Begin the maneuver from a normal hovering altitude by applying forward pressure on the cyclic. As movement begins, return the cyclic toward the neutral position to maintain low groundspeed—no faster than a brisk walk. Throughout the maneuver, maintain a constant groundspeed and path over the ground with the cyclic, a constant heading with the antitorque pedals, altitude with the collective, and the proper rpm with the throttle.

To stop the forward movement, apply rearward cyclic pressure until the helicopter stops. As forward motion stops, return the cyclic to the neutral position to prevent rearward movement. Forward movement can also be stopped by simply applying rearward pressure to level the helicopter and allowing it to drift to a stop.

Common Errors

1. Exaggerated movement of the cyclic, resulting in erratic movement over the surface.
2. Failure to use proper antitorque pedal control, resulting in excessive heading change.
3. Failure to maintain desired hovering altitude.
4. Failure to maintain proper rpm.
5. Failure to maintain alignment with direction of travel.

Hovering—Sideward Flight

Sideward hovering flight may be necessary to move the helicopter to a specific area when conditions make it impossible to use forward flight. During the maneuver, a constant groundspeed, altitude, and heading should be maintained.

Technique

Before starting sideward hovering flight, ensure the area for the hover is clear, especially at the tail rotor. Constantly monitor hover height and tail rotor clearance during all hovering maneuvers to prevent dynamic rollover or tail rotor strikes to the ground. Then, pick two points of in-line reference in the direction of sideward hovering flight to help maintain the proper ground track. These reference points should be kept in line throughout the maneuver. *[Figure 9-3]*

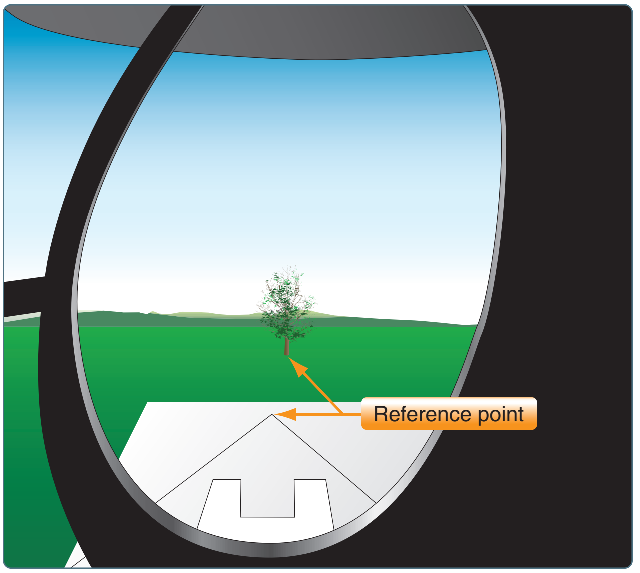

Figure 9-3. *The key to hovering sideward is establishing at least two reference points that help maintain a straight track over the ground while keeping a constant heading.*

Begin the maneuver from a normal hovering altitude by applying cyclic toward the side in which the movement is desired. As the movement begins, return the cyclic toward the neutral position to maintain low groundspeed—no faster than a brisk walk. Throughout the maneuver, maintain a constant groundspeed and ground track with cyclic. Maintain heading, which in this maneuver is perpendicular to the ground track, with the antitorque pedals, and a constant altitude with the collective. Use the throttle to maintain the proper operating rpm. Be aware that the nose tends to weathervane into the wind. Changes in the pedal position will change the rpm and must be corrected by collective and/or throttle changes to maintain altitude.

To stop the sideward movement, apply cyclic pressure in the direction opposite to that of movement and hold it until the helicopter stops. As motion stops, return the cyclic to the neutral position to prevent movement in the opposite direction. Applying sufficient opposite cyclic pressure to level the helicopter may also stop sideward movement. The helicopter then drifts to a stop.

Common Errors

1. Exaggerated movement of the cyclic, resulting in overcontrolling and erratic movement over the surface.
2. Failure to use proper antitorque pedal control, resulting in excessive heading change.
3. Failure to maintain desired hovering altitude.
4. Failure to maintain proper rpm.
5. Failure to make sure the area is clear prior to starting the maneuver.

Hovering—Rearward Flight

Rearward hovering flight may be necessary to move the helicopter to a specific area when the situation is such that forward or sideward hovering flight cannot be used. During the maneuver, maintain a constant groundspeed, altitude, and heading. Due to the limited visibility behind a helicopter, it

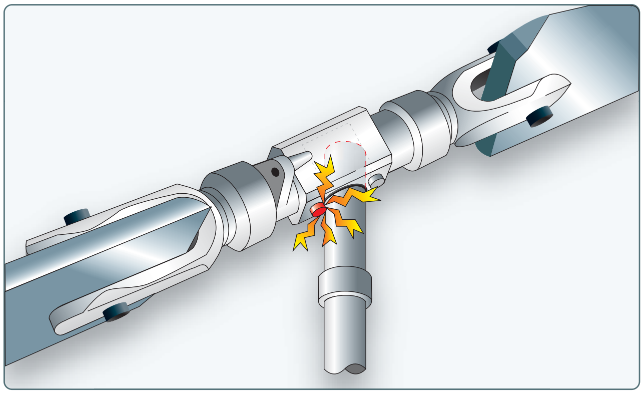

Figure 11-10. *Result of improper corrective action in a low-G condition.*

the rotor shaft. Since the mast is hollow, the structural failure manifests itself either as shaft failure with complete separation of the main rotor system from the helicopter or a severely damaged rotor mast.

In situations like the one described above, the helicopter pilot should first apply aft cyclic to bring the vectors into balance, with lift up and gravity down. Since helicopter blades carry the helicopter and have limited motion attachment, care must be given to those attachment limits. Helicopter pilots should always adhere to the maneuvering limitations stated in the RFM. There may be more than one reason or design criteria which limits the helicopters flight envelope. Heed all of the manufacturer's limitations and advisory data. Failure to do so could lead to dire, unintended consequences.

Low Rotor RPM and Blade Stall

As mentioned earlier, low rotor rpm during an autorotation might result in a less than successful maneuver. However, if rotor rpm decays to the point at which all the rotor blades stall, the result is usually fatal, especially when it occurs at altitude. It can occur in a number of ways, such as simply rolling the throttle the wrong way, pulling more collective pitch than power available, or when operating at a high density altitude.

When the rotor rpm decreases, the blades produce less lift so the pilot feels it necessary to increase collective pitch to stop the descent or increase the climb. As the pitch increases, drag increases, which requires more power to keep the blades turning at the proper rpm. When power is no longer available to maintain rpm and, therefore, lift, the helicopter begins to descend. This changes the relative wind and further increases the AOA. At some point, the blades stall unless rpm is restored. As main rotor RPM decays, centrifugal force continues to lessen until the lift force overcomes the centrifugal forces and folds or breaks the blades. At this point, airflow will provide no any lift or driving force for the system, and the result is disastrous.

Even though there is a safety factor built into most helicopters, any time rotor rpm falls below the green arc and there is power, simultaneously add throttle and lower the collective. If in forward flight, gently applying aft cyclic causes more air flow through the rotor system and helps increase rotor rpm. If without power, immediately lower the collective and apply aft cyclic.

Recovery From Low Rotor RPM

Under certain conditions of high weight, high temperature, or high density altitude, a pilot may get into a low rotor rpm situation. Although the pilot is using maximum throttle, the rotor rpm is low and the lifting power of the main rotor blades is greatly diminished. In this situation, the main rotor blades have an AOA that has created so much drag that engine power is not sufficient to maintain or attain normal operating rpm. When rotor rpm begins to decrease, it is essential to recover and maintain it.

As soon as a low rotor rpm condition is detected, apply additional throttle if it is available. If there is no throttle available, lower the collective. The amount the collective can be lowered depends on altitude. Rotor rpm is life! If the engine rpm is too low, it cannot produce its rated power for the conditions because power generation is defined at a qualified rpm value. An rpm that is too low equals low power. Main rotor rpm must be maintained.

When operating at altitude, the collective may need to be lowered only once to regain rotor speed. If power is available, throttle can be added and the collective raised. Once helicopter rotor blades cone excessively due to low rotor rpm, return the helicopter to the surface to allow the main rotor rpm to recover. Maintain precise landing gear alignment with the direction of travel in case a landing is necessary. Low inertia rotor systems can become unrecoverable in 2 seconds or less if the rpm is not regained immediately.

Since the tail rotor is geared to the main rotor, low main rotor rpm 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.