ROTORCRAFT FLYING HANDBOOK pdf

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Many aircraft also use placards and instrument markings in the cockpit, which provide important information that may not be committed to memory. This is achieved by removing the rotor blades and suspending the aircraft by its teeter bolt, free from contact with the ground. A measurement is then taken, either at the keel or the rotor mast, to determine how many degrees from level the gyroplane hangs. This number must be within the range specified by the manufacturer. For the test to reflect the true balance of the aircraft, it is important that it be conducted using the actual weight of the pilot and all gear normally carried in flight. Additionally, the measurement should be taken both with the fuel tank full and with it empty to ensure that fuel burn does not affect the loading. For safe operation, you must be thoroughly familiar with the procedures and limitations for your particular aircraft along with other factors that may affect the safety of your flight. Adherence to a preflight checklist greatly enhances your ability to evaluate the fitness of your gyroplane by ensuring that a complete and methodical inspection of all components is performed. To determine the status of Figure A checklist is extremely useful in conducting a thorough preflight inspection. Intrinsic to these typically small aircraft is a limited amount of space that must be utilized to its potential. The placement and accessibility of charts, writing materials, and other necessary items must be carefully considered. Gyroplanes with open cockpits add the challenge of coping with wind, which further increases the need for creative and resourceful cockpit management for optimum efficiency. Again, when a checklist is not provided, it is advisable to create one for the safety of yourself and others, and to prevent inadvertent damage to the engine or propeller. Being inherently dangerous, the propeller demands special attention during engine starting procedures. Always ensure that the propeller area is clear prior to starting. In addition to providing an added degree of safety, being thoroughly familiar with engine starting procedures and characteristics can also be very helpful in starting an engine under various weather conditions. However, a gyroplane should not be taxied in close proximity to people or obstructions while the rotor is turning. In addition, taxi speed should be limited to no faster than a brisk walk in ideal conditions, and adjusted appropriately according to the circumstances. BLADE FLAP On a gyroplane with a semi-rigid, teeter-head rotor system, blade flap may develop if too much airflow passes through the rotor system while it is operating at low r. This is most often the result of taxiing too fast for a given rotor speed. Unequal lift acting on the advancing and retreating blades Ch The blades then hit the teeter stops, creating a vibration that may be felt in the cyclic control. The frequency of the vibration corresponds to the speed of the rotor, with the blades hitting the stops twice during each revolution. If the flapping is not controlled, the situation can grow worse as the blades begin to flex Figure Taxiing too fast or gusting winds can cause blade flap in a slow turning rotor. If not controlled, a rotor blade may strike the ground. Because the system is operating at low r. The shock of hitting the teeter stops combined with uneven lift along the length of the blade causes an undulation to begin, which can increase in severity if allowed to progress. In extreme cases, a rotor blade may strike the ground or propeller. Consideration must also be given to wind speed and direction. If taxiing into a 10knot headwind, for example, the airflow through the rotor will be 10 knots faster than the forward speed of the gyroplane, so the taxi speed should be adjusted accordingly. When prerotating the rotor by taxiing with the rotor disc tilted aft, allow the rotor to accelerate slowly and smoothly. In the event blade flap is encountered, apply forward cyclic to reduce the rotor disc angle and slow the gyroplane by reducing throttle and applying the brakes, if needed. The engine should be at normal operating temperature, and the area must be clear for prerotation. Certificated gyroplanes using conventional aircraft engines have a checklist that includes items specific to the powerplant. These normally include, but are not limited to, checks for magneto drop, carburetor heat, and, if a constant speed propeller is installed, that it be cycled for proper operation. Following the engine run-up is the procedure for accomplishing prerotation. This should be reviewed and committed to memory, as it typically requires both hands to perform. The most basic method is to turn the rotor blades by hand. On a typical gyroplane with a counterclockwise rotating rotor, prerotation by hand is done on the right side of the rotor disk. This allows body movement to be directed away from the propeller to minimize the risk of injury. Other methods of prerotation include using mechanical, electrical, or hydraulic means for the initial blade spin-up. Decreasing the rotor disc angle of attack with forward cyclic can reduce the excessive amount of airflow causing the blade flap. This also allows greater clearance between the rotor blades and the surface behind the gyroplane, minimizing the chances of a blade striking the ground. After the prerotator is disengaged, taxi the gyroplane with the rotor disk tilted aft to allow airflow through the rotor. This increases rotor speed to flight r. In windy conditions, facing the gyroplane into the wind during prerotation assists in achieving the highest possible rotor speed from the prerotator. A factor often overlooked that can negatively affect the prerotation speed is the cleanliness of the rotor blades. For maximum efficiency, it is recommended that the rotor blades be cleaned periodically. By obtaining the maximum possible rotor speed through the use of proper prerotation techniques, you minimize the length of the ground roll that is required to get the gyroplane airborne. The prerotators on certificated gyroplanes remove the possibility of blade flap during prerotation. Before the clutch can be engaged, the pitch must be removed from the blades. When the desired rotor speed is achieved, blade pitch is increased for takeoff. Each type of takeoff assumes that certain conditions exist. When conditions dictate, a combination of takeoff techniques can be used. Two important speeds used for takeoff and initial climbout are VX and VY. VX is defined as the speed that provides the best angle of climb, and will yield the maximum altitude gain over a given distance. This speed is normally used when obstacles on the ground are a factor. Maintaining VY speed ensures the aircraft will climb at its maximum rate, providing the most altitude gain for a given period of time. The normal takeoff for most amateurbuilt gyroplanes is accomplished by prerotating to sufficient rotor r. Using a speed of 20 to 30 m. VY provides the most altitude gain for a given amount of time. As lift increases, move the cyclic forward to decrease the pitch angle on the rotor disc. When appreciable lift is being produced, the nose of the aircraft rises, and you can feel an increase in drag. Using coordinated throttle and flight control inputs, balance the gyroplane on the main gear without the nose wheel or tail wheel in contact with the surface. At this point, smoothly increase power to full thrust and hold the nose at takeoff attitude with cyclic pressure. The gyroplane will lift off at or near the minimum power required speed for the aircraft. VX should be used for the initial climb, then VY for the remainder of the climb phase. A normal takeoff for certificated gyroplanes is accomplished by prerotating to a rotor r. The brakes are then released and full power is applied. Lift off will not occur until the blade pitch is increased to the normal in-flight setting and the rotor disk tilted aft. This is normally accomplished at approximately 30 to 40 m. The gyroplane should then be allowed to accelerate to VX for the initial climb, followed by VY for the remainder of the climb. On any takeoff in a gyroplane, engine torque causes the aircraft to roll opposite the direction of propeller rotation, and adequate compensation must be made. The term crosswind component refers to that part of the wind which acts at right angles to the takeoff path. Begin the maneuver by aligning the gyroplane into the wind as much as possible. At airports with wide runways, you might be able to angle your takeoff roll down the runway to take advantage of as much headwind as you can. As airspeed increases, gradually tilt the rotor into the wind and use rudder pressure to maintain runway heading. In most cases, you should accelerate to a speed slightly faster than normal liftoff speed. As you reach takeoff speed, the downwind wheel lifts off the ground first, followed by the upwind wheel. Once airborne, remove the cross-control inputs and establish a crab, if runway heading is to be maintained. Due to the maneuverability of the gyroplane, an immediate turn into the wind after lift off can be safely executed, if this does not cause a conflict with existing traffic. Failure to check rotor for proper operation, track, and r. Improper initial positioning of flight controls. Improper application of power. Failure to lift off at proper airspeed. Failure to establish and maintain proper climb attitude and airspeed. Drifting from the desired ground track during the climb. The technique is identical to the normal takeoff, with performance being optimized during each phase. Using the help from wind and propwash, the maximum rotor r. VX climb speed should be maintained until the obstruction is cleared. Familiarity with the rotor acceleration characteristics and proper technique are essential for optimum short-field performance. If the prerotator is capable of spinning the rotor in excess of normal flight r. Once maximum rotor r. As airspeed and rotor r. While remaining on the ground, accelerate the gyroplane to a speed just prior to VX. At that point, tilt the disk aft and increase the blade pitch to the normal in-flight setting. The climb should be at a speed just under VX until rotor r. When the obstruction is no longer a factor, increase the airspeed to VY.

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Posted 07 September - Your numbers are probably right If you did actually lower the collective exactly at the degree intercept point, then you will overarc! What it says, is be aligned at the recommened approach airspeed. GomerPylot has it right when he talks about rate of closure. When I taught this stuff, I would teach 60kts is my pattern speed, and setup speed. However,when the desired approach angle is nearing, you should forget airspeed, and think rate of closure instead. Now at feet, a brisk walking pace just so happens to be about 60kts. At first, it is difficult to judge how early to start desceleration and when to start descent. A really proficient pilot can make this transition almost seamless, so to the observer, it would seem that he did intercept at 60kts. What about descent rate? The only time you need to watch RoD vs IAS is if you have overcooked it, and need to dump altitude at low airspeeds. You say you are finding that your normal approach works out at about 6 degrees. I used to stiffen up, when I instructed old-bold pilots, who seemed to me that they still thought they were coming into a hot LZ in Nam. Way too fast and way too steep for my liking. However, looking back on it, I realise now that is shallower than most other areas of the industry. Having moved out of flight training, it is obvious that most people are teaching approaches shallower than they need to be. I think it is because there is more margin for error. The landing site probably has a bearing too. Also the larger the aircraft, the less worry about SWP. SWP is almost impossible to get in an S So what I am saying is that is probably closer to the industry norm, but shallower is usually taught. Maybe some others not in flight training would care to coment on this.

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