

# **B737 ELECTRICAL SYSTEMS TRAINING MANUAL**

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# PREFACE

The 《B737 ELECTRICAL SYSTEMS TRAINING MANUAL》 course is an elective of the students in electrical engineering and the automation major. By learning it, the students will be able to master the electrical maintenance knowledge of B737 model systematically, and enlarge their theoretical knowledge for the airplane maintenance jobs. Through studying the text of English original edition, the students will also extend their vocabulary of professional English, acquire the CBT theoretical training, and establish a firm foundation for the practice at the end of the college and the maintenance job in the future.

According to the technical development trend of multi-discipline in electrical engineering and automation, it is a must to widen the knowledge of specialty, enlarge the teaching features in the civil aviation field, and strengthen the adaptability that students can have in order to qualify the needs of the society; hereby we compile and publish this teaching material. The characteristics of this book are: novel structure, abundant information, easily understood content, and integrating theory with practice. It lays particular emphasis on the airplane electric principle analysis, and enumerates those analysis of the typical electrical faults. The book is based on the advanced airplane model B737 - 700s, combining theory with practice, the latest information and systematically introduction. So it would be a proper teaching material or a teaching reference book for the students in airplane electrical engineering and the automation and the related majors in the college. It would also be a useful reference book for those who are engaged in the airplane electricity and machine maintenance jobs.

The whole book is divided into totally eight chapters: general, electrical power system, fuel system, APU system, fire protection system, pneumatic and air conditioning systems, ice and rain protection systems, light systems and other systems of airplane. All chapters contain both system introduction and fault analysis.

Based on the 1999's edition compiled by the associate professor Gui Jianxun and other teachers, we bring some enlargements and modifications to it then republish the book. We shall give thanks to the writers of the course. They are Gui Jianxun, Peng Ruomei, Zhang Fan and Zheng Aihong. The course is compiled by Peng Ruomei. All of the writers are the experts about the aviation theory and

come from the Civil Aviation University of China( CAUC).

We shall express our great thanks to the Professor Zhang Xiaojie from the Airplane Electric major and the advanced engineer Wang Lixiong from Electrical Power Transmission major. They have scrutinized the whole text and provided us many useful suggestions.

Because the knowledge of the editors is limited, it is totally possible that there are some improprieties. We appeal experts and readers to grant us corrections.

We wish this book will be a reference of grate value to you. We are also confident that with proper use of this book, you will score very well on any of the Civil Aircraft Maintenance License Examinations.

Editors  
2005. 10

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# CHAPTER 1 AIRPLANE GENERAL DESCRIPTION AND FLIGHT COMPARTMENT

## 飞机概述和驾驶舱

内容提示：飞机的基本结构；飞机仪表板布局和相关电气指示仪表位置。

内容重点：飞机的基本结构；飞机仪表板布局和相关电气指示仪表位置。

### SECTION A BRIEF INTRODUCTION

#### 简介

The Boeing 737 - 700 twin engine airplane is designed for short to medium range operation. It is a capacity to carry up to 149 passengers in a single class or to 128 passengers in a mixed class.

The airplane is a metal low-wing monoplane with a full cantilever wing and tail surfaces, semi-monocoque fuselage, and fully retractable tricycle-type landing gear.

The two powerplants are located on short struts below and forward of the wings ( Figure 1 - 1 ).



Figure 1 - 1 B737 - 700

## SECTION B STRUCTURES — GENERAL DESCRIPTION

### 结构 — 概述

These are the general dimensions of the airplane ( Figure 1 - 2 ).

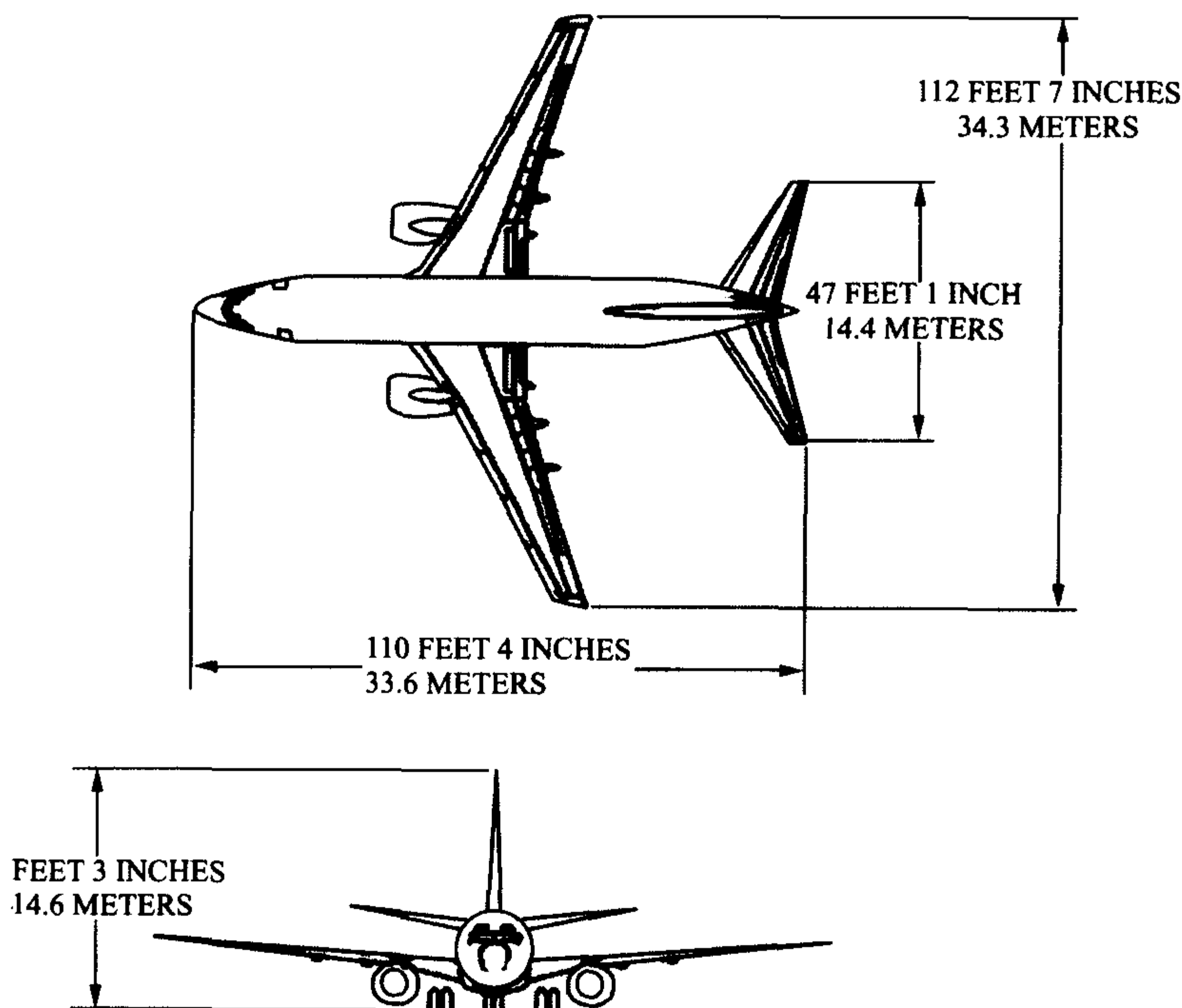


Figure 1 - 2 B737 - 700 DIMENSIONS

## SECTION C STRUCTURES — COMPOSITE MATERIALS

### 结构 — 复合材料

Some airplane structure and parts are composite materials ( Figure 1 - 3 ). These are some advantages of composite materials:

- High strength;
- Corrosion resistant;
- Increased fatigue life;
- Light weight.

These are the principal dimensions and areas of the airplane ( Figure 1 - 4 and Figure 1 - 5 ).

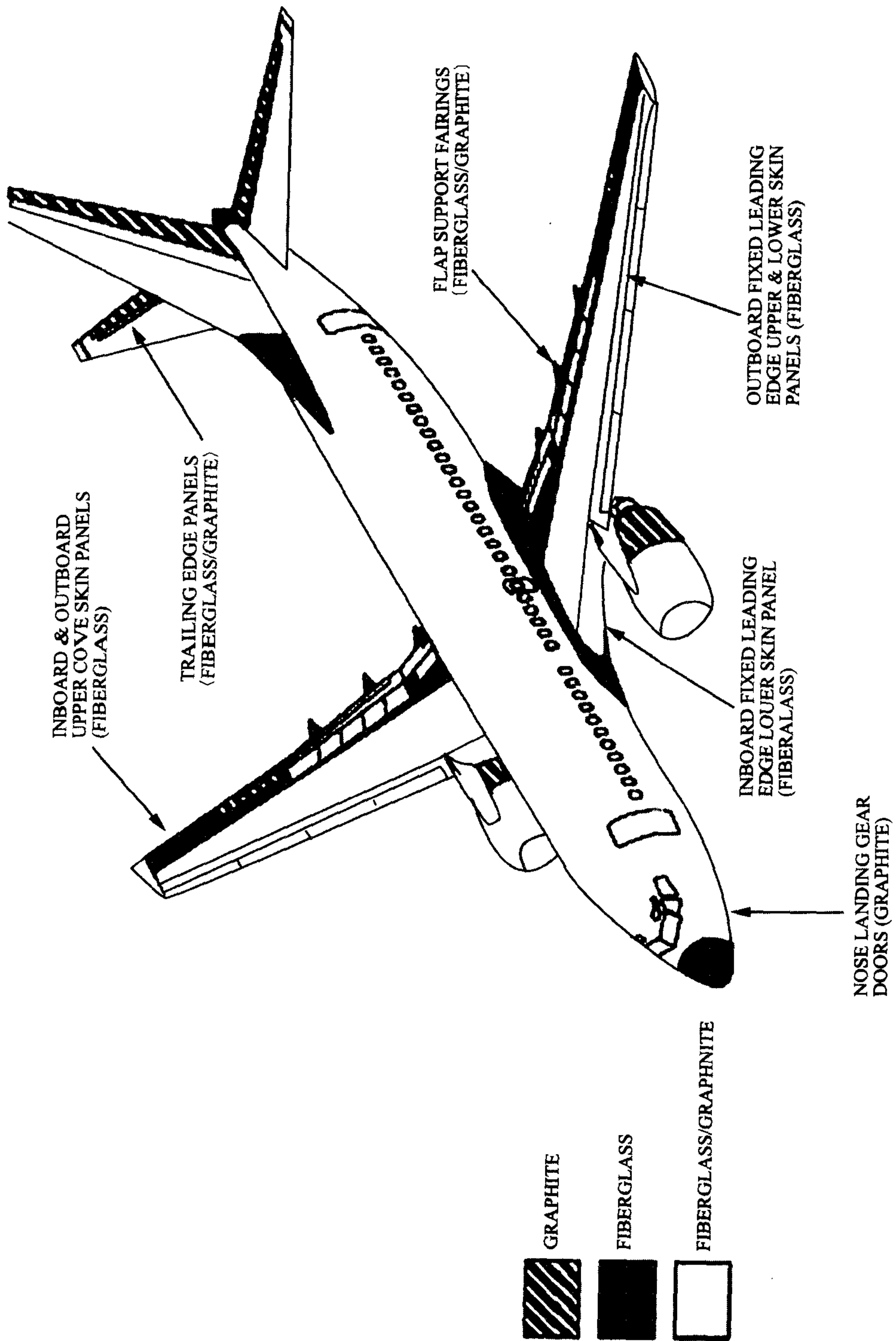


Figure 1-3 STRUCTURES—COMPOSITE MATERIALS

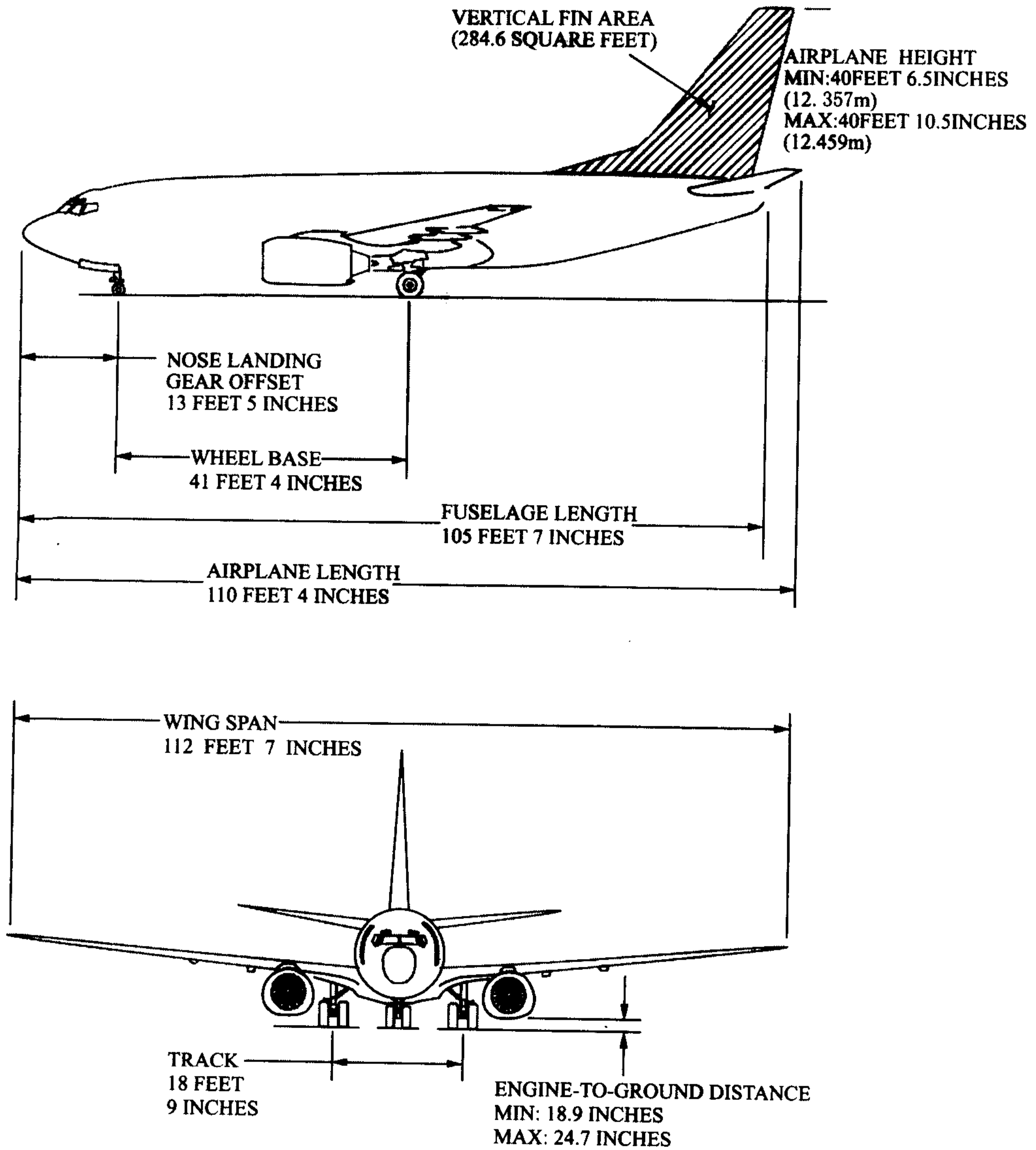


Figure 1 -4 PRINCIPAL DIMENSIONS AND AREAS

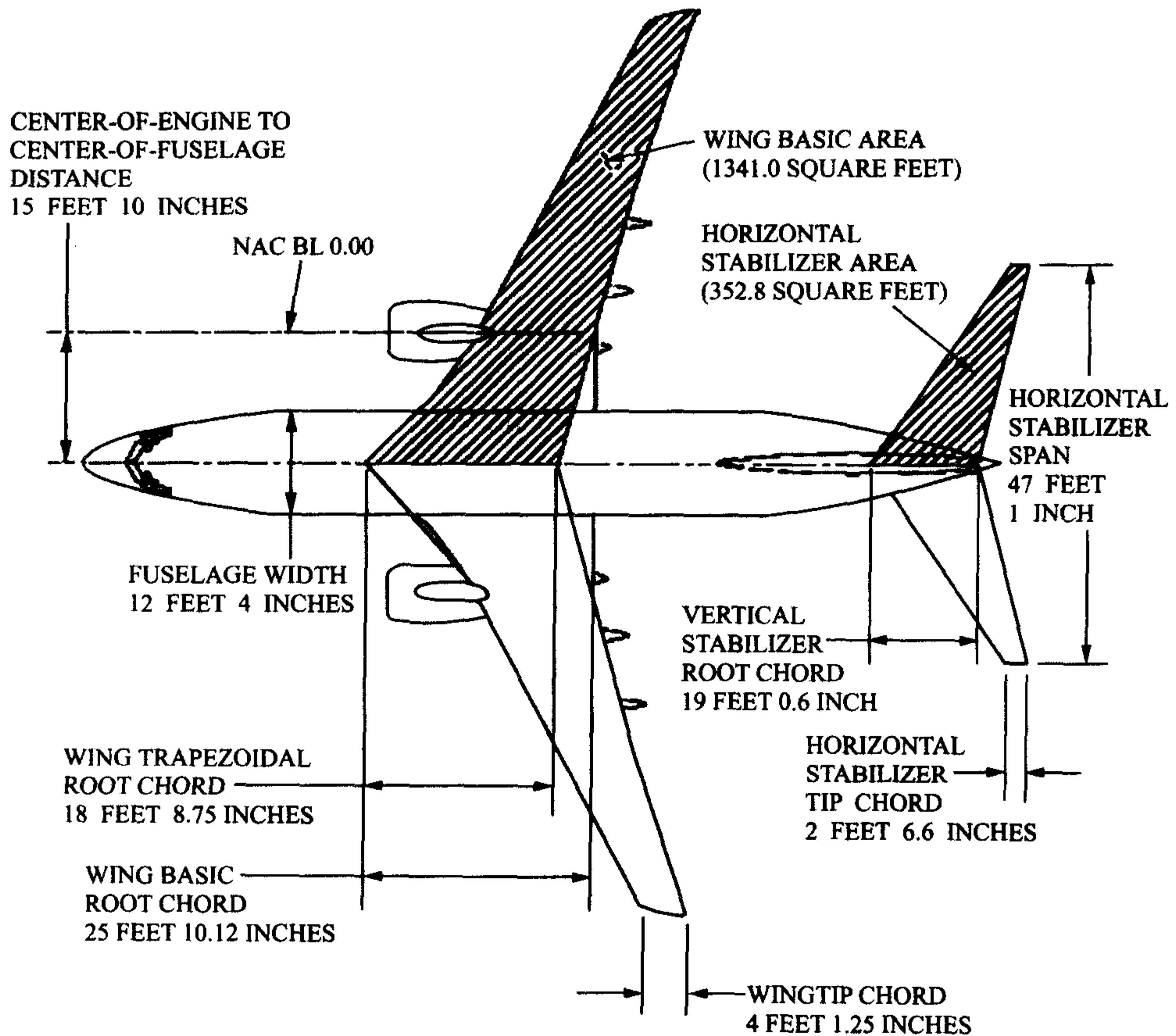


Figure 1 - 5 PRINCIPAL DIMENSIONS AND AREAS ( PLAN VIEW )

## SECTION D DOORS 舱 门

The doors are removable units that give access to the airplane compartments.

### A. General Description

There are the types of doors on the airplane:

- Forward and aft entry doors ;
- Forward and aft galley service doors;
- Emergency exit doors;

- Cargo doors;
- Miscellaneous access doors.

A door warning system shows the crew that pressure bearing doors are closed and properly latched before flight.

All doors have silicon rubber seals. The seals do these things:

- Seal air and light leaks;
- Act as acoustic and thermal barriers;
- Supply aerodynamic smoothness.

See the main gear and doors section for more information on the landing gear doors. (AMM PART I 32 - 10)

## B. Location

The entry doors are on the left side of the airplane.

The galley service doors are on the right side of the airplane.

The emergency exit doors are above the wings on both sides of the airplane.

The cargo doors are on the right side of the airplane.

The miscellaneous access doors are near the systems they serve.

## C. Training Information Point

You can open and close entry, galley service, and cargo doors in winds up to 40 knots without structural damage. You can let these doors stay latched open in winds up to 65 knots without structural damage.

If a door is open for a long time, a protective cover should be put over the door frame. This prevents bad weather damage to the airplane.

When an entry and galley service doors are open and not used, a safety strap must be attached in the doorway.

## D. Access Door Locations (Figure 1 - 6)

### 1. General Component Location

Doors allow access to the passenger cabin, air stairs and cargo and service areas.

There are two entry doors on the left side of the airplane, one forward and one aft. There are two galley service doors on the right side, one forward and one aft. All the doors operate the same way.

Emergency exit hatches are located one on each side of the fuselage over the wing area.

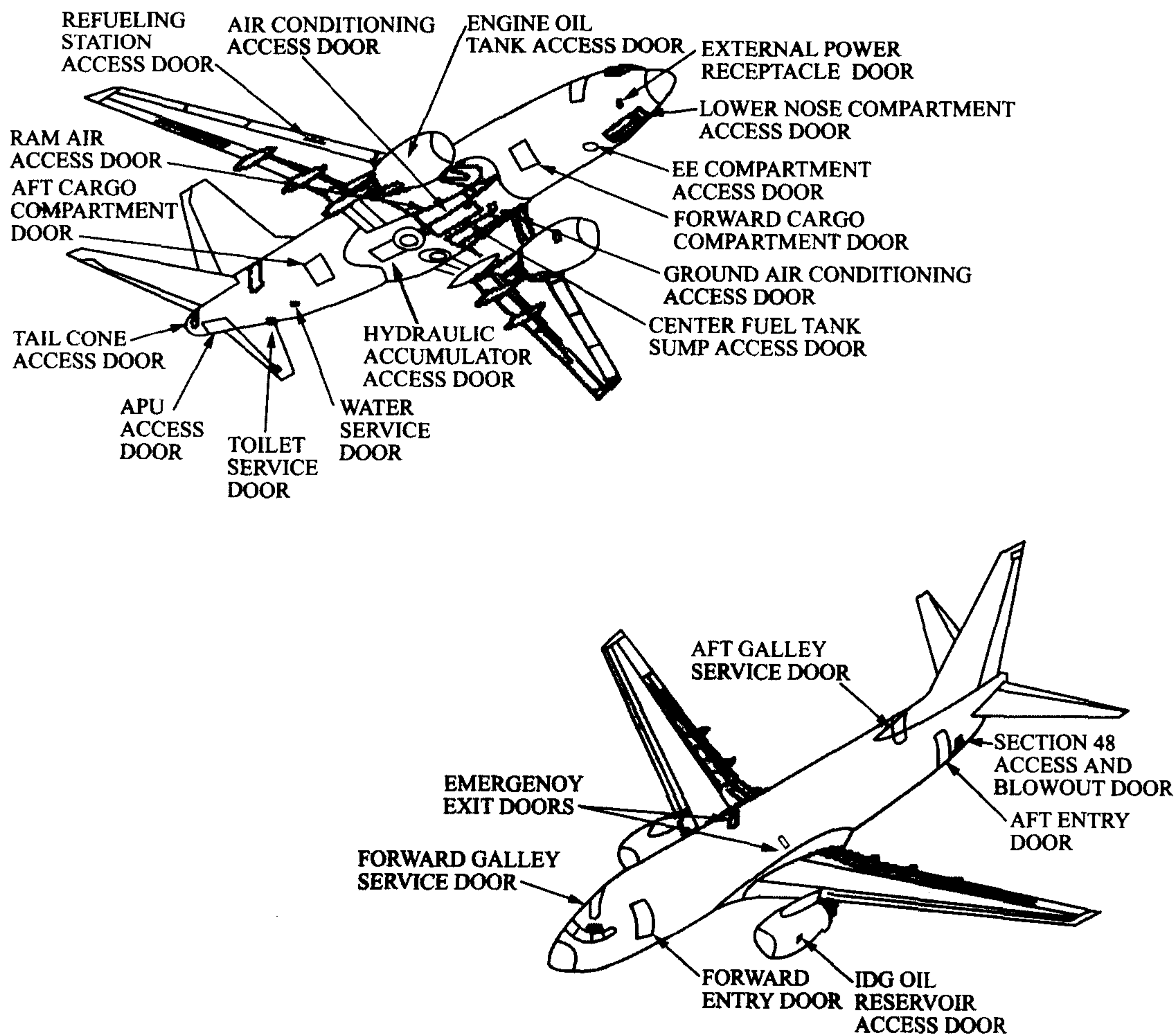


Figure 1 - 6 ACCESS DOOR LOCATION

There are two cargo compartment doors on the lower right side of the fuselage, one serving each cargo compartment.

The lower nose compartment access door is located forward of the nose wheel well.

The electronic equipment compartment access door is located in the lower fuselage, aft of the nose wheel well.

The section 48 interior access door is located in the lower lobe, L/H side.

## SECTION E FLIGHT COMPARTMENT

### 驾驶舱

#### A. General Features

The flight compartment ( Figure 1 - 7) accommodates two crew members: captain and first officer. In front of the crew members are located the various panels for operation of the airplane systems. Between the two seats is the control stand containing engine and flight controls. Two observer seats are in the flight compartment behind the crew seats.

The description of instrument panel is in the panel description booklet.



Figure 1 - 7 FLIGHT COMPARTMENT

These are the main control panels in flight compartment:

- ① P1 CAPT INSTRUMENT PANEL
  - Capt display select panel
  - Left inboard DU
  - Left outboard DU
  - Capt brightness controls
- ② P2 CENTER INSTRUMENT PANEL
  - Engine display control panel

- Upper center DU
- ③ P3 F/O INSTRUMENT PANEL
  - F/O display select panel
  - Right inboard DU
  - Right outboard DU
  - F/O brightness controls
- ④ P5 FORWARD OVERHEAD PANEL
  - Display source selectors
- ⑤ P7 GLARESHIELD PANEL
  - EFIS control panel
- ⑥ P9/P8 FORWARD/AFT ELECTRONICS PANELS.

# CHAPTER 2 ELECTRICAL POWER SYSTEM

## 电源系统

**内容提示:** B737 飞机电源系统的组成; 电源系统的发电原理; GCU、GB、BTB 等部件功用; 主发电机供电、APU 发电机供电、地面电源供电原理; 二次电源、备用电源和电源转换; M400 电源系统指示和测试; 飞机电源的故障分析。

**内容重点:** B737 飞机电源系统的组成; 电源系统的发电原理; GCU、GB、BTB 等部件功用; 主发电机供电、APU 发电机供电、地面电源供电原理; 二次电源、备用电源和电源转换; M400 电源系统指示和测试; 飞机电源的故障分析。

### SECTION A B737 ELECTRICAL POWER SYSTEM INTRODUCTION B737 飞机电源系统介绍

The electrical power system makes, supplies, and controls electrical power. The system has automatic and manual control features. Built-in test equipment (BITE) and alternate source selection make the system reliable and easy to keep.

Electrical power has these subsystems (Figure 2 - 1):

- Generator drive;
- AC generation;
- DC generation;
- External power;
- AC electrical load distribution.

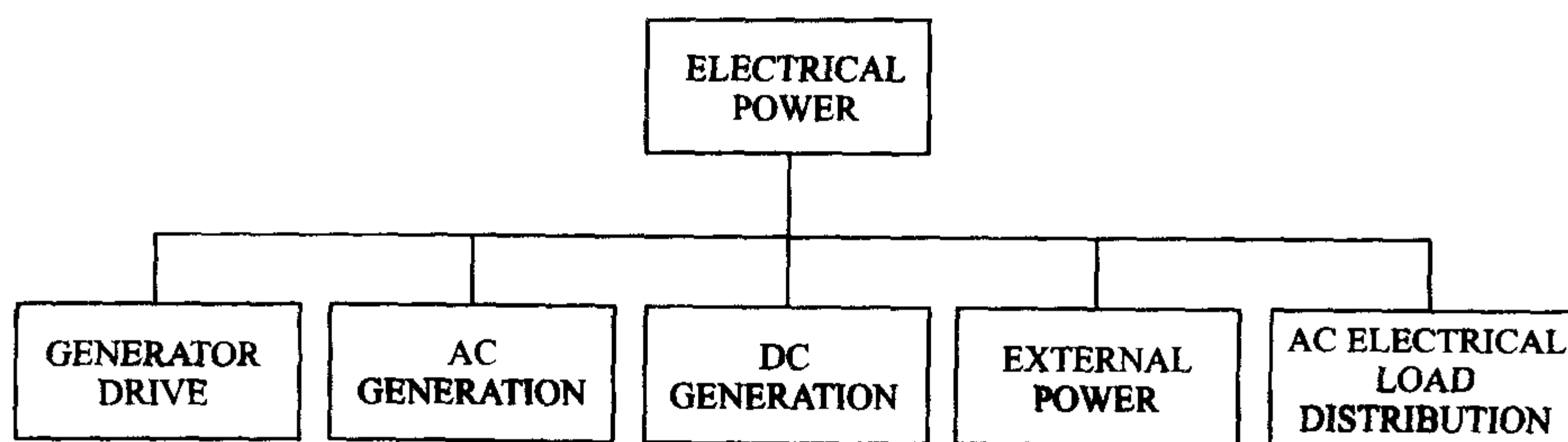


Figure 2 - 1 ELECTRICAL POWER—INTRODUCTION

## A. General Component Locations

Electrical power components are in these areas of the airplane ( Figure 2 - 2 ) :

- Flight compartment;
- External power panel;
- Forward lower fuselage;
- EE compartment;
- Engine;
- APU ( auxiliary power unit ) compartment.

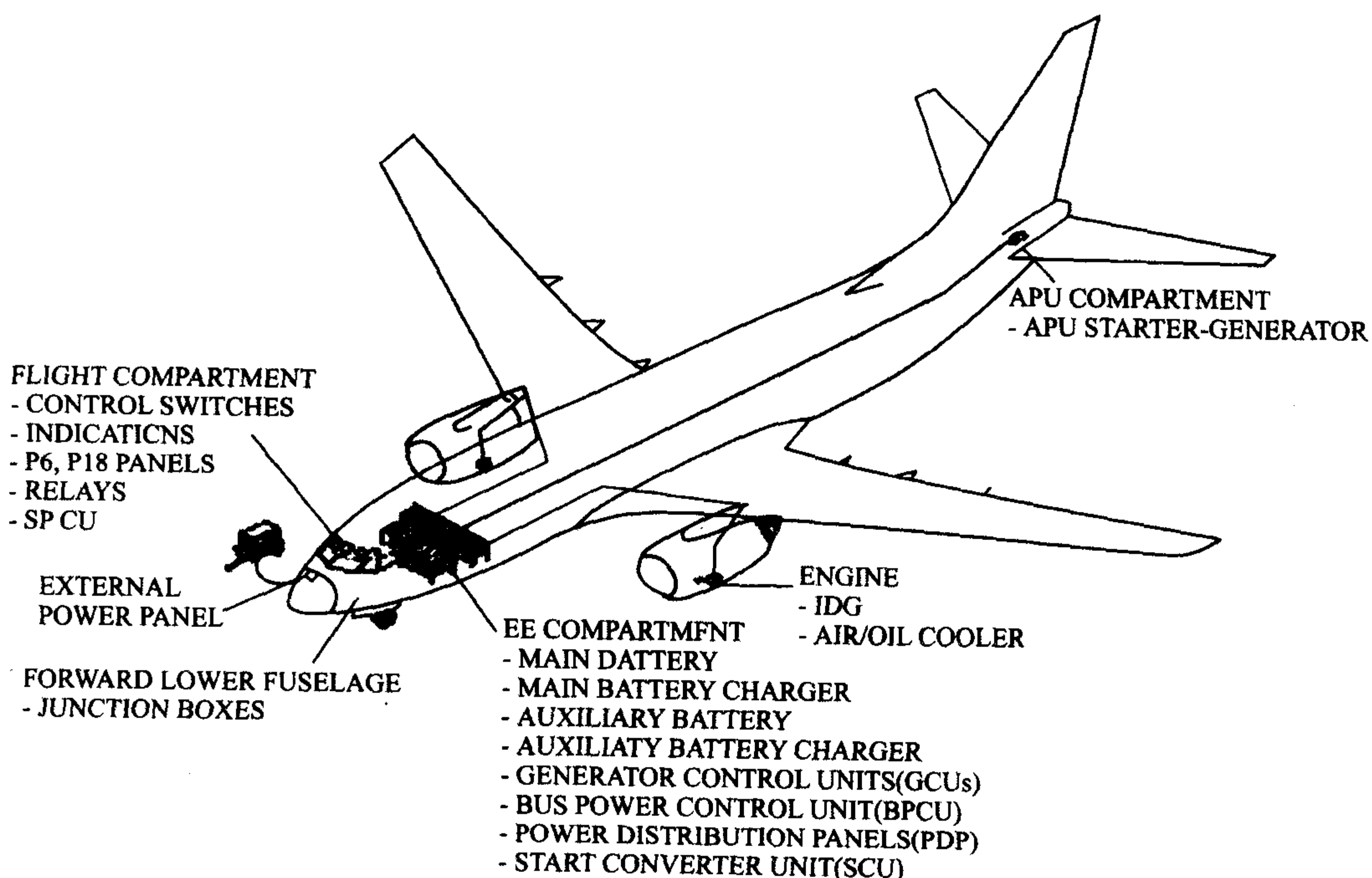


Figure 2 - 2 ELECTRICAL POWER — COMPONENT LOCATIONS