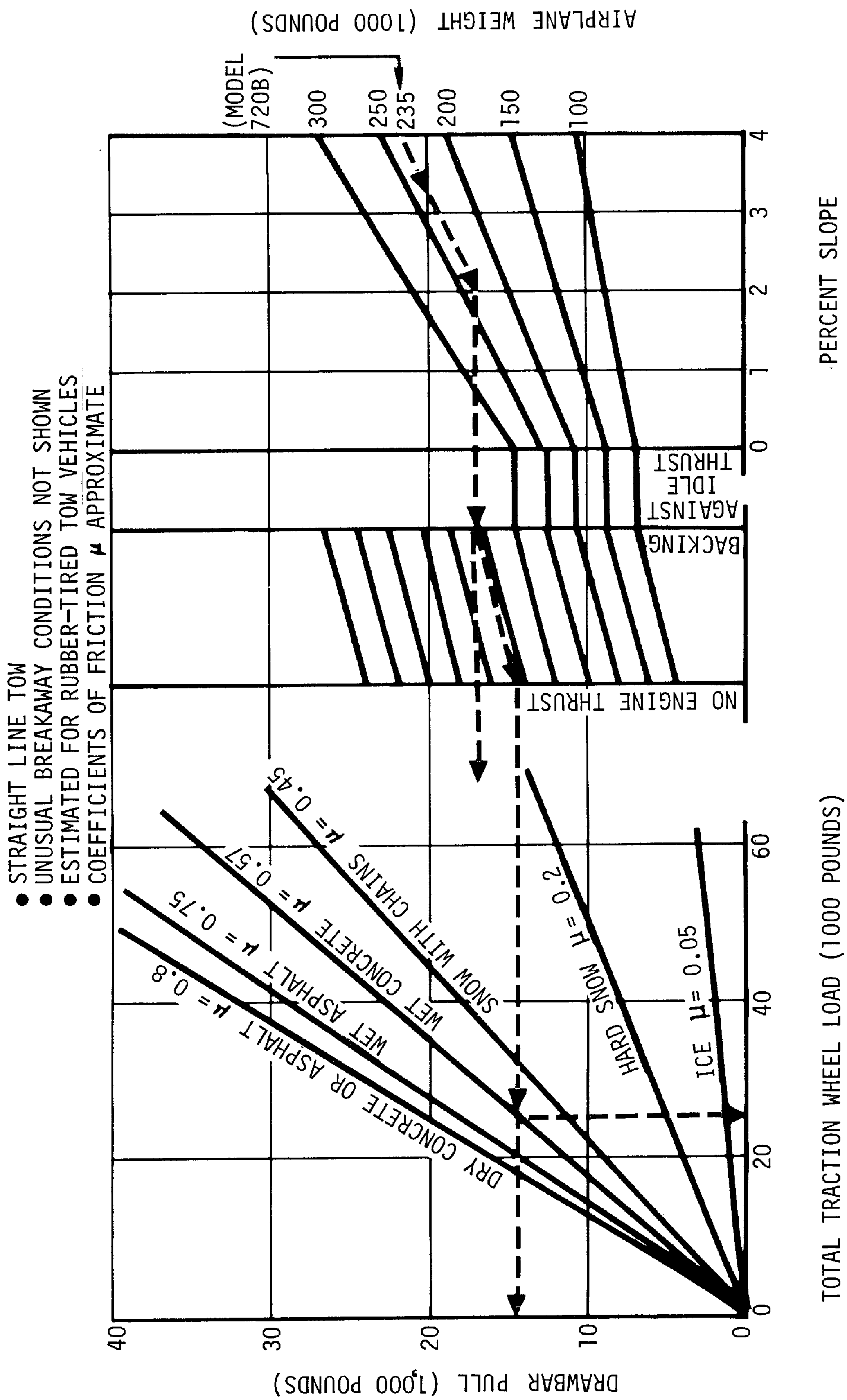
## 5.7 Ground Towing Requirements

Ground towing requirements for various towing conditions are presented on Pages **52 and 53.**

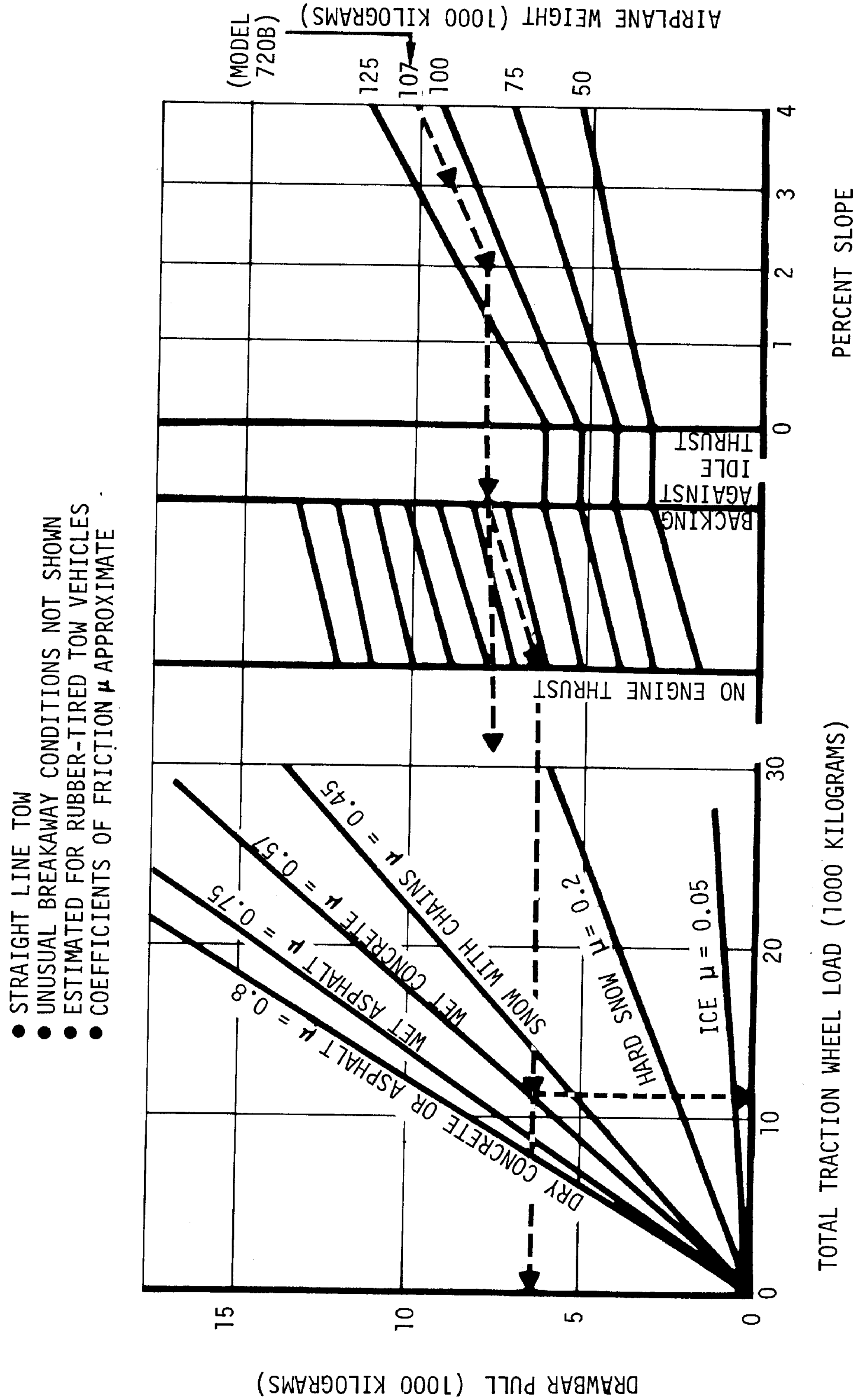
Drawbar pull and total traction wheel load may be determined considering airplane weight, pavement slope, and coefficient of friction and engine idle thrust.

<u>Example:</u>

An example is illustrated on Page **52** for the Model 720B with a maximum taxi weight of 235,000 pounds and engines off (no engine thrust). Assuming the pavement to be wet concrete with a 2-degree slope, the required total traction wheel load would be 24,800 pounds; the drawbar pull would be 14,100 pounds. Note, when backing against idle thrust these numbers would change to 29,000 and 16,500 pounds, respectively.




GROUND TOWING REQUIREMENTS
MODELS 720, 720B




GROUND TOWING REQUIREMENTS — METRIC
MODELS 720, 720B

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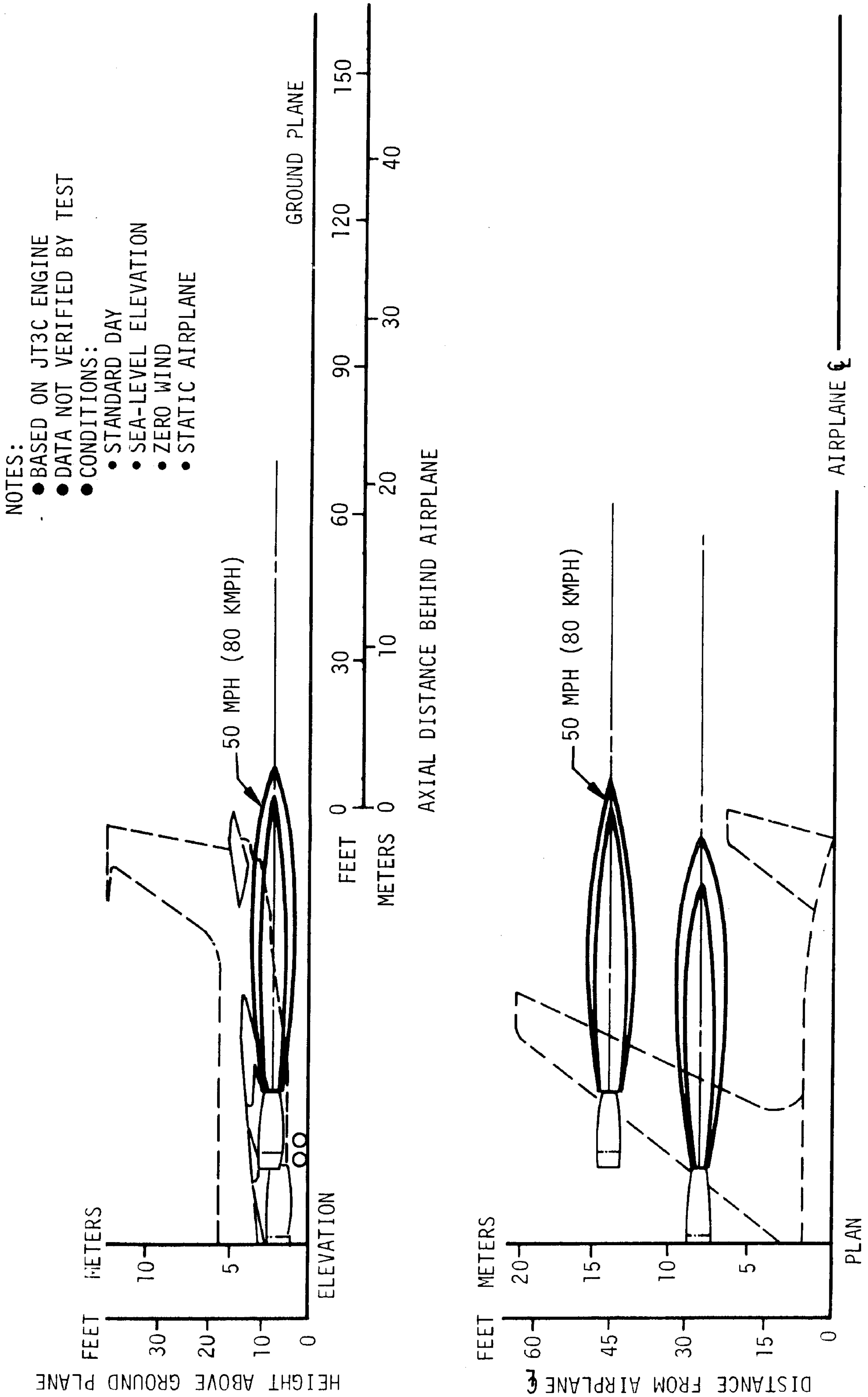
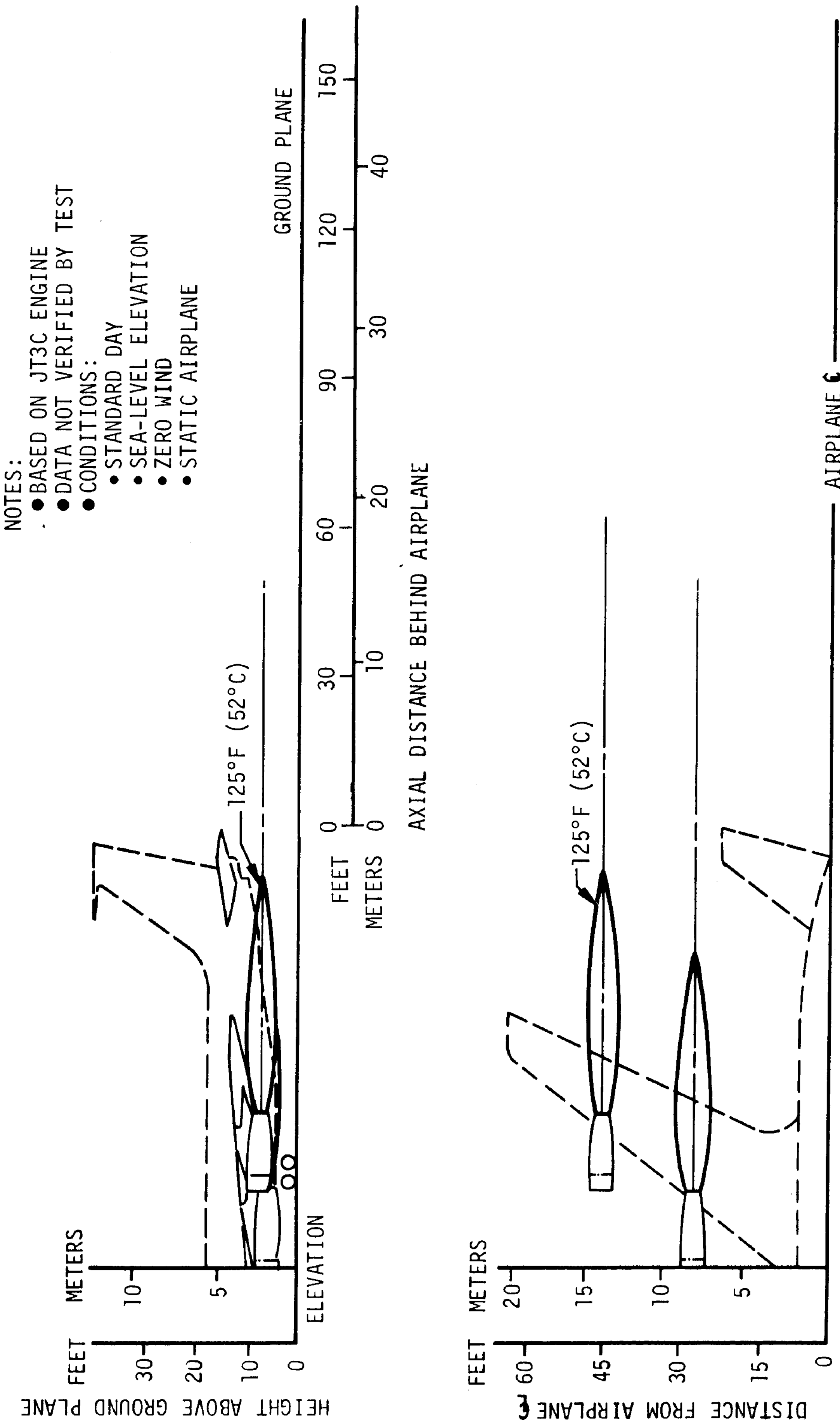
# 6.0 JET ENGINE WAKE AND NOISE DATA

6.1 Jet Engine Exhaust Velocities and Temperatures

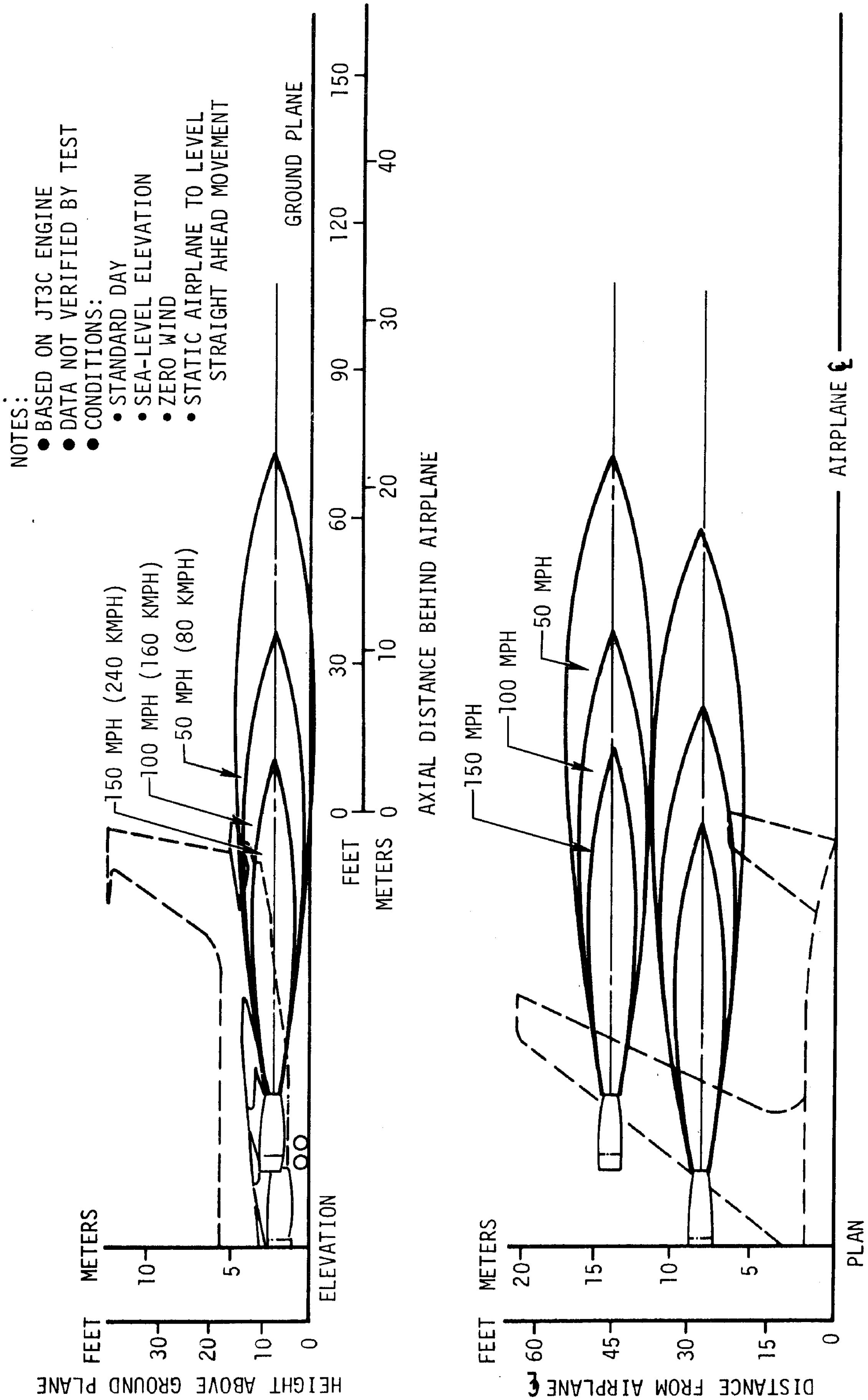
6.2 Airport and Community Noise



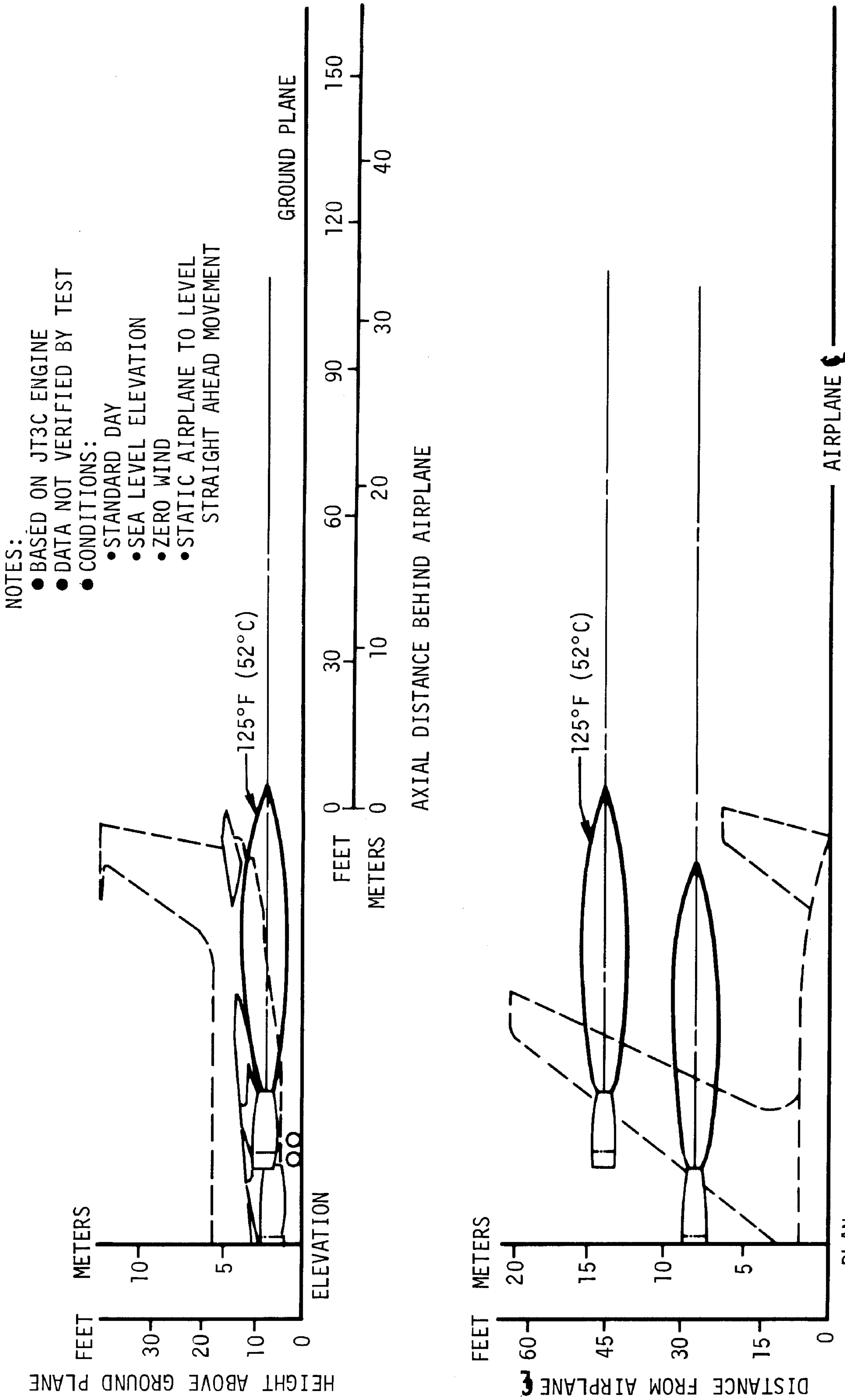

6.1 JET ENGINE EXHAUST — VELOCITY CONTOURS — IDLE POWER
MODEL 720



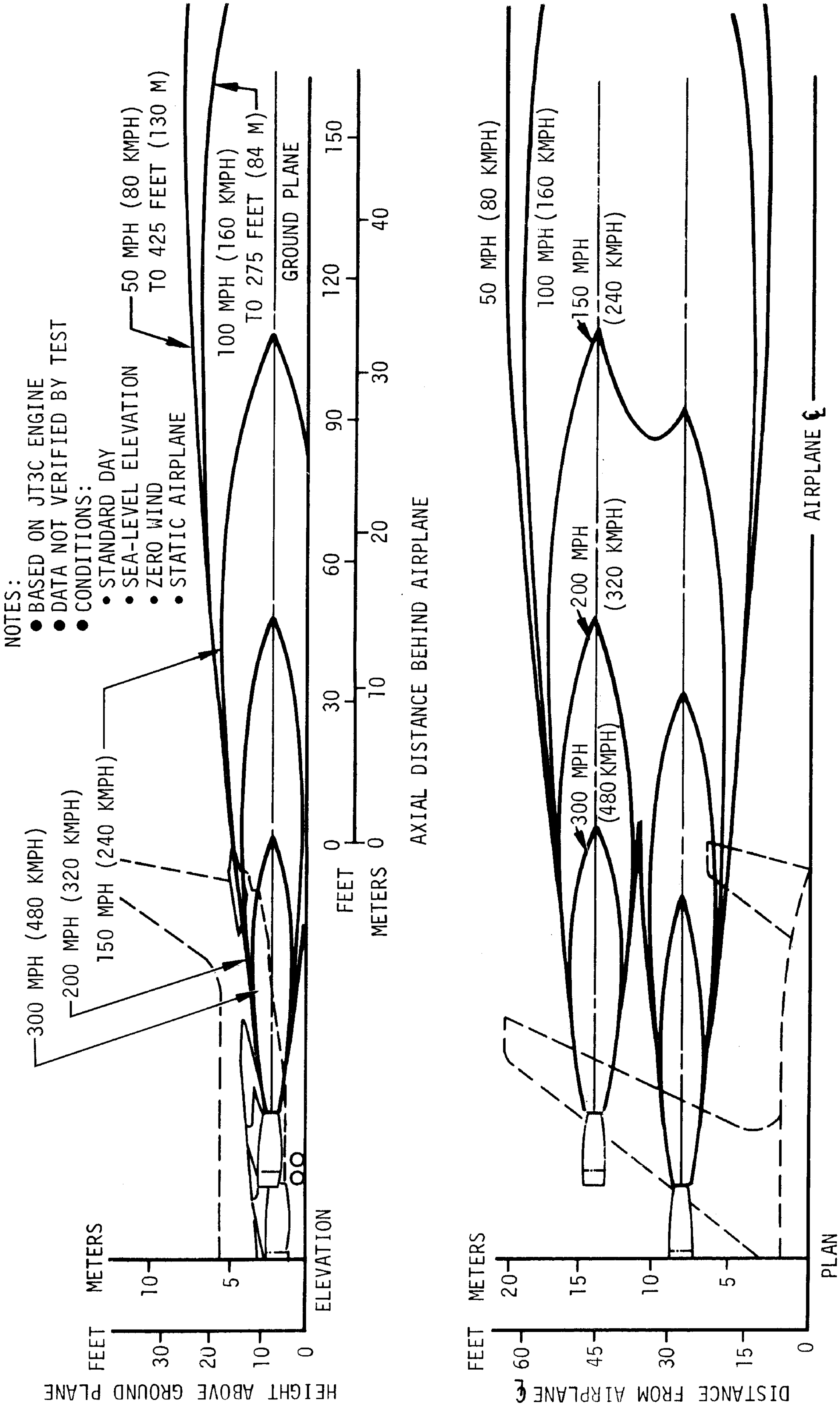

JET ENGINE EXHAUST — TEMPERATURE CONTOURS — IDLE POWER
MODEL 720



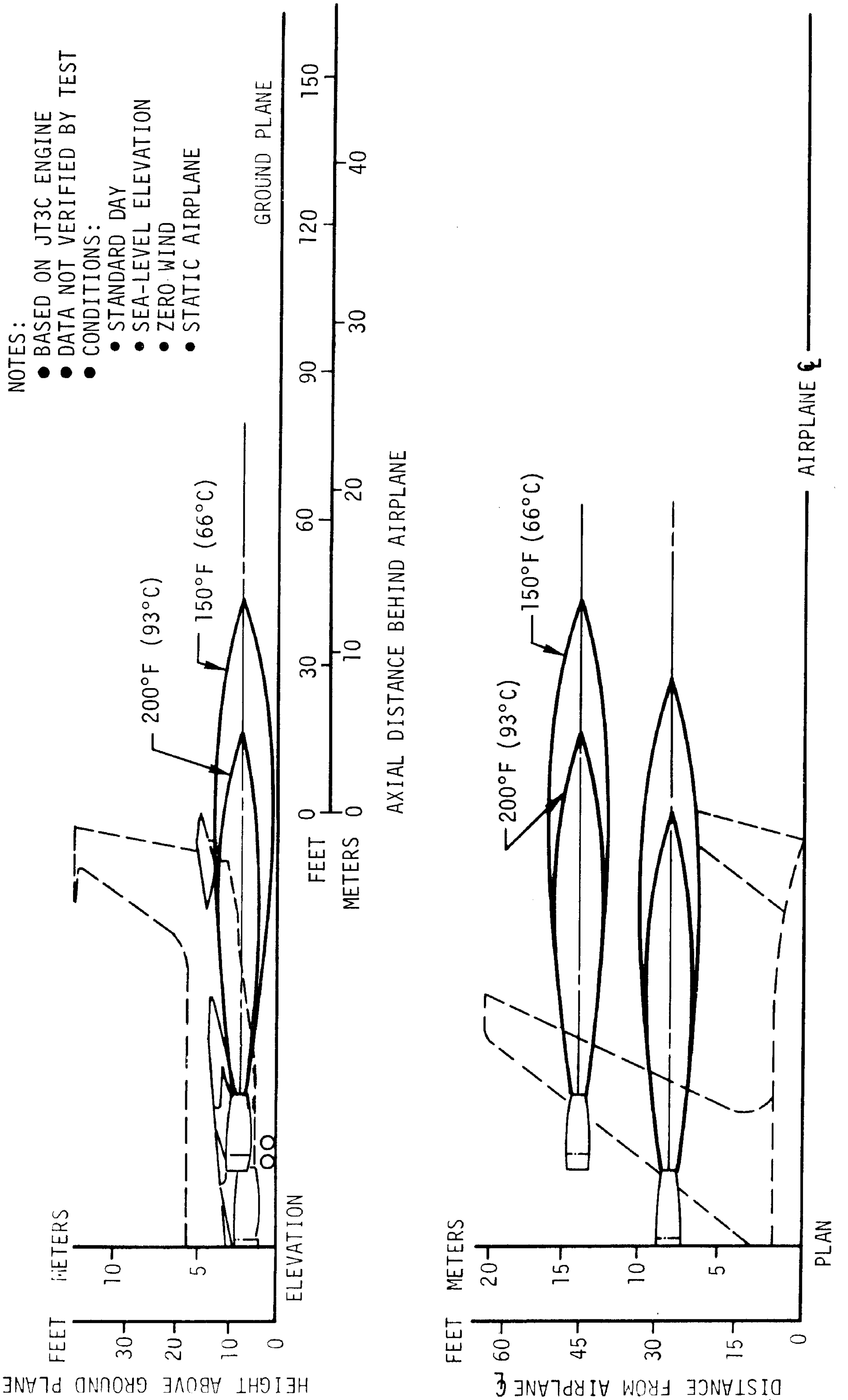

JET ENGINE EXHAUST — VELOCITY CONTOURS — BREAKAWAY POWER
MODEL 720



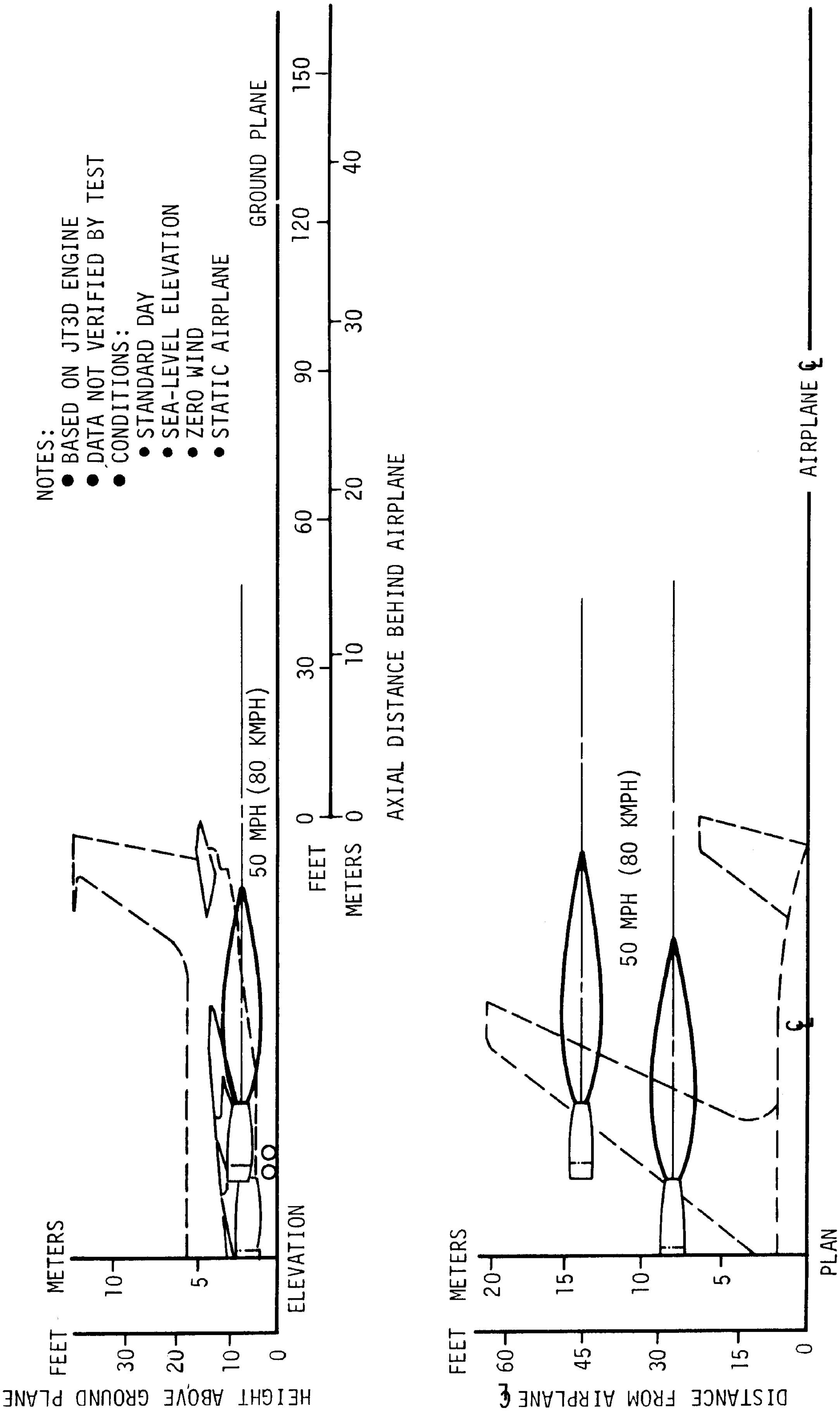

JET ENGINE EXHAUST — TEMPERATURE CONTOURS — BREAKAWAY POWER
MODEL 720



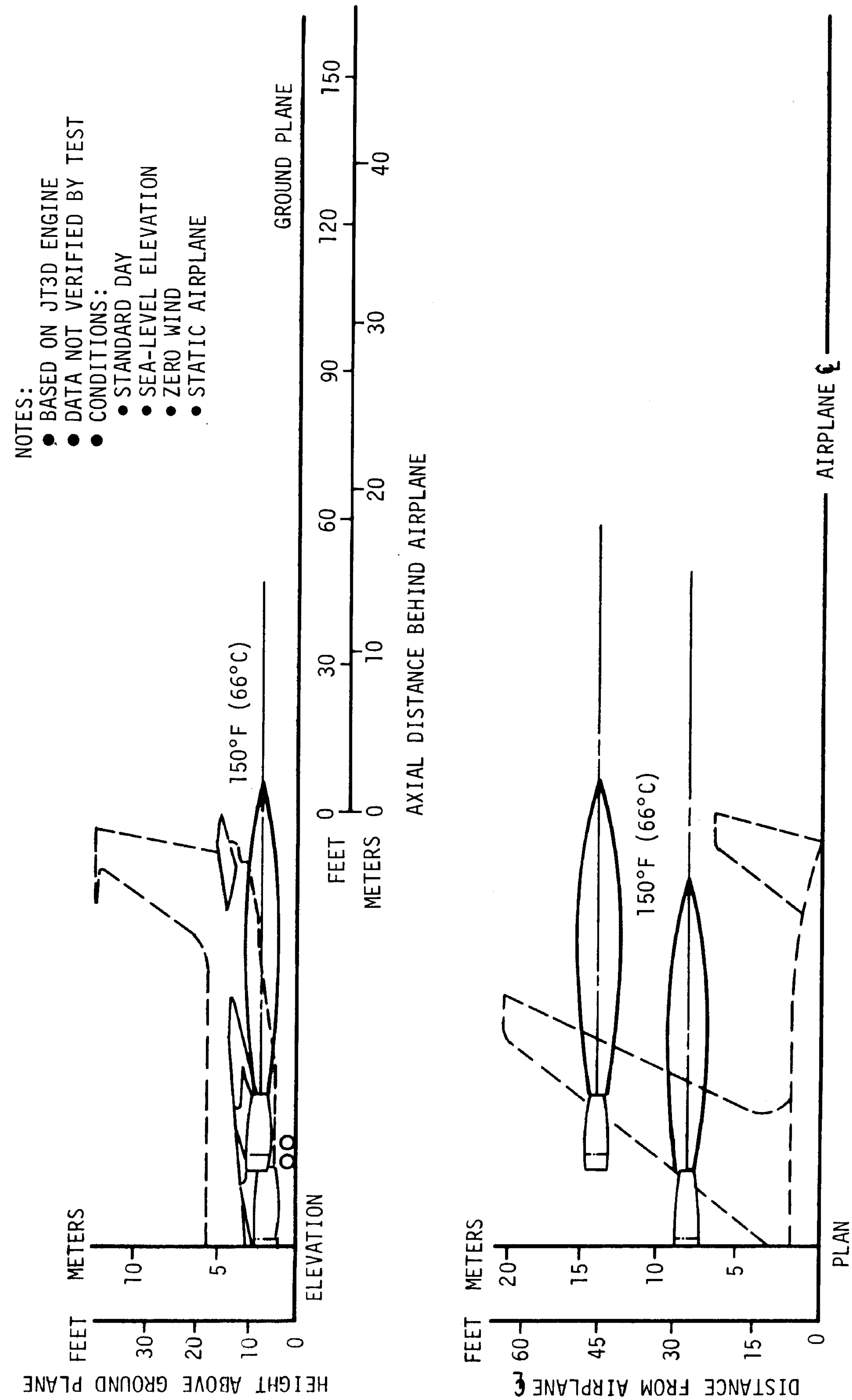

JET ENGINE EXHAUST — VELOCITY CONTOURS — MAXIMUM POWER
MODEL 720



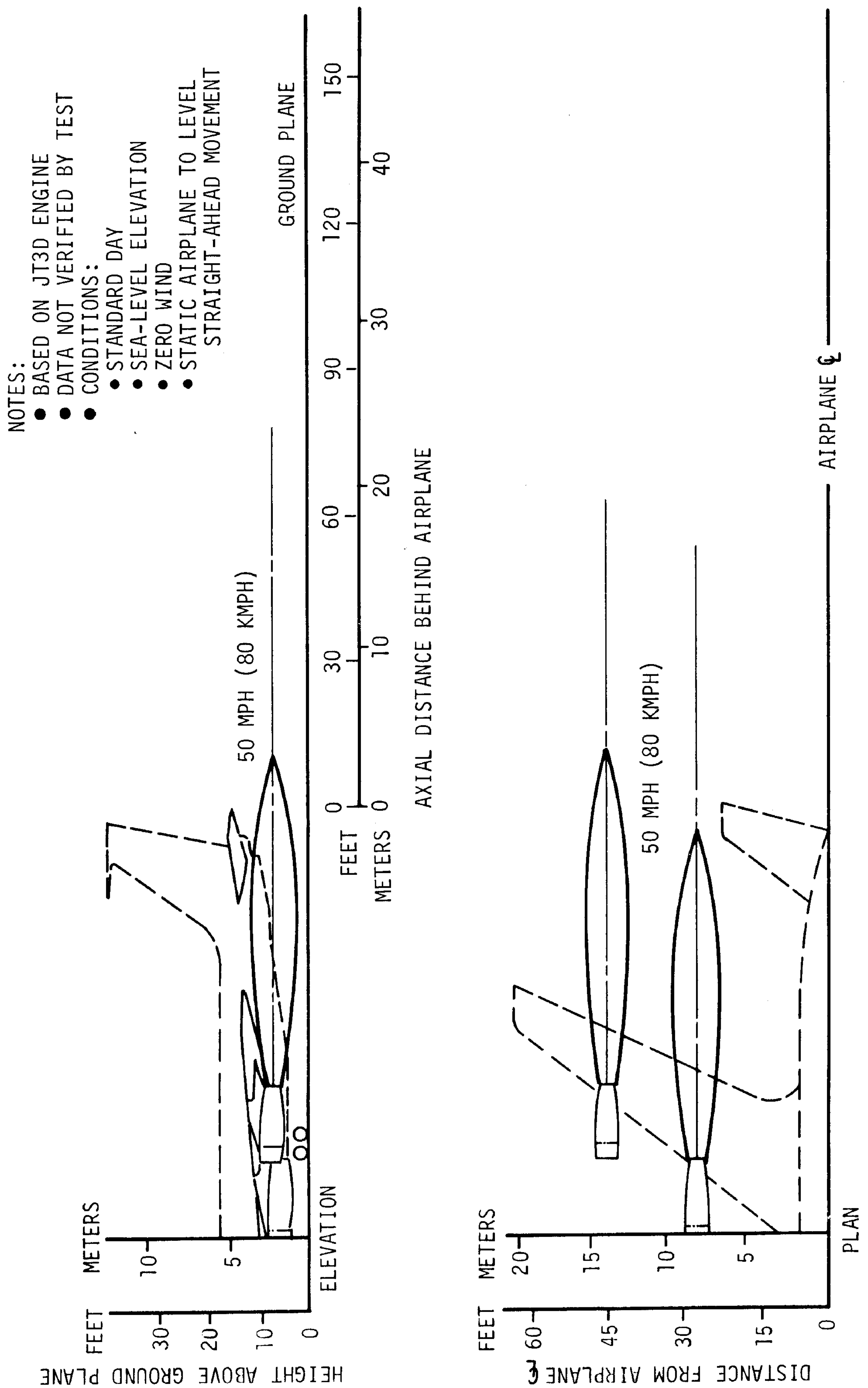

JET ENGINE EXHAUST — TEMPERATURE CONTOURS — MAXIMUM POWER
MODEL 720



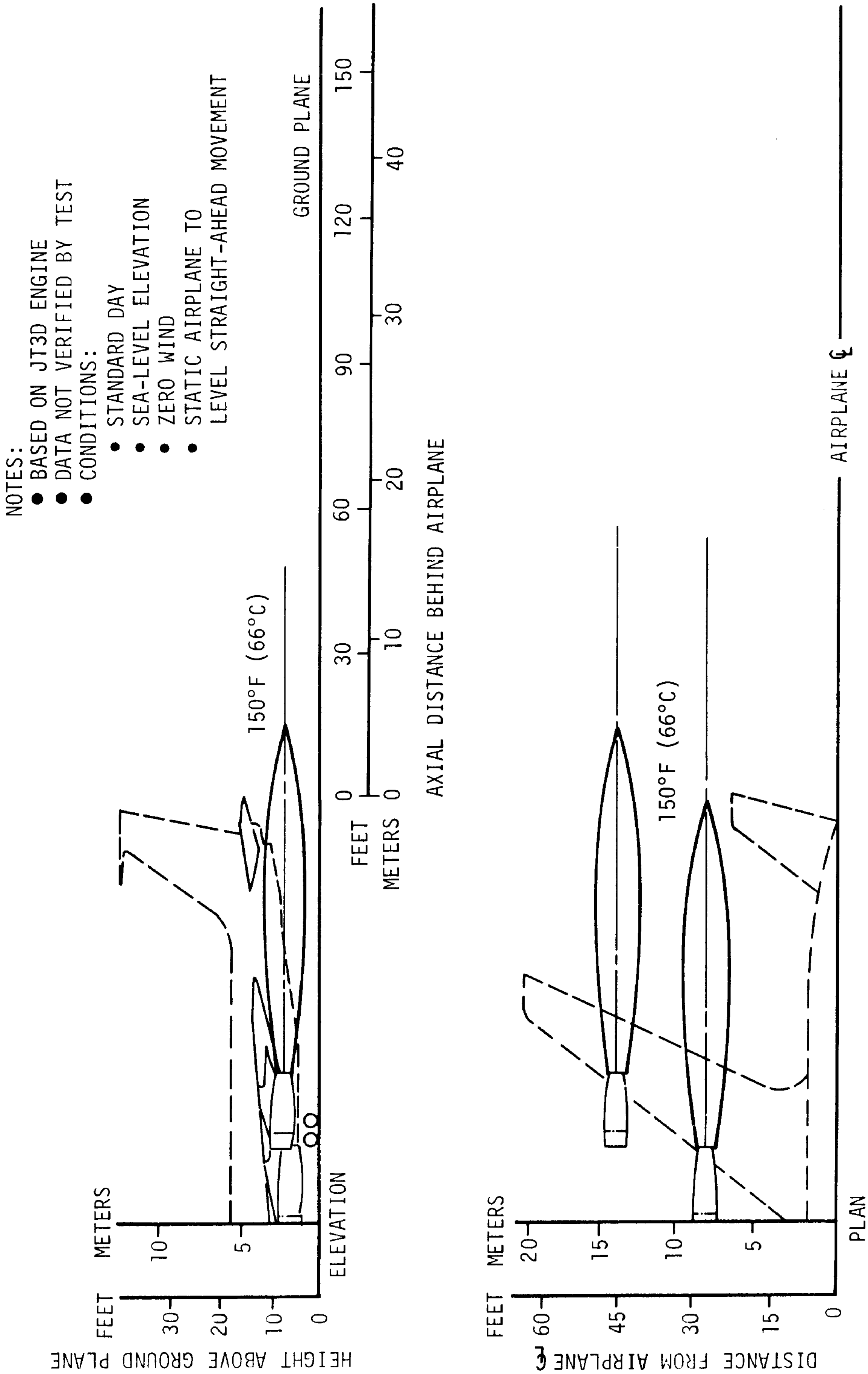

JET ENGINE EXHAUST — VELOCITY CONTOURS — IDLE POWER
MODEL 720B



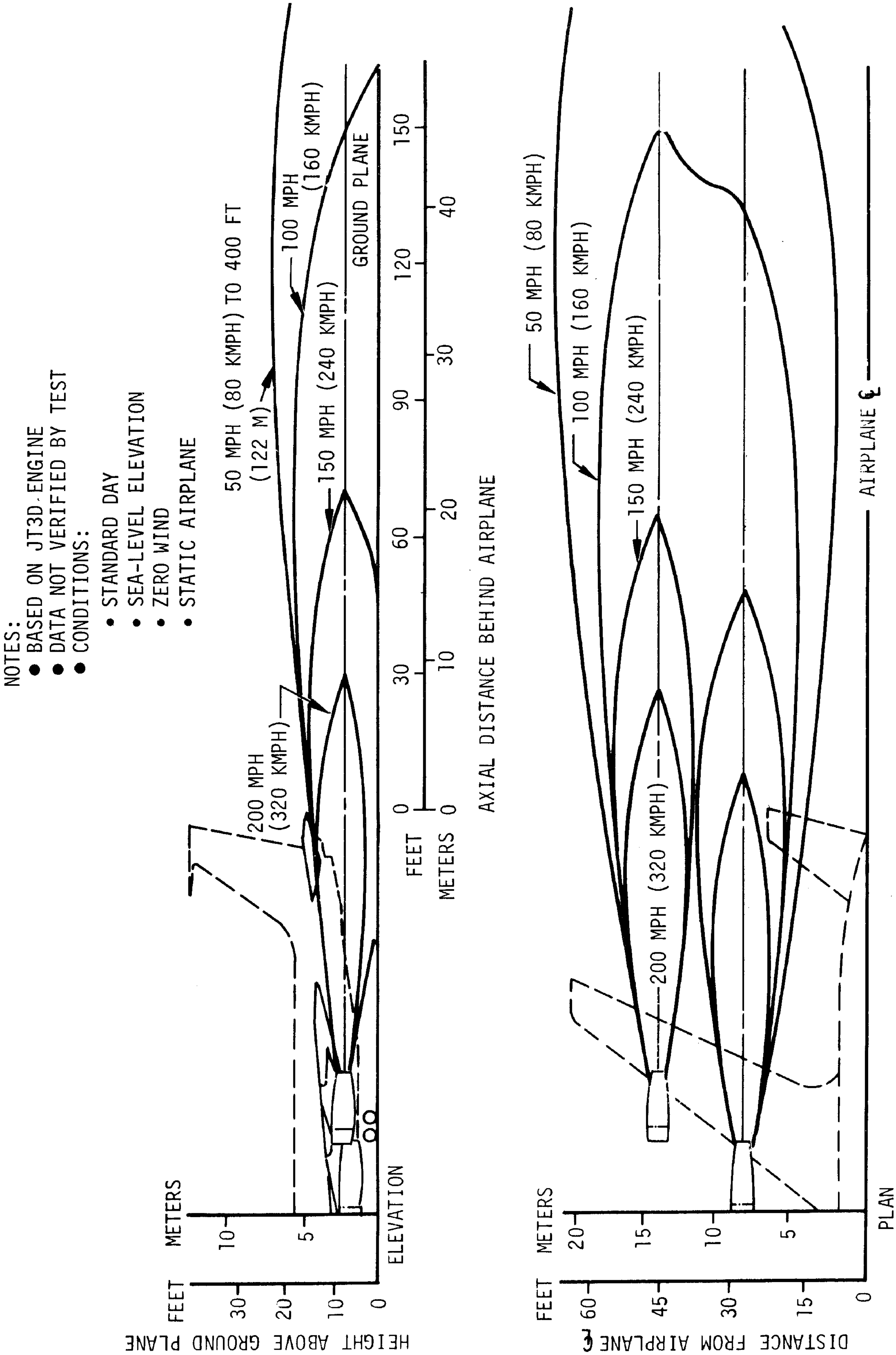

JET ENGINE EXHAUST — TEMPERATURE CONTOURS — IDLE POWER
MODEL 720B



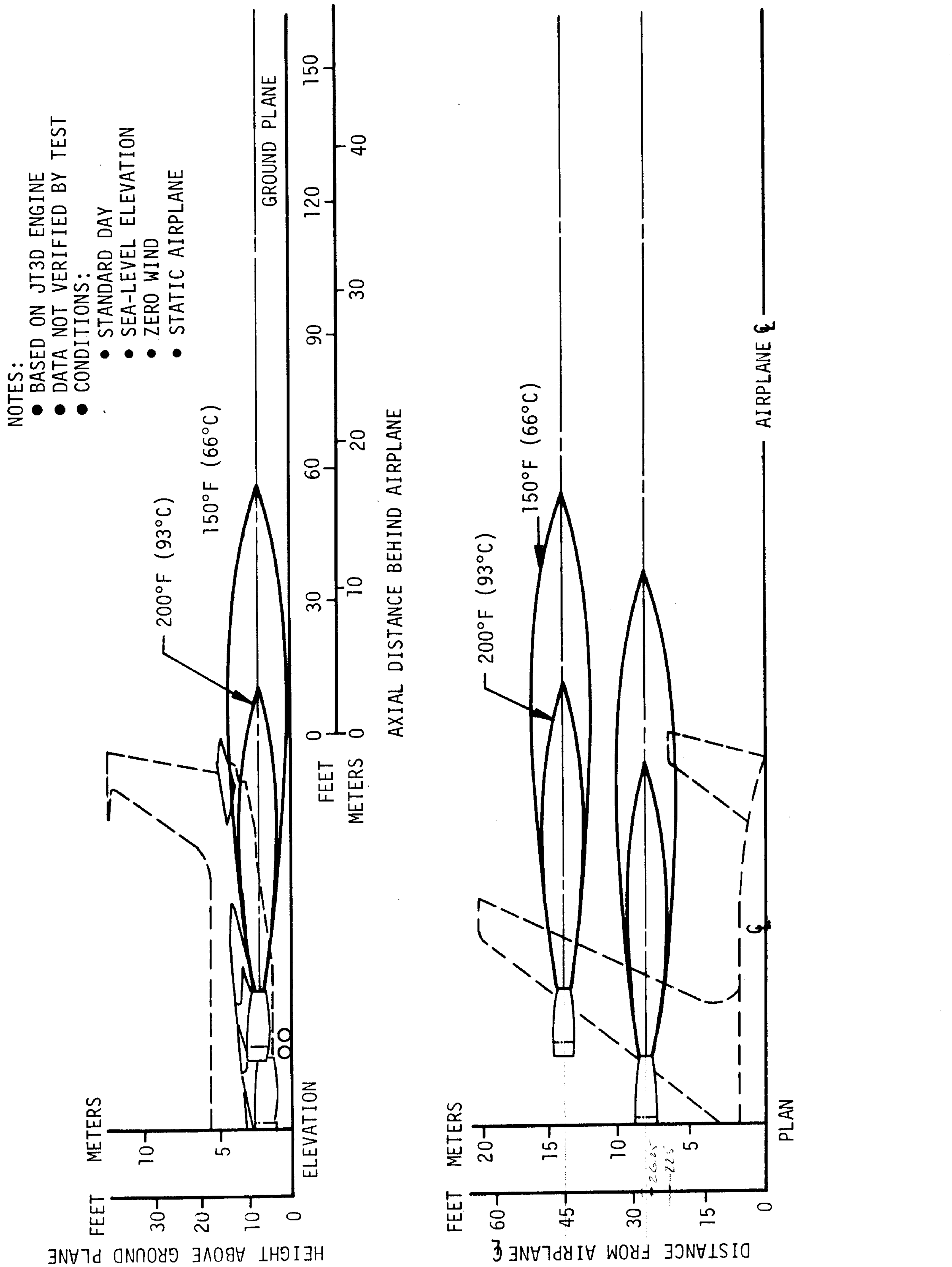

JET ENGINE EXHAUST — VELOCITY CONTOURS — BREAKAWAY
MODEL 720B




JET ENGINE EXHAUST — TEMPERATURE CONTOURS — BREAKAWAY
MODEL 720B




JET ENGINE EXHAUST — VELOCITY CONTOURS — MAXIMUM POWER
MODEL 720B




JET ENGINE EXHAUST — TEMPERATURE CONTOURS — MAXIMUM POWER
MODEL 720B

## 6.2 Airport and Community Noise

Noise level footprint contours will be developed and displayed in the document at some future date. These contours will reflect the noise level impingement upon a theoretical ground level plane at the same elevation as the runway. Contours will be provided for both takeoff and landing operations.

These footprint contours will permit investigations at individual airports of the noise associated with operation of the airplane as it relates to the airport proper and the adjoining community. This will assist in planning investigations related to clear zones, zoning for nonsensitive land utilization, or alternate compatible land development.

As an interim measure for airport planning it is recommended that FAA DS-67-14, "Techniques for Developing Noise Exposure Forecasts," with the exception of Section 4, "Land Use Planning," be used as representative of noise contours for two-, three-, and four-engine airplanes. It must be kept in mind that the data presented is for effective perceived noise level in units of EPNdB, and as such must be considered to have a tolerance of ±8 EPNdB.

# 7.0 PAVEMENT DATA

## 7.0 PAVEMENT DATA

### 7.1 General Information

A brief description of the pavement charts that follow will help in their use for airport planning. Each airplane configuration is depicted with a minimum range of four loads imposed on the main landing gear to aid in interpolation between the discrete values shown. All curves for any single chart represent data based on rated loads and tire pressures considered normal and acceptable by current aircraft tire manufacturer's standards. Tire pressures, where specifically designated on tables and charts, are at values obtained under loaded conditions as certificated for commercial use.

Page 72 presents basic data on the landing gear footprint configuration, maximum design taxi loads, and tire sizes and pressures.

Maximum pavement loads for certain critical conditions at the tire-to-ground interface are shown on Page 73.

Pavement requirements for commercial airplanes are customarily derived from the static analysis of loads imposed on the main landing gear struts. The chart on Page 74 is provided in order to determine these loads throughout the stability limits of the airplane at rest on the pavement. These main landing gear loads are used as the point of entry to the pavement design charts, interpolating load values where necessary.

The flexible pavement design curves (Page 75) are based on procedures set forth in Instruction Report No. S-77-1, "Procedures for Development of CBR Design Curves," dated June 1977, and as modified according to the methods described in ICAO Aerodrome Design Manual, Part 3, Pavements, 2$^{nd}$ Edition, 1983, Section 1.1 (The ACN-PCN Method), and utilizing the alpha factors approved by ICAO in October 2007. Instruction Report No. S-77-1 was prepared by the U.S. Army Corps of Engineers Waterways Experiment Station, Soils and Pavements Laboratory, Vicksburg, Mississippi. The line showing 10,000 coverages is used to calculate Aircraft Classification Number (ACN).

Rigid pavement design curves (Section 7.7) have been prepared with the Westergaard equation in general accordance with the procedures outlined in the Design of Concrete Airport Pavement (1955 edition) by Robert G. Packard, published by the American Concrete Pavement Association, 3800 North Wilke Road, Arlington Heights, Illinois 60004-1268. These curves are modified to the format described in the Portland Cement Association publication XP6705-2, Computer Program for Airport Pavement Design (Program PDILB), 1968, by Robert G. Packard.

new format described in the 1968 Portland Cement Association publication **"Operating Instructions — Computer Program for Concrete Airport Pavement Design," (Program PDILB) by Robert G. Packard.**

The following procedure is used to develop rigid pavement design curves such as those shown on **Page 80**:

1. Having established the scale for pavement thickness to the left and the scale for allowable working stress to the right, an arbitrary load line is drawn representing the main landing gear maximum weight to be shown.

2. All values of the subgrade modulus (k values) are then plotted as shown on **Page 80.**

3. Additional load lines for the incremental values of weight on the main landing gear are then established on the basis of the curve for k = 300, already established.

All LCN curves where shown have been plotted from data in the International Civil Aviation Organization (ICAO) Document 7920-AN/865/2, Aerodrome Manual, Part 2, "Aerodrome Physical Characteristics," 2nd Edition, 1965.

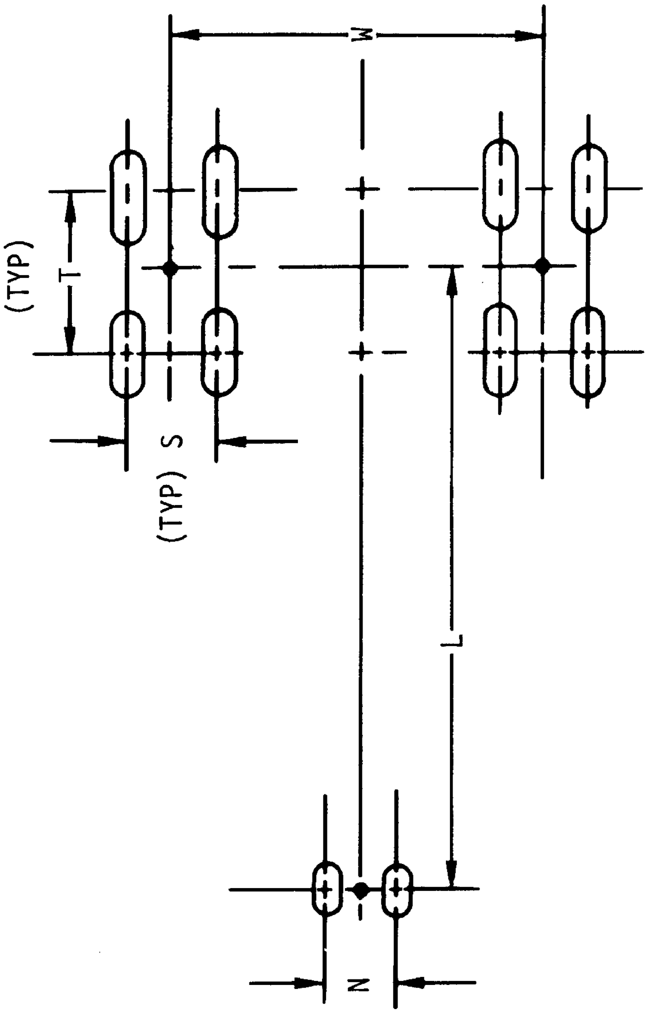
On the same charts showing LCN versus equivalent single-wheel load, there are load plots for the 720 and 720B showing equivalent single-wheel load versus pavement thickness (h) for flexible pavements and versus $\ell$ (radius of relative stiffness) for rigid pavements.

Procedures and curves provided in the ICAO Aerodrome Manual, Part 2, Chapter 4, are used to determine equivalent single-wheel loads for use in making LCN conversion of rigid pavement requirements.

NOTE: Pavement requirements are presented for loads, tires, and tire pressures presently planned for certified commercial usage.

All curves represent data at a constant specified tire pressure.

## 7.2 LANDING GEAR FOOTPRINT MODELS 720, 720B




| MODEL | MAXIMUM RAMP WEIGHT | PERCENT OF WEIGHT ON MAIN GEAR | NOSE TIRE SIZE | NOSE TIRE PRESSURE | MAIN GEAR TIRE SIZE | MAIN GEAR TIRE PRESSURE | L | N | S | T | W |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 720 | 230,000 LB<br>104,400 KG | SEE PAGE (74) | (2)<br>34 X 9.9 | 100 PSI<br>7.04 KG/CM$^2$ | (8)<br>40 X 14 | 145 PSI<br>10.2 KG/CM$^2$ | 50 FT 8 IN.<br>(15.44 M) | 1 FT 10 IN.<br>(0.56 M) | 2 FT 8 IN.<br>(0.81 M) | 4 FT 1 IN.<br>(1.24 M) | 21FT 11IN.<br>(6.68 M) |
| 720 B | 235,000 LB<br>106,700 KG | SEE PAGE (74) | (2)<br>39 X 13 | 115 PSI<br>8.10 KG/CM$^2$ | (8)<br>40 X 14 | 145 PSI<br>10.2 KG/CM$^2$ | 50 FT 8 IN.<br>(15.44 M) | 1 FT 10 IN.<br>(0.56 M) | 2 FT 8 IN.<br>(0.81 M) | 4 FT 1 IN.<br>(1.24 M) | 21FT 11IN.<br>(6.68 M) |

## 7.3 MAXIMUM GROUND LOADS
## MODELS 720, 720B

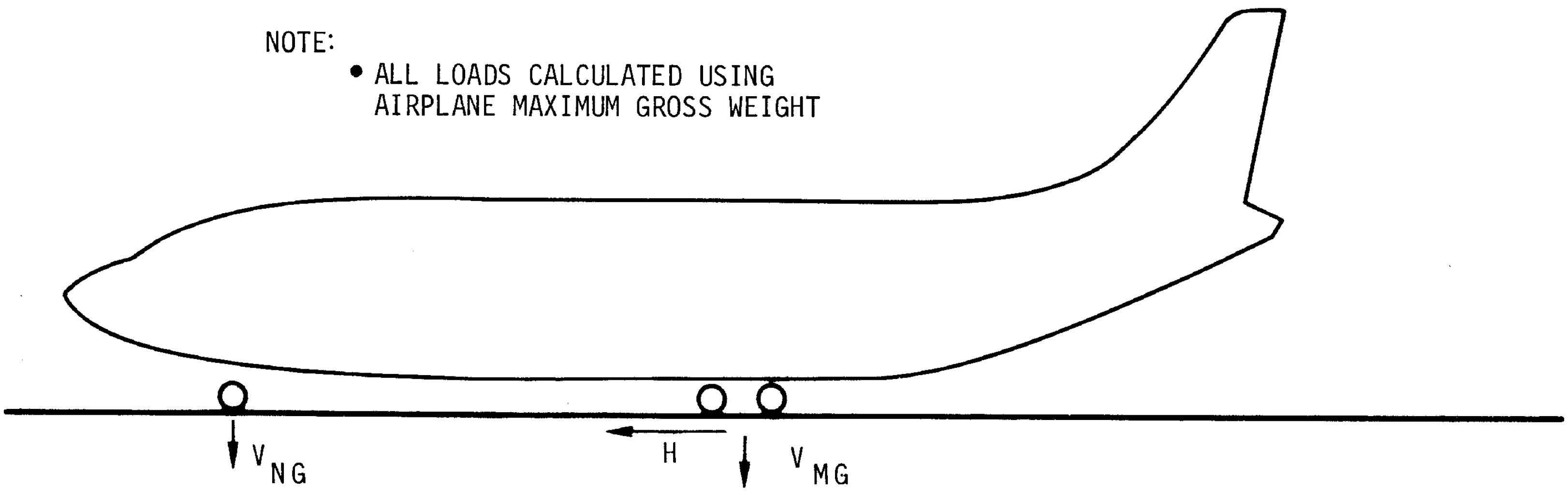
$V_{NG}$ = MAXIMUM VERTICAL NOSE GEAR GROUND LOAD AT MOST FORWARD CG

$V_{MG}$ = MAXIMUM VERTICAL MAIN GEAR GROUND LOAD AT MOST AFT CG

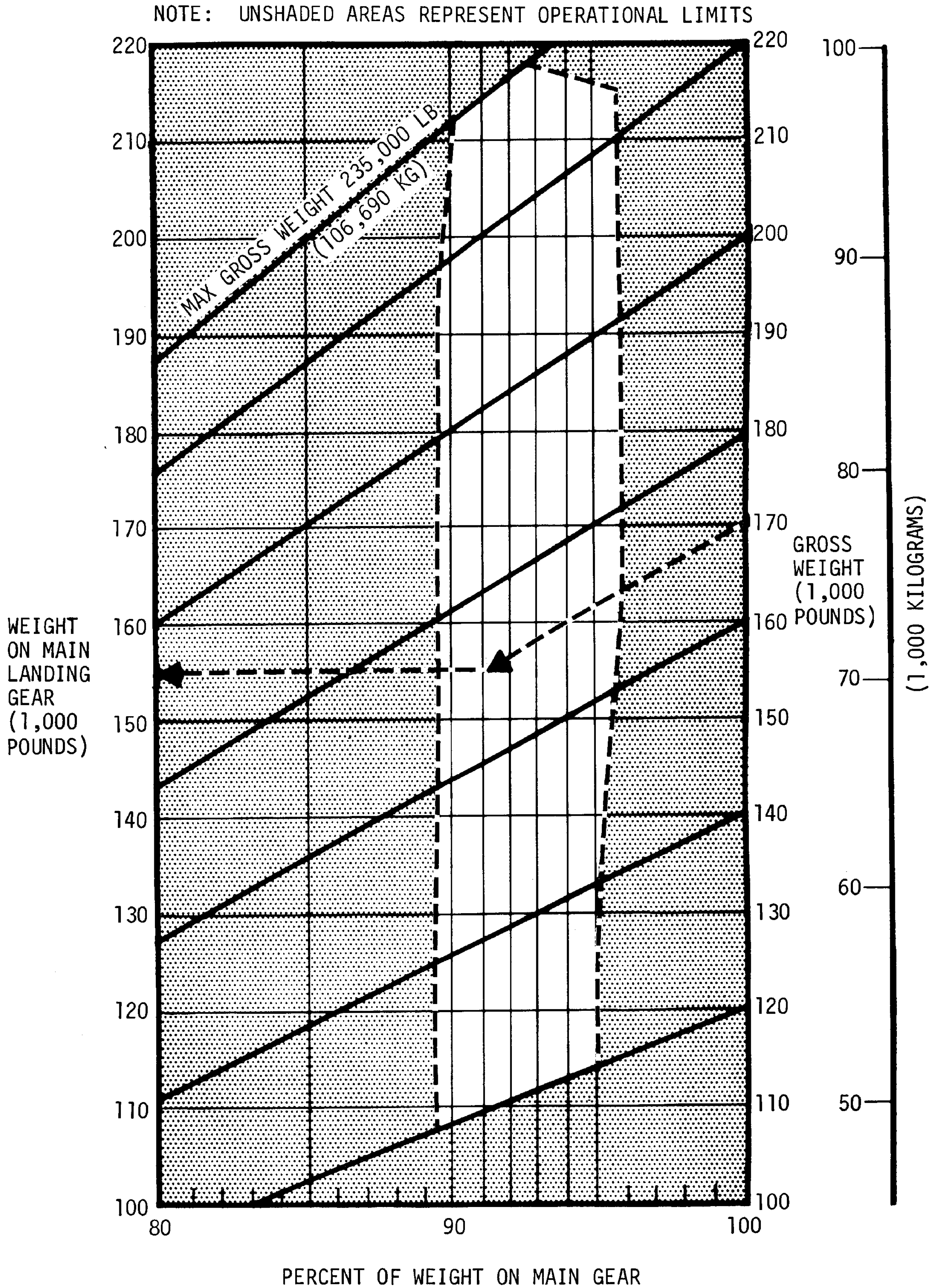
H = MAXIMUM HORIZONTAL GROUND LOAD FROM BRAKING

NOTE:

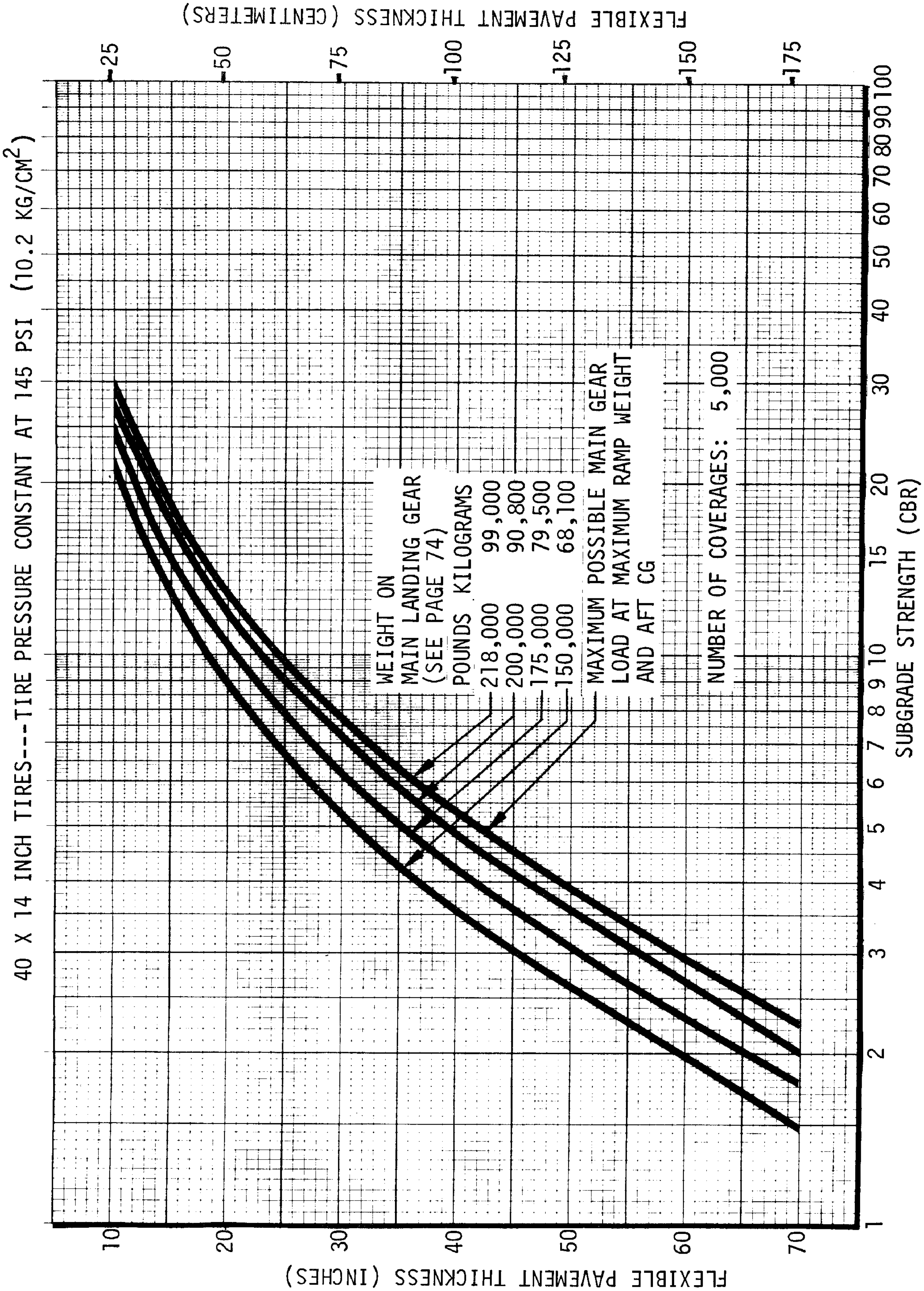
- ALL LOADS CALCULATED USING AIRPLANE MAXIMUM GROSS WEIGHT




| MODEL | MAXIMUM GROSS WEIGHT | $V_{NG}$ | | | | $V_{MG}$ PER STRUT (2) | | H (PER STRUT (2) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | STATIC AT MOST FORWARD CG | | STATIC + BRAKING @ 10 FT/SEC$^2$ DECELERATION | | MAXIMUM LOAD OCCURING AT STATIC AFT CG | | AT STEADY BRAKING 10 FT/SEC$^2$ DECELERATION | | AT INSTANTANEOUS BRAKING [COEFFICIENT OF FRICTION 0.8] | |
| | | LB | KG | LB | KG | LB | KG | LB | KG | LB | KG |
| 720 | (720B LOADS ARE APPLICABLE TO THE 720) | | | | | | | | | | |
| 720B | 235,000 LB<br>106,700 KG | 22,600 | 10,260 | 35,870 | 16,250 | 109,000 | 49,480 | 36,500 | 16,570 | 87,250 | 39,610 |




7.4 LANDING GEAR LOADING ON PAVEMENT
MODELS 720, 720B



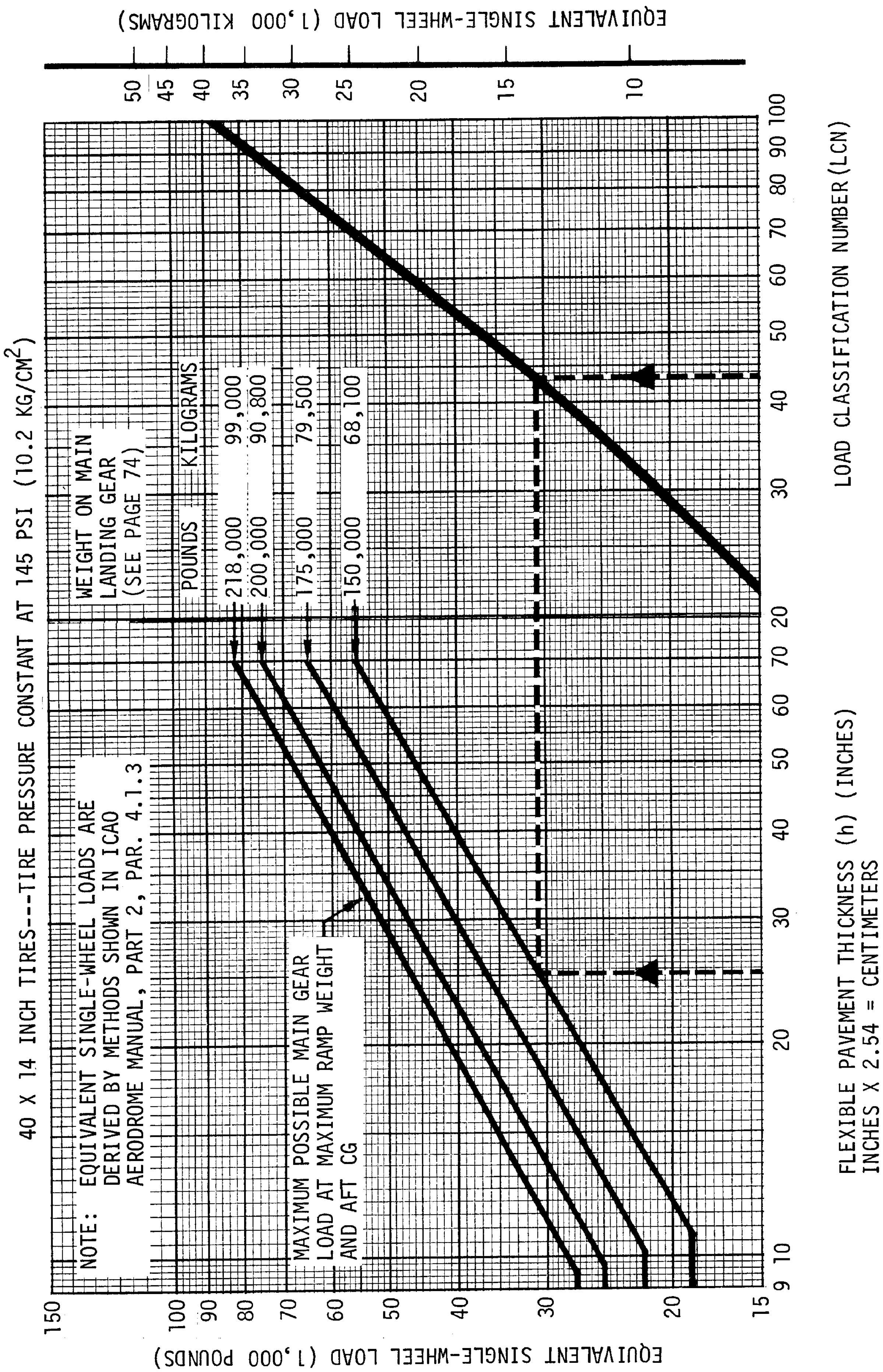

7.5 FLEXIBLE PAVEMENT REQUIREMENTS, SEFL 165A — U.S. CORPS OF ENGINEERS DESIGN METHOD
MODELS 720, 720B

## 7.6 Flexible Pavement Requirements, LCN Conversion

In order to determine the aircraft weight that can be accommodated on a particular flexible pavement, both the LCN of the pavement and the thickness (h) of the pavement must be known.

In the example for the 720 and 720B, shown on Page **77**, the flexible pavement thickness is shown at 25 inches with an LCN of 43. For these conditions the apparent maximum allowable weight permissible on the main landing gear is 150,000 pounds.

NOTE: Provided that the resultant aircraft LCN is not more than 10% above the published pavement LCN, it is the United Kingdom view that the bearing strength of the pavement can be considered sufficient for unlimited use by the aircraft. The figure of 10% has been chosen as representing the lowest degree of variation in LCN which is significant. (Reference: ICAO Aerodrome Manual, Part 2, "Aerodrome Physical Characteristics," Chapter 4, Paragraph 4.1.5.7v.)




FLEXIBLE PAVEMENT REQUIREMENTS — LCN CONVERSION
MODELS 720, 720B

## 7.7 Rigid Pavement Requirements, Portland Cement Association Design Method

Rigid pavement requirements, herein presented, are based upon two Portland Cement Association practices:

1. The former standard manual method of counting unit moment blocks on the Pickett and Ray influence charts (Reference: Portland Cement Association publication, "Design of Concrete Airport Pavement," 1955).

2. The new computerized version of the above as described in document XP-6705-2 "Computer Program for Airport Pavement Design," by Robert G. Packard, Portland Cement Association, 1967.

Higher stresses for equivalent pavement thicknesses are obtained by the computerized method. These occur because of the following:

1. Increased Radius of Influence

   The effect of influence from adjacent wheels by the manual method was limited to approximately 2 times $\ell$ (the radius of relative stiffness). The computer utilizes the Westergaard equation directly and includes influence from all wheels within a radius of 3 times $\ell$.

2. Maximizing Process

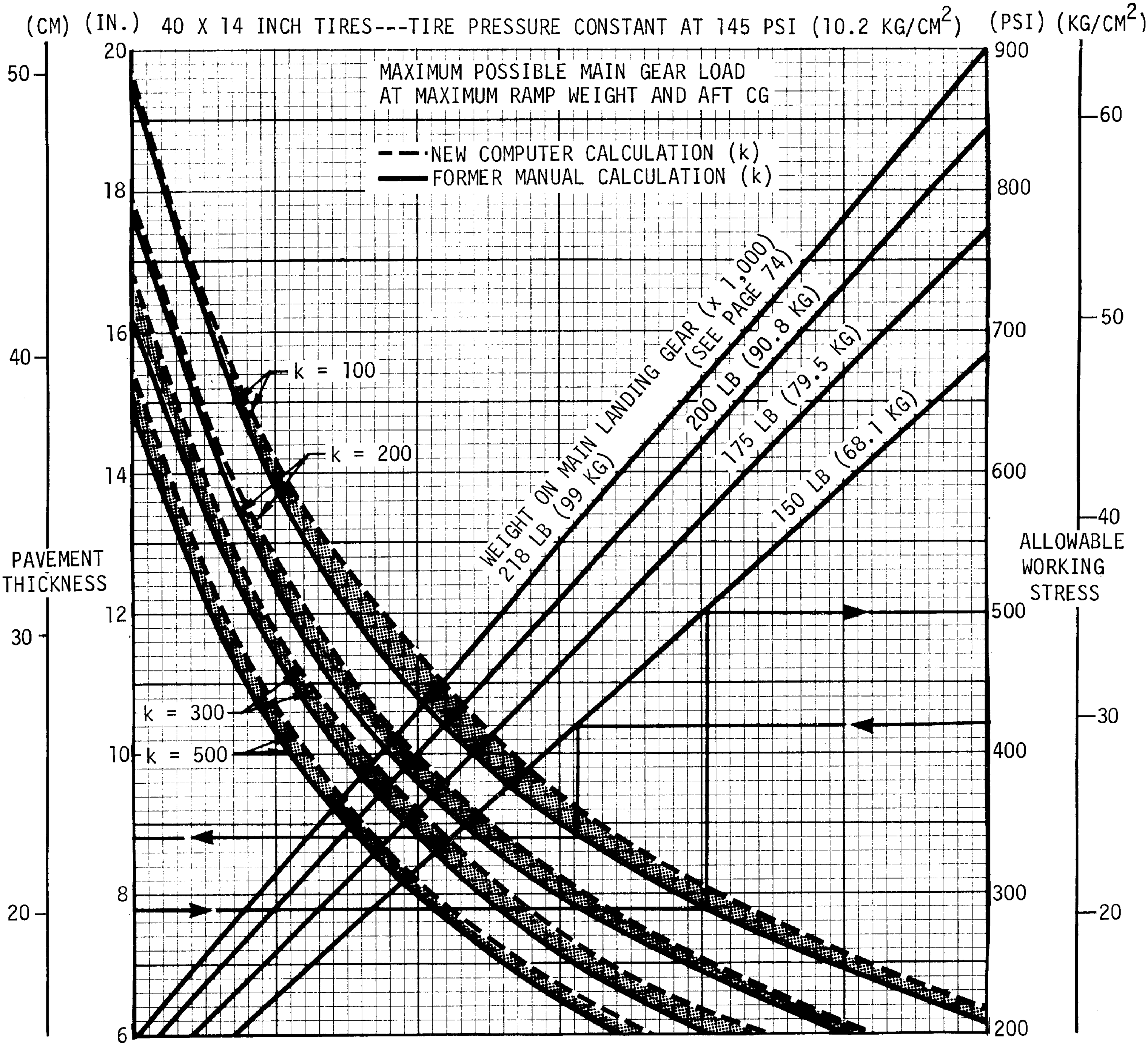
   It has been common practice when using the manual count method to align the landing gear footprint on the major axis of the influence chart with one wheel centered over the origin. While this practice does not necessarily produce the maximum possible moment, the values obtained have been considered practical since the procedure eliminates arduous repetitive manual summations of moment blocks.

   The computer determines the actual maximum stress values by a combination of shifting the footprint in relationship to the origin and by angular rotation of the footprint.

3. Difference in Footprint Shape

An elliptical contact area is used in the computerized version to represent a single-wheel footprint instead of a rectangle with rounded ends. The variance in moment attributed to this change is minor.

Actual pavement stress for any given model of airplane has not increased. The state of the art in calculation of pavement stress has advanced to permit prediction of stress values to a higher degree of certainty. This permits a proportionate decrease in design stress safety factor.




NOTE: THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUE OF k ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR k = 300, BUT DEVIATE SLIGHTLY FOR OTHER VALUES OF k.

REFERENCES: "DESIGN OF CONCRETE AIRPORT PAVEMENT" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN" PROGRAM - PDILB PORTLAND CEMENT ASSN

NOTICE: DUE TO CHANGES PER NEW COMPUTER METHOD, VALUES OF STRESS ARE HIGHER THAN OBTAINED BY FORMER STANDARD MANUAL METHOD. (SEE PAGE 78)

RIGID PAVEMENT REQUIREMENTS — PORTLAND CEMENT ASSOCIATION DESIGN METHOD
MODELS 720, 720B

## RADIUS OF RELATIVE STIFFNESS ($\ell$)

VALUES OF $\ell$ IN INCHES

FOR E = 4,000,000 PSI AND $\mu$ = 0.15

$$\text{RADIUS OF RELATIVE STIFFNESS} = \ell = \sqrt[4]{\frac{E\,d^3}{12(1-\nu^2)k}} = 24.1652\ \sqrt[4]{\frac{d^3}{k}}$$

| d (IN.) | k=50 | k=100 | k=150 | k=200 | k=250 | k=300 | k=350 | k=400 | k=500 |
|---|---|---|---|---|---|---|---|---|---|
| 6 | 34.84 | 29.30 | 26.47 | 24.63 | 23.30 | 22.26 | 21.42 | 20.72 | 19.59 |
| 6.5 | 36.99 | 31.11 | 28.11 | 26.16 | 24.74 | 23.64 | 22.74 | 22.00 | 20.80 |
| 7 | 39.11 | 32.89 | 29.72 | 27.65 | 26.15 | 24.99 | 24.04 | 23.25 | 21.99 |
| 7.5 | 41.19 | 34.63 | 31.29 | 29.12 | 27.54 | 26.32 | 25.32 | 24.49 | 23.16 |
| 8 | 43.23 | 36.35 | 32.85 | 30.57 | 28.91 | 27.62 | 26.58 | 25.70 | 24.31 |
| 8.5 | 45.24 | 38.04 | 34.37 | 31.99 | 30.25 | 28.91 | 27.81 | 26.90 | 25.44 |
| 9 | 47.22 | 39.71 | 35.88 | 33.39 | 31.58 | 30.17 | 29.03 | 28.08 | 26.55 |
| 9.5 | 49.17 | 41.35 | 37.36 | 34.77 | 32.89 | 31.42 | 30.23 | 29.24 | 27.65 |
| 10 | 51.10 | 42.97 | 38.83 | 36.14 | 34.17 | 32.65 | 31.42 | 30.39 | 28.74 |
| 10.5 | 53.01 | 44.57 | 40.28 | 37.48 | 35.45 | 33.87 | 32.59 | 31.52 | 29.81 |
| 11 | 54.89 | 46.16 | 41.71 | 38.81 | 36.71 | 35.07 | 33.75 | 32.64 | 30.87 |
| 11.5 | 56.75 | 47.72 | 43.12 | 40.13 | 37.95 | 36.26 | 34.89 | 33.74 | 31.91 |
| 12 | 58.59 | 49.27 | 44.52 | 41.43 | 39.18 | 37.44 | 36.02 | 34.84 | 32.95 |
| 12.5 | 60.41 | 50.80 | 45.90 | 42.72 | 40.40 | 38.60 | 37.14 | 35.92 | 33.97 |
| 13 | 62.22 | 52.32 | 47.27 | 43.99 | 41.61 | 39.75 | 38.25 | 36.99 | 34.99 |
| 13.5 | 64.00 | 53.82 | 48.63 | 45.26 | 42.80 | 40.89 | 39.35 | 38.06 | 35.99 |
| 14 | 65.77 | 55.31 | 49.98 | 46.51 | 43.98 | 42.02 | 40.44 | 39.11 | 36.99 |
| 14.5 | 67.53 | 56.78 | 51.31 | 47.75 | 45.16 | 43.15 | 41.51 | 40.15 | 37.97 |
| 15 | 69.27 | 58.25 | 52.63 | 48.98 | 46.32 | 44.26 | 42.58 | 41.19 | 38.95 |
| 15.5 | 70.99 | 59.70 | 53.94 | 50.20 | 47.47 | 45.36 | 43.64 | 42.21 | 39.92 |
| 16 | 72.70 | 61.13 | 55.24 | 51.41 | 48.62 | 46.45 | 44.70 | 43.23 | 40.88 |
| 16.5 | 74.40 | 62.56 | 56.53 | 52.61 | 49.75 | 47.54 | 45.74 | 44.24 | 41.84 |
| 17 | 76.08 | 63.98 | 57.81 | 53.80 | 50.88 | 48.61 | 46.77 | 45.24 | 42.78 |
| 17.5 | 77.75 | 65.38 | 59.48 | 54.98 | 52.00 | 49.68 | 47.80 | 46.23 | 43.72 |
| 18 | 79.41 | 66.78 | 60.35 | 56.16 | 53.11 | 50.74 | 48.82 | 47.22 | 44.66 |
| 19 | 82.70 | 69.54 | 62.84 | 58.48 | 55.31 | 52.84 | 50.84 | 49.17 | 46.51 |
| 20 | 85.95 | 72.27 | 65.30 | 60.77 | 57.47 | 54.92 | 52.84 | 51.10 | 48.33 |
| 21 | 89.15 | 74.97 | 67.74 | 63.04 | 59.62 | 56.96 | 54.81 | 53.01 | 50.13 |
| 22 | 92.31 | 77.63 | 70.14 | 65.28 | 61.73 | 58.98 | 56.75 | 54.89 | 51.91 |
| 23 | 95.44 | 80.26 | 72.52 | 67.49 | 63.83 | 60.98 | 58.68 | 56.75 | 53.67 |
| 24 | 98.54 | 82.86 | 74.87 | 69.68 | 65.90 | 62.96 | 60.58 | 58.59 | 55.41 |

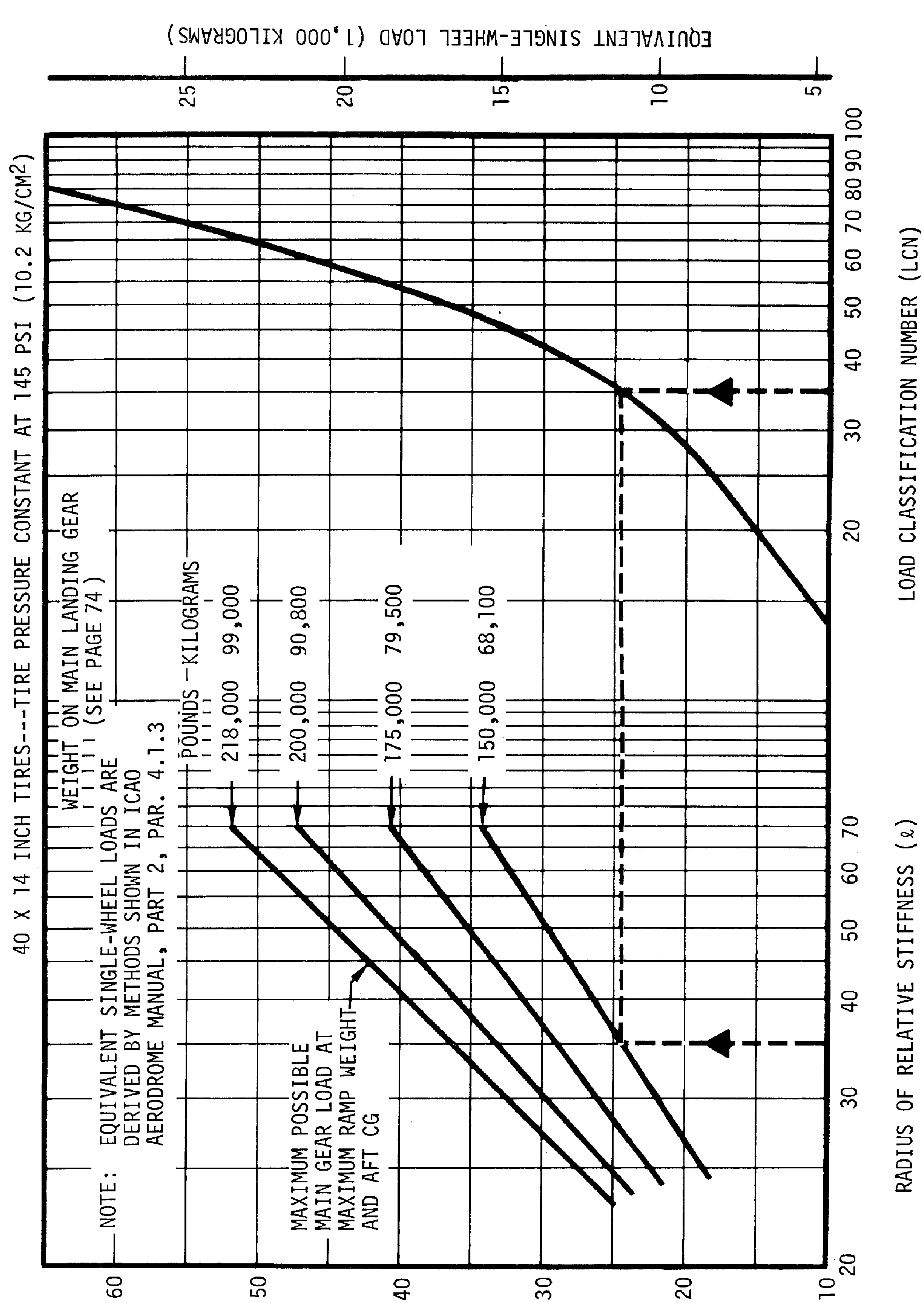
RADIUS OF RELATIVE STIFFNESS (REFERENCE: PORTLAND CEMENT ASSOCIATION)

7.8 Rigid Pavement Requirements, LCN Conversion

In order to determine the aircraft weight that can be accommodated on a particular rigid pavement, both the LCN of the pavement and the radius of relative stiffness ($\ell$) of the pavement must be known.

In the example for the 720 and 720B, shown on Page 83, the rigid pavement radius of relative stiffness ($\ell$) is shown at 35 with an LCN of 35. For these conditions, the apparent maximum allowable weight permissible on the main landing gear is 150,000 pounds.

NOTE: Provided that the resultant aircraft LCN is not more than 10% above the published pavement LCN it is the United Kingdom view that the bearing strength of the pavement can be considered sufficient for unlimited use by the aircraft. The figure of 10% has been chosen as representing the lowest degree of variation in LCN which is significant. (Reference: ICAO Aerodrome Manual, Part 2, "Aerodrome Physical Characteristics," Chapter 4, Paragraph 4.1.5.7v.)




RIGID PAVEMENT REQUIREMENTS, LCN CONVERSION

MODELS 720, 720B

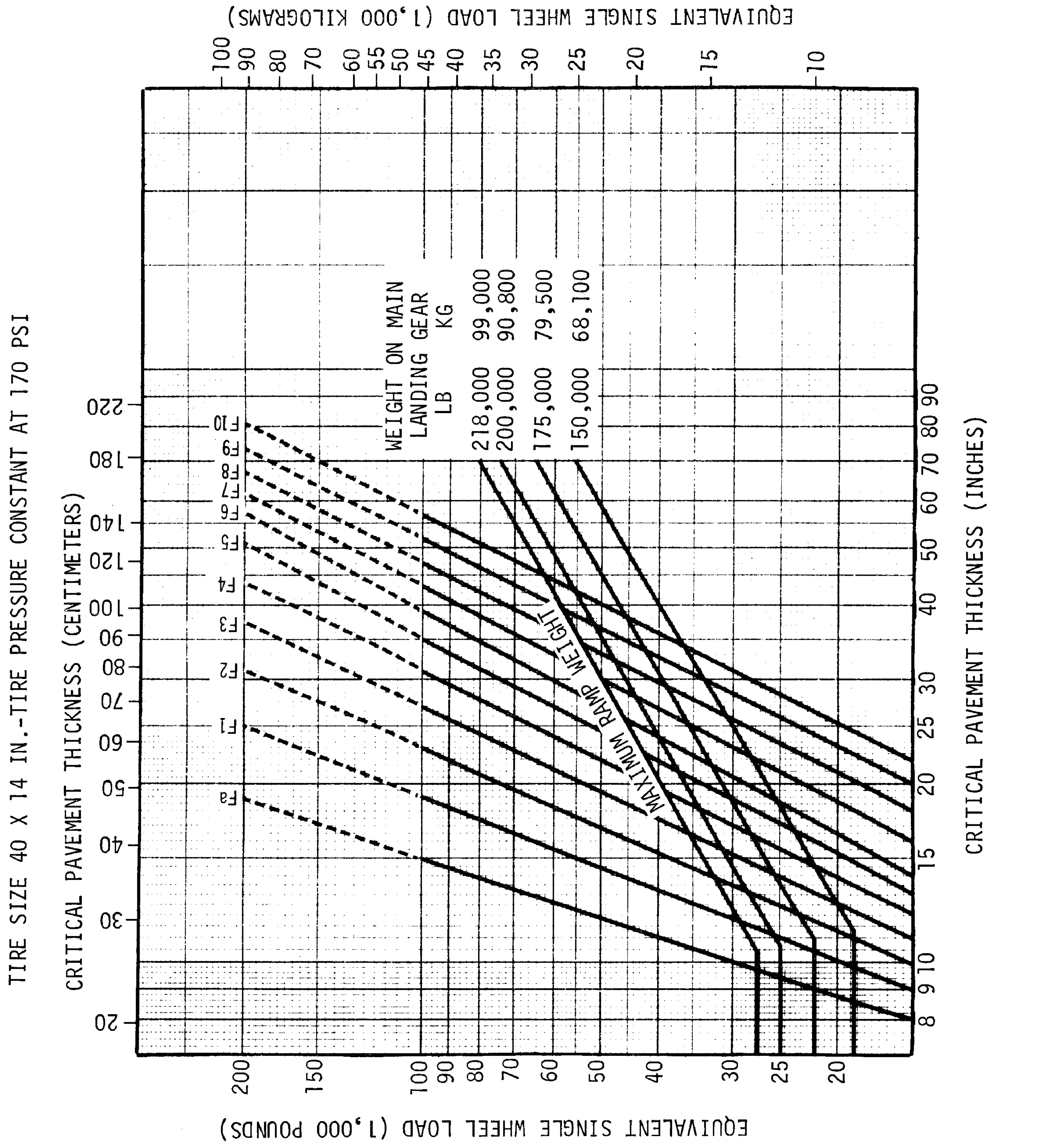
## 7.9 Flexible and Rigid Pavement Requirements, FAA Method

The charts on Pages 85 and 86 are developed directly from pages in FAA Advisory Circular AC 150/5320-6A, May 9, 1967.

Pavement thicknesses are shown for gross aircraft weight irrespective of landing gear configuration and tire pressure. The following general assumptions were made by the FAA in preparing the charts:

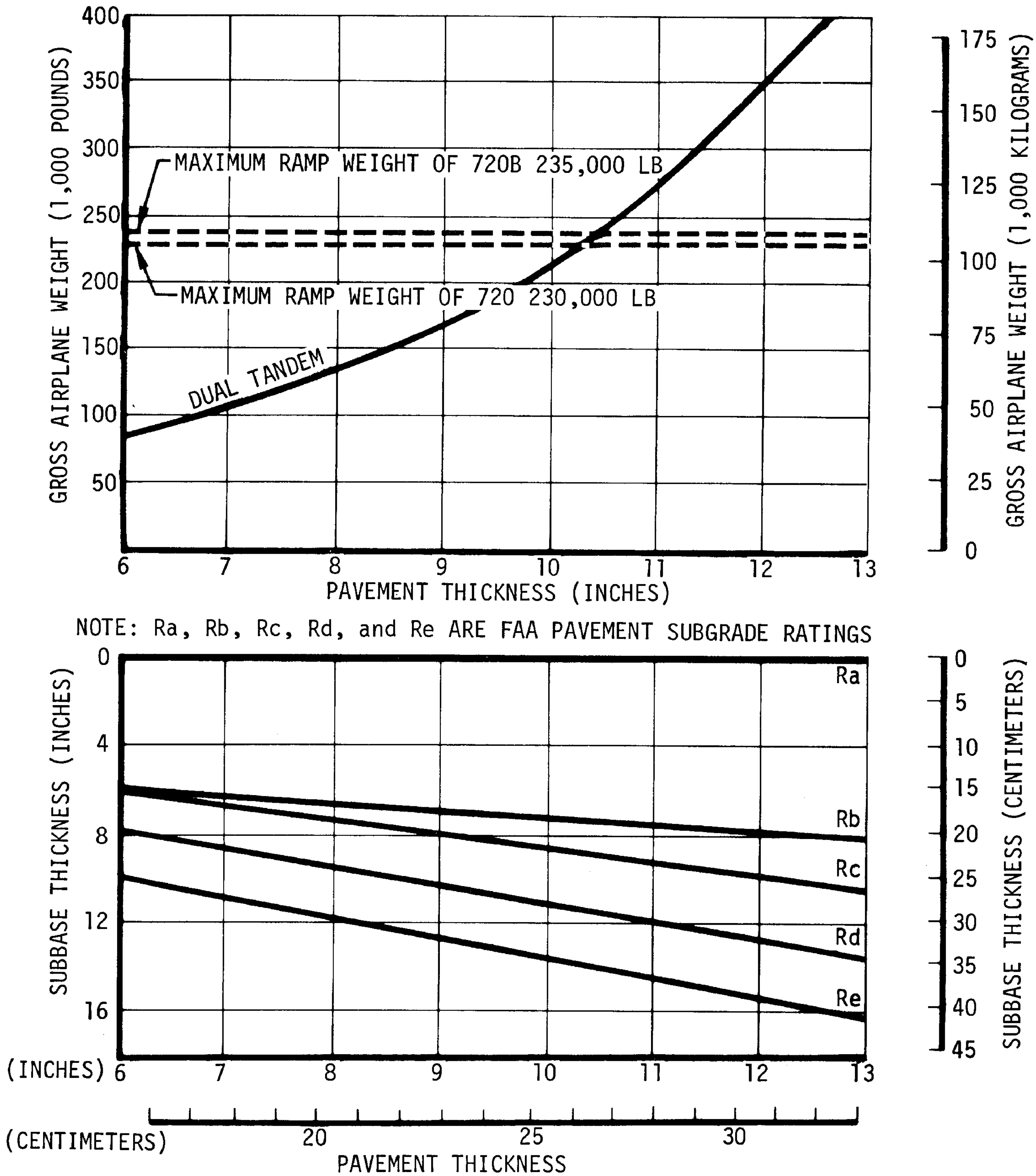
1. Ninety-five percent of the gross aircraft weight is assumed to be supported by the main gear.
2. Dual-tandem wheel spacings are not given specifically, but certain design compromises are made as described in the Advisory Circular Appendix 1 in order to develop the curves shown.

The subgrade ratings for pavements are shown as standard FAA designations. These ratings and their derivation are fully described in the Advisory Circular mentioned above.




NOTES:
- INTERSECTION OF A LINE DENOTING PAVEMENT SUBGRADE RATING (Fa, F1, F2) WITH WEIGHT LINE DETERMINES PAVEMENT THICKNESS
- ADAPTED FROM FAA ADVISORY CIRCULAR AC 150/5320 6A

**FLEXIBLE PAVEMENT REQUIREMENTS — FAA METHOD**
**MODEL 720, 720B**




NOTE: CHART ADAPTED FROM PAGE 31 (AND 32),
PAR. 17 CHAP. 3 OF FAA ADVISORY CIRCULAR
AC 150/5320-6A, DATED 9 MAY 1967.

RIGID PAVEMENT REQUIREMENTS, FAA METHOD
MODELS 720, 720B

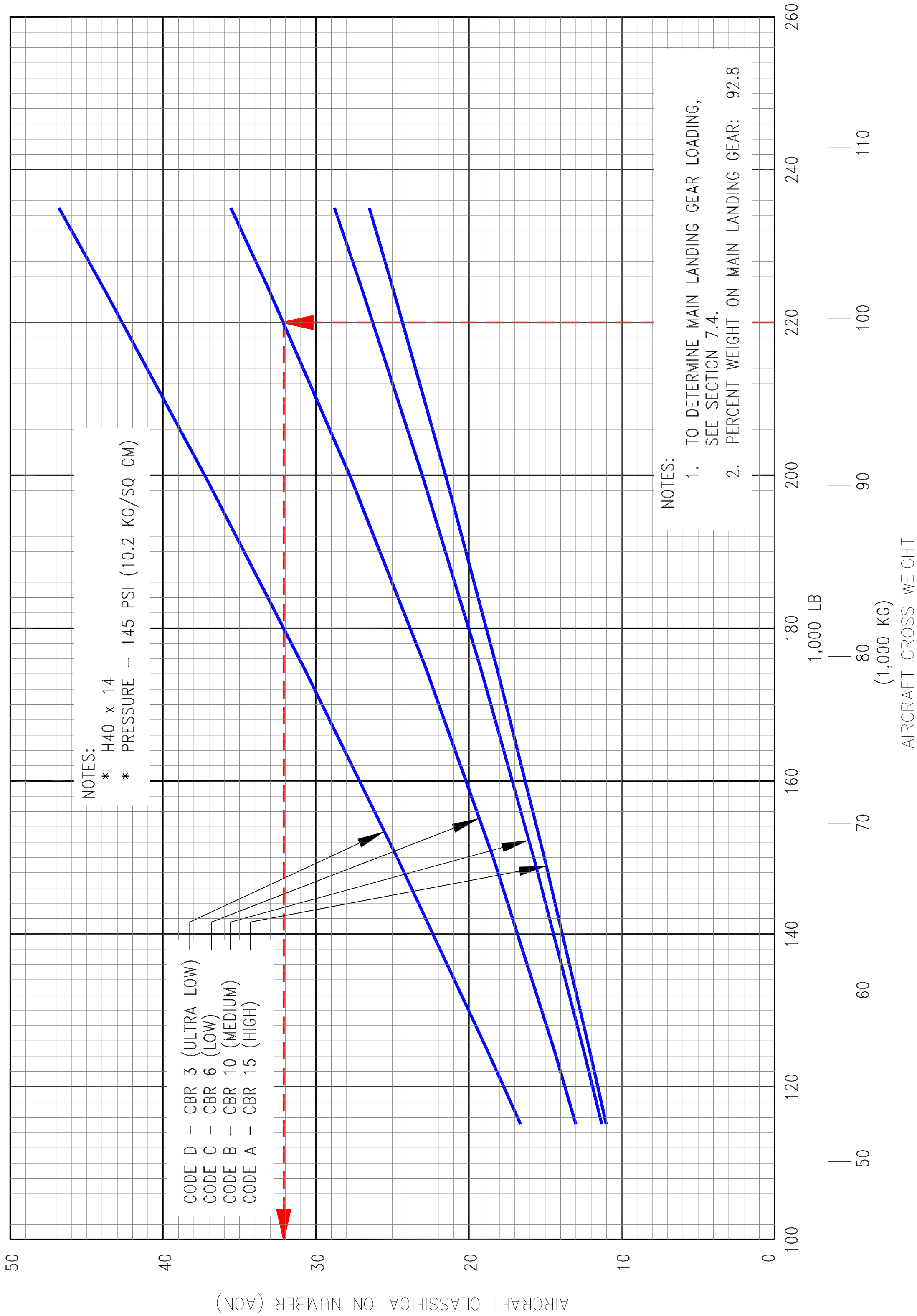
## 7.10 ACN/PCN Reporting System - Flexible and Rigid Pavements

To determine the ACN of an aircraft on flexible or rigid pavement, both the aircraft gross weight and the subgrade strength category must be known. In the chart in 7.10.1, for an aircraft with gross weight of 210,000 lb on a (Code C), the flexible pavement ACN is 30. Referring to 7.10.2, the same aircraft on a low strength subgrade rigid pavement has an ACN of 32.5.

The following table provides ACN data in tabular format similar to the one used by ICAO in the "Aerodrome Design Manual Part 3, Pavements." If the ACN for an intermediate weight between maximum taxi weight and minimum weight of the aircraft is required, Figures 7.10.1 through 7.10.2 should be consulted.

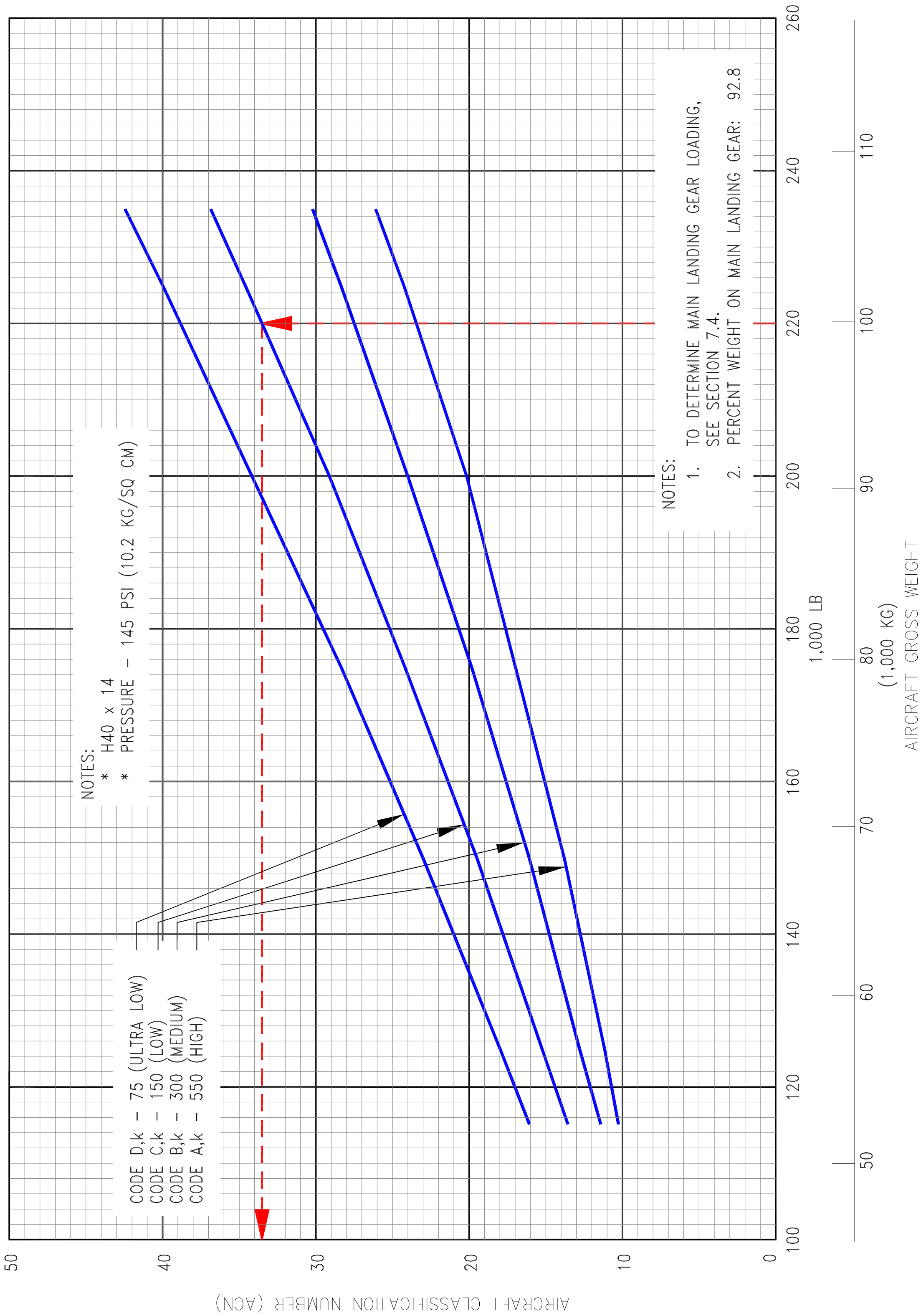
| | | | | ACN FOR RIGID PAVEMENT SUBGRADES – MN/m$^3$ | | | | ACN FOR FLEXIBLE PAVEMENT SUBGRADES – CBR | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AIRCRAFT TYPE | MAXIMUM TAXI WEIGHT<br>MINIMUM WEIGHT (1)<br>LB (KG) | LOAD ON ONE MAIN GEAR LEG (%) | TIRE PRESSURE<br>PSI (MPa) | HIGH 150 | MEDIUM 80 | LOW 40 | ULTRA LOW 20 | HIGH 15 | MEDIUM 10 | LOW 6 | ULTRA LOW 3 |
| 720**B** | 235,000(106,700) | 23.50 | 145 (0.99) | 27 | 29 | 36 | 47 | 25 | 30 | 37 | 43 |
| | 115,000(52,200) | | | 11 | 11 | 13 | 17 | 10 | 11 | 14 | 16 |

(1) Minimum weight used solely as a baseline for ACN curve generation.




### 7.10.1 AIRCRAFT CLASSIFICATION NUMBER - FLEXIBLE PAVEMENT

*MODEL 720B*




## 7.10.2 AIRCRAFT CLASSIFICATION NUMBER - RIGID PAVEMENT

*MODEL 720B*