CHAPTER 1 Helicopter

Introduction to the Helicopter

Helicopters come in many sizes and shapes, but most share the same major components. These components include a cabin where the **payload** and crew are carried; an airframe, which houses the various components, or where components are attached; a powerplant or engine; and a transmission, which, among other things, takes the power from the engine and transmits it to the main rotor, which provides the aerodynamic forces that make the helicopter fly. Then, to keep the helicopter from turning due to **torque**, there must be some type of antitorque system. Finally there is the landing gear, which could be skids, wheels, skis, or floats. This chapter is an introduction to these components. [Figure 1-1]

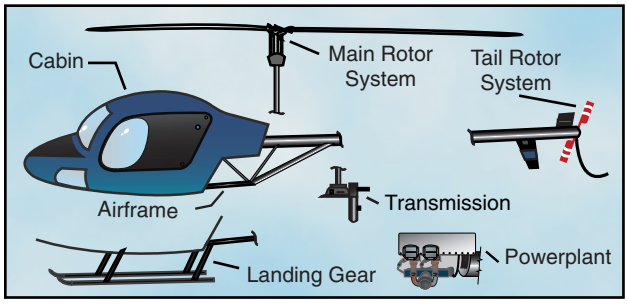

Figure 1-1. The major components of a helicopter are the cabin, airframe, landing gear, powerplant, transmission, main rotor system, and tail rotor system.

THE MAIN ROTOR SYSTEM

The rotor system found on helicopters can consist of a single main rotor or dual rotors. With most dual rotors, the rotors turn in opposite directions so the torque from one rotor is opposed by the torque of the other. This cancels the turning tendencies. [Figure 1-2]

In general, a rotor system can be classified as either fully articulated, semirigid, or rigid. There are variations and combinations of these systems, which will be discussed in greater detail in Chapter 5—Helicopter Systems.

FULLY ARTICULATED ROTOR SYSTEM

A fully articulated rotor system usually consists of three or more rotor blades. The blades are allowed to **flap**, **feather**, and **lead or lag** independently of each other. Each rotor blade is attached to the rotor hub by a horizontal hinge, called the flapping hinge, which permits the blades to flap up and down. Each blade can move up and down independently of the others. The flapping hinge may be located at varying distances from the rotor hub, and there may be more than one. The position is chosen by each manufacturer, primarily with regard to stability and control.

Figure 1-2. Helicopters can have a single main rotor or a dual rotor system.

Payload—The term used for passengers, baggage, and cargo.

Torque—In helicopters with a single, main rotor system, the tendency of the helicopter to turn in the opposite direction of the main rotor rotation.

Blade Flap—The upward or downward movement of the rotor blades during rotation.

Blade Feather or Feathering—The rotation of the blade around the spanwise (pitch change) axis.

Blade Lead or Lag—The fore and aft movement of the blade in the plane of rotation. It is sometimes called hunting or dragging.