the main rotor blades having an angle of attack that has created so much drag that engine power is not sufficient to maintain or attain normal operating r.p.m.

If you are in a low r.p.m. situation, the lifting power of the main rotor blades can be greatly diminished. As soon as you detect a low r.p.m. condition, immediately apply additional throttle, if available, while slightly lowering the collective. This reduces main rotor pitch and drag. As the helicopter begins to settle, smoothly raise the collective to stop the descent. At hovering altitude you may have to repeat this technique several times to regain normal operating r.p.m. This technique is sometimes called "milking the collective." When operating at altitude, the collective may have to be lowered only once to regain rotor speed. The amount the collective can be lowered depends on altitude. When hovering near the surface, make sure the helicopter does not contact the ground as the collective is lowered.

Since the tail rotor is geared to the main rotor, low main rotor r.p.m. may prevent the tail rotor from producing enough thrust to maintain directional control. If pedal control is lost and the altitude is low enough that a landing can be accomplished before the turning rate increases dangerously, slowly decrease collective pitch, maintain a level attitude with cyclic control, and land.

SYSTEM MALFUNCTIONS

The reliability and dependability record of modern helicopters is very impressive. By following the manufacturer's recommendations regarding periodic maintenance and inspections, you can eliminate most systems and equipment failures. Most malfunctions or failures can be traced to some error on the part of the pilot; therefore, most emergencies can be averted before they happen. An actual emergency is a rare occurrence.

ANTITORQUE SYSTEM FAILURE

Antitorque failures usually fall into two categories. One focuses on failure of the power drive portion of the tail rotor system resulting in a complete loss of antitorque. The other category covers mechanical control failures where the pilot is unable to change or control tail rotor thrust even though the tail rotor may still be providing antitorque thrust.

Tail rotor drive system failures include driveshaft failures, tail rotor gearbox failures, or a complete loss of the tail rotor itself. In any of these cases, the loss of antitorque normally results in an immediate yawing of the helicopter's nose. The helicopter yaws to the right in a counter-clockwise rotor system and to the left in a clockwise system. This discussion assumes a helicopter with a counter-clockwise rotor system. The severity of the yaw is proportionate to the amount of power being used and the airspeed. An antitorque failure with a high power setting at a low airspeed results in a severe yawing to the right. At low power settings and high airspeeds, the yaw is less severe. High airspeeds tend to streamline the helicopter and keep it from spinning.

If a tail rotor failure occurs, power has to be reduced in order to reduce main rotor torque. The techniques differ depending on whether the helicopter is in flight or in a hover, but will ultimately require an autorotation. If a complete tail rotor failure occurs while hovering, enter a hovering autorotation by rolling off the throttle. If the failure occurs in forward flight, enter a normal autorotation by lowering the collective and rolling off the throttle. If the helicopter has enough forward airspeed (close to cruising speed) when the failure occurs, and depending on the helicopter design, the vertical stabilizer may provide enough directional control to allow you to maneuver the helicopter to a more desirable landing sight. Some of the yaw may be compensated for by applying slight cyclic control opposite the direction of yaw. This helps in directional control, but also increases drag. Care must be taken not to lose too much forward airspeed because the streamlining effect diminishes as airspeed is reduced. Also, more altitude is required to accelerate to the correct airspeed if an autorotation is entered into at a low airspeed.

A mechanical control failure limits or prevents control of tail rotor thrust and is usually caused by a stuck or broken control rod or cable. While the tail rotor is still producing antitorque thrust, it cannot be controlled by the pilot. The amount of antitorque depends on the position where the controls jam or fail. Once again, the techniques differ depending on the amount of tail rotor thrust, but an autorotation is generally not required.

LANDING—STUCK LEFT PEDAL

Be sure to follow the procedures and techniques outlined in the FAA-approved rotorcraft flight manual for the helicopter you are flying. A stuck left pedal, such as might be experienced during takeoff or climb conditions, results in the helicopter's nose yawing to the left when power is reduced. Rolling off the throttle and entering an autorotation only makes matters worse. The landing profile for a stuck left pedal is best described as a normal approach to a momentary hover at three to four feet above the surface. Following an analysis, make the landing. If the helicopter is not turning, simply lower the helicopter to the surface. If the helicopter is turning to the right, roll the throttle toward flight idle the amount necessary to stop the turn as you land. If the helicopter is beginning to turn left, you should be able to make the landing prior to the turn rate becoming excessive. However, if the turn rate becomes excessive prior to the landing, simply execute a takeoff and return for another landing.