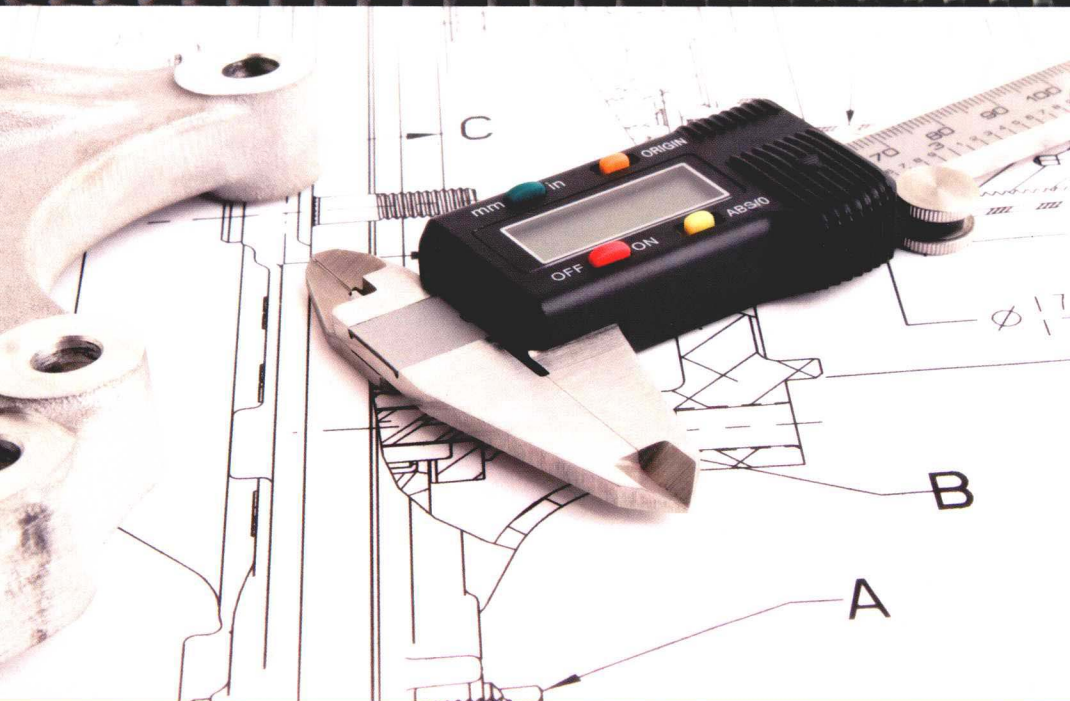


STANDARD AIRCRAFT HANDBOOK

FOR MECHANICS
AND TECHNICIANS

SEVENTH EDITION



Larry Reithmaier and Ronald Sterkenburg

Standard Aircraft Handbook for Mechanics and Technicians

Edited by Larry Reithmaier
and Ronald Sterkenburg



Seventh Edition

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Preface

The *Standard Aircraft Handbook for Mechanics and Technicians* is presented in shop terms for the mechanics and technicians engaged in building, maintaining, overhauling, and repairing metal and composite aircraft. It is also useful for the student mechanic, who must acquire the basic mechanical skills fundamental to every technical specialty.

This handbook is a relatively complete guide to all basic shop practices, such as use of basic tools, drilling, riveting, sheet-metal forming, use of threaded fasteners, and installation of plumbing, cables, and electrical wiring. Chapters on nondestructive testing (NDT) and corrosion detection and control provide a guide to advanced technology inspection and detection equipment, techniques, and procedures.

For the Seventh Edition, the editors updated all existing chapters with new relevant information and figures to reflect current technologies, hardware, and materials used for aircraft maintenance. A new chapter was added to the handbook to provide information about composite materials such as carbon fiber used in modern aircraft models.

The information presented in this handbook was obtained from techniques and procedures developed by various aircraft and equipment manufacturers and is in general compliance with manufacturing specifications.

This handbook is not intended to replace, substitute for, or supersede any FAA regulations, shop and quality-control standards of an aircraft manufacturer, repair station, or manufacturer's maintenance manual.

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Introduction

Many aircraft configurations have been built, such as flying wing, tailless, canard, and biplane; however, the basic airplane configuration consists of a monoplane with a fuselage and tail assembly. See Figs. 1-1 and 1-2.

Although other construction methods are, or have been, used, such as wood, fabric, steel tube, composites, and plastics, the basic all-metal aluminum alloy structure predominates with steel and/or titanium in high-stress or high-temperature locations.

The airframe components are composed of various parts called *structural members* (i.e., stringers, longerons, ribs, formers, bulkheads, and skins). These components are joined by rivets, bolts, screws, and welding. Aircraft structural members are designed to carry a load or to resist stress. A single member of the structure could be subjected to a combination of stresses.

In designing an aircraft, every square inch of wing and fuselage, every rib, spar, and each metal fitting must be considered in relation to the physical characteristics of the metal of which it is made. Every part of the aircraft must be planned to carry the load to be imposed upon it. The determination of such loads is called *stress analysis*. Although planning the design is not the function of the aviation mechanic, it is nevertheless important that he or she understand and appreciate the stresses involved in order to avoid changes in the original design through improper repairs or poor workmanship.

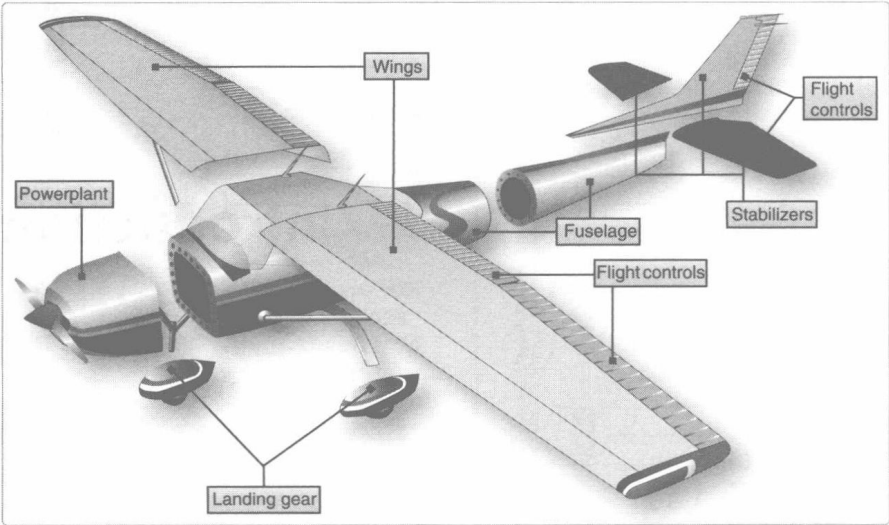
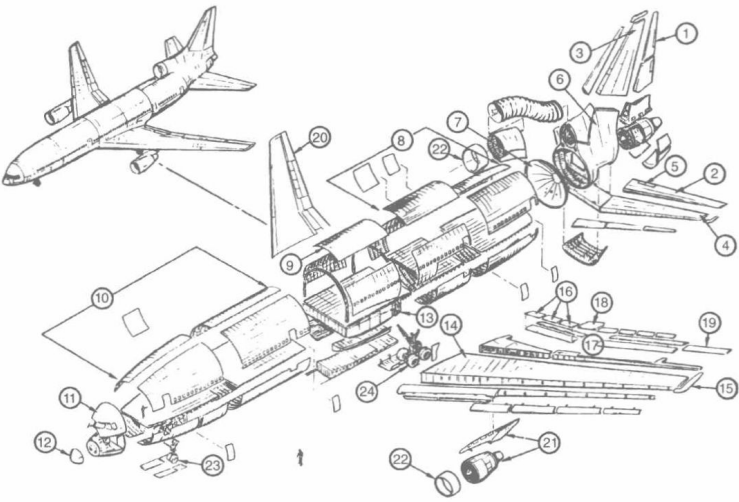


Figure 1-1 Major components of a piston-engine-powered light airplane.



- | | |
|-----------------------------|---------------------------|
| 1 Rudder | 13 Stub Wing |
| 2 Elevator | 14 Wing |
| 3 Vertical Stabilizer – Fin | 15 Wing Tip |
| 4 Horizontal Stabilizer | 16 Spoilers |
| 5 Elevator Trim Tab | 17 Flaps |
| 6 Aft Body | 18 High Speed Aileron |
| 7 Pressure Bulkhead | 19 Aileron |
| 8 Aft Fuselage | 20 Wing Complete |
| 9 Center Fuselage | 21 Power Plant & Nacelles |
| 10 Forward Fuselage | 22 Engine Cowling |
| 11 Flight Station | 23 Nose Landing Gear |
| 12 Nose | 24 Main Landing Gear |

Figure 1-2 Major components of a turbine-powered airliner.

Fuselage Structure

The monocoque (single shell) fuselage relies largely on the strength of the skin or covering to carry the primary stresses. Most aircraft, however, use the semimonocoque design inasmuch as the monocoque type does not easily accommodate concentrated load points, such as landing gear fittings, powerplant attachment, wing fittings, etc.

The semimonocoque fuselage (Fig. 1-3) is constructed primarily of aluminum alloy, although steel and titanium are used in areas of high temperatures and/or high stress. Primary loads are taken by the longerons, which usually extend across several points of support. The longerons are supplemented by other longitudinal members, called *stringers*. Stringers are more numerous and lighter in weight than longerons and usually act as stiffeners. The vertical structural members are referred to as *bulkheads*, *frames*, and *formers*. The heaviest of these vertical members are located at intervals to carry concentrated loads and at points where fittings are used to attach other units, such as the wings, powerplants, and stabilizers.

Location Numbering Systems

Various numbering systems are used to facilitate the location of specific wing frames, fuselage bulkheads, or any other structural

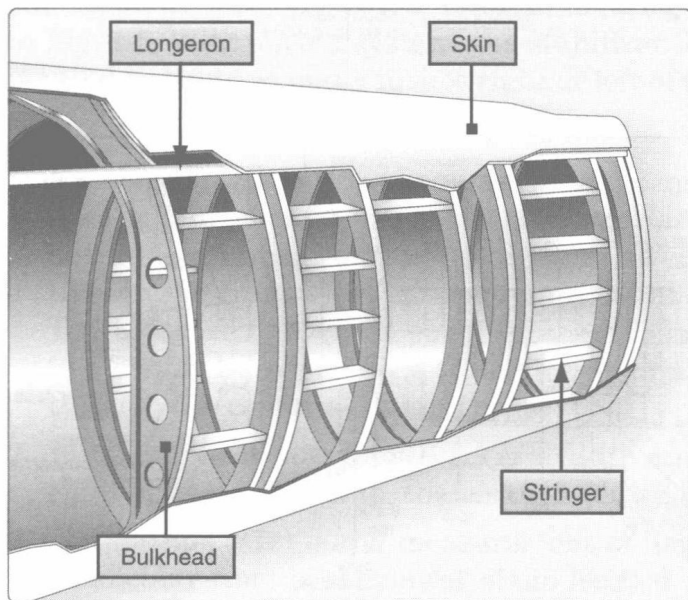


Figure 1-3 Typical metal aircraft fuselage structure.