

b. Due to the difference in contact limitations (4 degrees compared to 11 degrees) it is likely that this vibration (2 per rev) will be felt while flying within the flight envelope. Gusts, winds, landings with slope angles, greater than 4 degrees and hoisting operations are several situations that increase main rotor flapping angles, thus increasing the possibility of hub spring contact. While the hub spring will not prohibit mast bumping, it will aid in controlling rotor flapping angles, and provide an extra margin of safety. Installation of the hub spring does not change in any way the approved flight envelope. Should hub spring contact occur during normal operations, no special inspections or maintenance actions are required. Anytime operating limitations or the flight envelope is exceeded and hub spring contact is encountered, a mast bump inspection will be performed.

8-46. Collective Bounce. Collective bounce is a pilot induced vertical oscillation of the collective control system when an absolute friction (either pilot applied or control rigged) is less than seven pounds. It may be encountered in any flight condition by a rapid buildup of vertical bounce at approximately three cycles per second. The severity of the oscillation is such that effective control of the helicopter may become difficult to maintain. The pilot should apply and maintain adequate collective friction in all flight conditions.

8-47. Blade Stall. Refer to FM 1-203, Fundamentals of Flight.

8-48. Setting with Power. Refer to FM 1-203, Fundamentals of Flight.

8-49. Maneuvering Flight. Action and response of the controls during maneuvering flight are normal at all times when the helicopter is operated within the limitations set forth in this manual.

8-50. Hovering Capabilities. Refer to Chapter 7.

8-51. Flight With External Loads. The airspeed with external cargo is limited by controllability.

8-52. Types of vibration.

a. The source of vibration of various frequencies are the rotating and moving components on the helicopter; other components vibrate in response to an existing vibration.

b. Rotor vibrations felt during in-flight or ground operations are divided in general frequencies as follows.

(1) Extreme low frequency - Less than one per revolution (pylon rock).

(2) Low frequency - One or two per revolution

(3) Medium frequency - Generally, four, five, or six per revolution

(4) High frequency - Tail rotor frequency or higher

c. Most vibrations are always present at low magnitudes. The main problem is deciding when a vibration level has reached the point of being excessive.

d. Extreme low, and most medium frequency vibrations are caused by the rotor or dynamic controls. Various malfunctions in stationary components can affect the absorption or damping of the existing vibrations and increase the overall level.

e. A number of vibrations are present which are considered a normal characteristic. Two per revolution is the most prominent of these, with four or six per revolution the most prominent. There is always a small amount of high-frequency vibration present that may be detectable. Expedience is necessary to learn the normal vibration levels. Sometimes the mistake is made of concentrating on feeling one specific vibration and concluding that the level is higher than normal.

8-53. Low G Maneuvers.

WARNING

Intentional flight below +0.5G is prohibited.

WARNING

Abrupt inputs of flight controls cause excessive main rotor flapping, which may result in mast bumping and must be avoided.

a. Because of mission requirements, it may be necessary to rapidly lower the nose of the helicopter. At moderate to high airspeeds, it becomes increasingly easier to approach zero or negative load factors by abrupt forward cyclic inputs. The helicopter may exhibit a tendency to roll to the right simultaneously with the forward cyclic input.

b. Such things as sideslip, weight and location of external stores and airspeed will affect the severity of the right roll. Variances in gross weight longitudinal cg, and rotor rpm may affect the roll characteristics. The right roll occurs throughout the normal operating airspeed range and becomes more violent at progressively lower load factors. When it is necessary to rapidly lower the nose of the helicopter, it is essential that the pilot monitor changes in roll attitude as the cyclic is moved forward.

c. If the flight envelope is inadvertently exceeded, causing a low "G" condition and right roll, move cyclic aft to return rotor to positive thrust condition, then roll level, continuing flight if mast bumping has not occurred.

S-54. Rollover Characteristics. Refer to FM 1-203, Fundamentals of Flight.