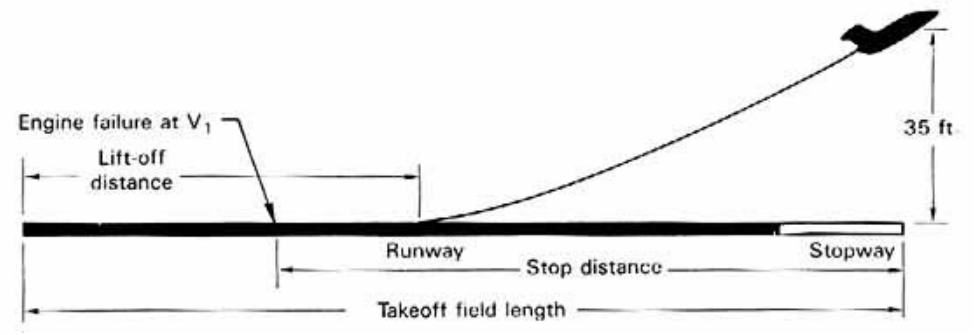
Balanced field length

J-12, Q – 5b

Explain the concept of balanced field length of a multi – engined civil transport aircraft.

Answer



The FAR takeoff field length, often called the FAR balanced field length, contains certain inherent safety features to account for engine failure situations. This takeoff field length is defined in several slightly different ways.

Briefly, if an engine should fail during the takeoff roll at a critical speed, called the decision speed V_1, the pilot is offered the option of two safe courses of action.

He may elect to continue the takeoff on the remaining engines, in which case, the takeoff distance is defined as the distance from the point at which the takeoff run is initiated to the point where the aircraft has reached an altitude of 35 feet.

In the second alternative, the pilot may elect to shut down all engines and apply full braking.

The decision speed V_1 is chosen in such a way that the sum of the distance required to accelerate to V_1 and then decelerate to a stop is the same as the total distance for the case in which the takeoff is continued following engine failure.

If an engine should fail before V_1 is reached, the aircraft is usually brought to a stop on the runway; whereas, if an engine fails at a speed greater than V_1 the takeoff is continued. The distances are based on smooth, hard, dry runway surfaces. A somewhat idealized sketch of the FAR takeoff field length is shown in above figure.