

VORTEX RING STATE

PURPOSE:

To demonstrate the dangerous results of operating at low airspeeds, moderate to high power settings, and high rates of sink (Vortex Ring State).

DESCRIPTION:

The vortex ring state is most dangerous when it happens at relatively low altitudes. The most common condition is during a steep approach with a tailwind. It should be demonstrated at an altitude of at least 1000 feet AGL.

To enter a maneuver, adjust the power to approximately 13–15 inches manifold pressure. Hold altitude with aft cyclic until the airspeed approaches 20 KTS. Allow the sink rate to increase to 300 FPM or more as the attitude is adjusted to obtain airspeed of less than 10 KTS. The aircraft will begin to shudder. Application of additional up collective will increase the vibration and sink rate while the cyclic and pedal effectiveness is reduced. Once the condition is well developed, rate of sink in excess of 2000 FPM can result. Recovery should be initiated at the first sign. The maneuver can also be entered from an OGE hover.

There are two recovery techniques:

1. The traditional technique is to apply forward cyclic to increase airspeed and simultaneously reduce the collective. When the airspeed indicates 20–30 KTS and the trim strings have become effective raise the collective to takeoff power and adjust the cyclic to a maximum performance climb attitude. The recovery is completed when the VSI reads 0.
2. A more efficient recovery technique is called the Vuichard Recovery. Initiate the recovery by raising the collective to takeoff power (MCP at lower gross weights), simultaneously applying left pedal to maintain heading and right cyclic (10°–20° bank) to get lateral movement. Once the right side of the rotor disc reaches the upwind part of the vortex the recovery is completed. Average loss of altitude during the recovery is 20–50 feet.

PERFORMANCE STANDARDS:

The pilot must thoroughly understand and recognize the vortex ring state and be able to safely recover.