

## Chapter 8

# Ground Procedures and Flight Preparations

### Introduction

Once a pilot takes off, it is up to him or her to make sound, safe decisions throughout the flight. It is equally important for the pilot to use the same diligence when conducting a preflight inspection, making maintenance decisions, refueling, and conducting ground operations. This chapter discusses the responsibility of the pilot regarding ground safety in and around the helicopter and when preparing to fly.





## Preflight

Before any flight, ensure the helicopter is airworthy by inspecting it according to the rotorcraft flight manual (RFM), pilot's operating handbook (POH), or other information supplied either by the operator or the manufacturer. Remember that it is the responsibility of the pilot in command (PIC) to ensure the aircraft is in an airworthy condition.

In preparation for flight, the use of a checklist is important so that no item is overlooked. [Figure 8-1] Follow the manufacturer's suggested outline for both the inside and outside inspection. This ensures that all the items the manufacturer feels are important are checked. If supplemental equipment has been added to the helicopter, these procedures should be included on the checklist as well.

### Minimum Equipment Lists (MELs) and Operations with Inoperative Equipment

Title 14 of the Code of Federal Regulations (14 CFR) requires that all aircraft instruments and installed equipment be operative prior to each departure. However, when the Federal Aviation Administration (FAA) adopted the minimum equipment list (MEL) concept for 14 CFR part 91 operations, flights were allowed with inoperative items, as long as the inoperative items were determined to be nonessential for safe flight. At the same time, it allowed part 91 operators, without an MEL, to defer repairs on nonessential equipment within the guidelines of part 91.



**Figure 8-1.** The pilot in command is responsible for the airworthy condition of the aircraft and using checklists to ensure proper inspection of the helicopter prior to flight.

There are two primary methods of deferring maintenance on rotorcraft operating under part 91. They are the deferral provision of 14 CFR part 91, section 91.213(d) and an FAA-approved MEL.

The deferral provision of 14 CFR section 91.213(d) is widely used by most pilot/operators. Its popularity is due to simplicity and minimal paperwork. When inoperative equipment is found during preflight or prior to departure, the decision should be to cancel the flight, obtain maintenance prior to flight, determine if the flight can be made under the limitations imposed by the defective equipment, or to defer the item or equipment.

Maintenance deferrals are not used for in-flight discrepancies. The manufacturer's RFM/POH procedures are to be used in those situations. The discussion that follows is an example of a pilot who wishes to defer maintenance that would ordinarily be required prior to flight.

If able to use the deferral provision of 14 CFR section 91.213(d), the pilot determines whether the inoperative equipment is required by type design or 14 CFR. If the inoperative item is not required, and the helicopter can be safely operated without it, the deferral may be made. The inoperative item shall be deactivated or removed and an INOPERATIVE placard placed near the appropriate switch, control, or indicator. If deactivation or removal involves maintenance (removal always does), it must be accomplished by certificated maintenance personnel.

For example, if the position lights (installed equipment) were discovered to be inoperative prior to a daytime flight, the pilot would follow the requirements of 14 CFR section 91.213(d). The pilot must then decide if the flight can be accomplished prior to night, when the lights will be needed.

The deactivation may be a process as simple as the pilot positioning a circuit breaker to the *off* position, or as complex as rendering instruments or equipment totally inoperable. Complex maintenance tasks require a certificated and appropriately rated maintenance person to perform the deactivation. In all cases, the item or equipment must be placarded INOPERATIVE.

When an operator requests an MEL, and a Letter of Authorization (LOA) is issued by the FAA, then the use of the MEL becomes mandatory for that helicopter. All maintenance deferrals must be accomplished in accordance with the terms and conditions of the MEL and the operator-generated procedures document.

The use of an MEL for rotorcraft operated under part 91 also allows for the deferral of inoperative items or equipment. The primary guidance becomes the FAA-approved MEL issued to that specific operator and N-numbered helicopter.

The FAA has developed master minimum equipment lists (MMELs) for rotorcraft in current use. Upon written request by a rotorcraft operator, the local FAA Flight Standards District Office (FSDO) may issue the appropriate make and model MMEL, along with an LOA, and the preamble. The operator then develops operations and maintenance (O&M) procedures from the MMEL. This MMEL with O&M procedures now becomes the operator's MEL. The MEL, LOA, preamble, and procedures document developed by the operator must be on board the helicopter when it is operated.

The FAA considers an approved MEL to be a supplemental type certificate (STC) issued to an aircraft by serial number and registration number. It therefore becomes the authority to operate that aircraft in a condition other than originally type certificated.

With an approved MEL, if the position lights were discovered inoperative prior to a daytime flight, the pilot would make an entry in the maintenance record or discrepancy record provided for that purpose. The item is then either repaired or deferred in accordance with the MEL. Upon confirming that daytime flight with inoperative position lights is acceptable in accordance with the provisions of the MEL, the pilot would leave the position lights switch *off*, open the circuit breaker (or whatever action is called for in the procedures document), and placard the position light switch as INOPERATIVE.

There are exceptions to the use of the MEL for deferral. For example, should a component fail that is not listed in the MEL as deferrable (the rotor tachometer, engine tachometer, or cyclic trim, for example), then repairs are required to be performed prior to departure. If maintenance or parts are not readily available at that location, a special flight permit can be obtained from the nearest FSDO. This permit allows the helicopter to be flown to another location for maintenance. This allows an aircraft that may not currently meet applicable airworthiness requirements, but is capable of safe flight, to be operated under the restrictive special terms and conditions attached to the special flight permit.

Deferral of maintenance is not to be taken lightly, and due consideration should be given to the effect an inoperative component may have on the operation of a helicopter, particularly if other items are inoperative. Further information regarding MELs and operations with inoperative equipment can be found in AC 91-67, Minimum Equipment Requirements for General Aviation Operations Under FAR Part 91.

## Engine Start and Rotor Engagement

During the engine start, rotor engagement, and systems ground check, use the manufacturer's checklists. If a problem arises, have it checked before continuing. Prior to performing these tasks, however, make sure the area around and above the helicopter is clear of personnel and equipment. Position the rotor blades so that they are not aligned with the fuselage. This may prevent the engine from being started with the blades still fastened. For a two-bladed rotor system, position the blades so that they are perpendicular to the fuselage and easily seen from the cockpit. Helicopters are safe and efficient flying machines as long as they are operated within the parameters established by the manufacturer.

## Rotor Safety Considerations

The exposed nature of the main and tail rotors deserves special caution. Exercise extreme care when taxiing near hangars or obstructions since the distance between the rotor blade tips and obstructions is very difficult to judge. [Figure 8-2] In addition, the tail rotor of some helicopters cannot be seen from the cabin. Therefore, when hovering backward or turning in those helicopters, allow plenty of room for tail rotor clearance. It is a good practice to glance over your shoulder to maintain this clearance

Another rotor safety consideration is the thrust a helicopter generates. The main rotor system is capable of blowing sand, dust, snow, ice, and water at high velocities for a significant distance causing injury to nearby people and damage to buildings, automobiles, and other aircraft. Loose snow, sand, or soil can severely reduce visibility and obscure outside visual references. There is also the possibility of sand and snow being ingested into the engine intake, which can overwhelm filters and cutoff air to the engine or allow unfiltered air into the engine, leading to premature failure. Any airborne debris near the helicopter can be ingested into the engine air intake or struck by the main and tail rotor blades.



**Figure 8-2.** Exercise extreme caution when hovering near buildings or other aircraft.

## Aircraft Servicing

The helicopter rotor blades are usually stopped, and both the aircraft and the refueling unit properly grounded prior to any refueling operation. The pilot should ensure that the proper grade of fuel and the proper additives, when required, are being dispensed.

Refueling of a turbine aircraft while the blades are turning, known as “hot refueling,” may be practical for certain types of operation. However, this can be hazardous if not properly conducted. Pilots should remain at the flight controls; and refueling personnel should be knowledgeable about the proper refueling procedures and properly briefed for specific helicopter makes and models.

The pilot may need to train the refueling personnel on proper hot refueling procedures for that specific helicopter. The pilot should explain communication signs or calls, normal servicing procedures, and emergency procedures as a minimum. At all times during the refueling process, the pilot should remain vigilant and ready to immediately shut down the engine(s) and egress the aircraft. Several accidents have occurred due to hot refueling performed by improperly trained personnel.

Refueling units should be positioned to ensure adequate rotor blade clearance. Persons not involved with the refueling operation should keep clear of the area. Smoking must be prohibited in and around the aircraft during all refueling operations.

If operations dictate that the pilot must leave the helicopter during refueling operations, the throttle should be rolled back to flight idle and flight control friction firmly applied to prevent uncommanded control movements. The pilot should be thoroughly trained on setting the controls and egressing/ingressing the helicopter.

## Safety in and Around Helicopters

People have been injured, some fatally, in helicopter accidents that would not have occurred had they been informed of the proper method of boarding or deplaning. *[Figure 8-3]* A properly briefed passenger should never be endangered by a spinning rotor. The simplest method of avoiding accidents of this sort is to stop the rotors before passengers are boarded or allowed to depart. Because this action is not always practicable, and to realize the vast and unique capabilities of the helicopter, it is often necessary to take on passengers or have them exit the helicopter while the engine and rotors are turning. To avoid accidents, it is essential that all persons associated with helicopter operations, including passengers, be made aware of all possible hazards and instructed how those hazards can be avoided.

## Ramp Attendants and Aircraft Servicing Personnel

These personnel should be instructed as to their specific duties and the proper method of fulfilling them. In addition, the ramp attendant should be taught to:

1. Keep passengers and unauthorized persons out of the helicopter landing and takeoff area.
2. Brief passengers on the best way to approach and board a helicopter with its rotors turning.

Persons directly involved with boarding or deplaning passengers, aircraft servicing, rigging, or hooking up external loads, etc., should be instructed as to their duties. It would be difficult, if not impossible, to cover each and every type of operation related to helicopters. A few of the more obvious and common ones are covered below.

## Passengers

Passengers increase the responsibility, workload, and risk for the pilot. The workload and distractions seem magnified to inexperienced pilots while they are developing confidence and ability to operate in the aviation environment. Inexperienced pilots should consider building up their passenger carrying experience while remaining in good flying conditions and in a familiar area.

All persons boarding a helicopter while its rotors are turning should be briefed on the safest means of doing so. The pilot in command (PIC) should always brief the passengers prior to engine start to ensure complete understanding of all procedures. The exact procedures may vary slightly from one helicopter model to another, but the following should suffice as a generic guide.

When boarding—

1. Stay away from the rear of the helicopter.
2. Approach or leave the helicopter in a crouching manner.
3. Approach from the side of the helicopter but never out of the pilot's line of vision. Certain rotor system designs allow for rotor blades to pass closer to the ground towards the front of the helicopter. For that reason, it is generally accepted for personnel to approach from the side of the helicopter. Helicopters designed to be loaded from the rear require personnel to exercise extreme caution due to tailrotor hazards.
4. Carry tools horizontally, below waist level—never upright or over the shoulder.
5. Hold firmly onto hats and loose articles.
6. Never reach up or dart after a hat or other object that might be blown off or away.
7. Protect eyes by shielding them with a hand or by



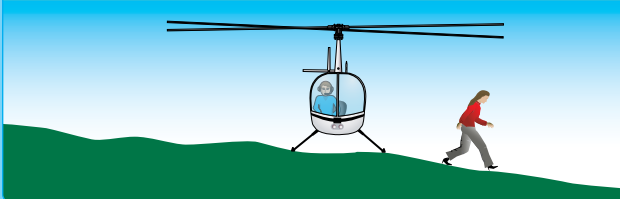
## SAFETY AROUND HELICOPTERS

### Approaching or Leaving a Helicopter

Do not approach or leave without the pilot's visual acknowledgment. Keep in pilot's field of vision **at all times**. **Observe helicopter safety zones** (see diagram at right).



On sloping ground, always approach or leave on the downslope side for maximum rotor clearance.



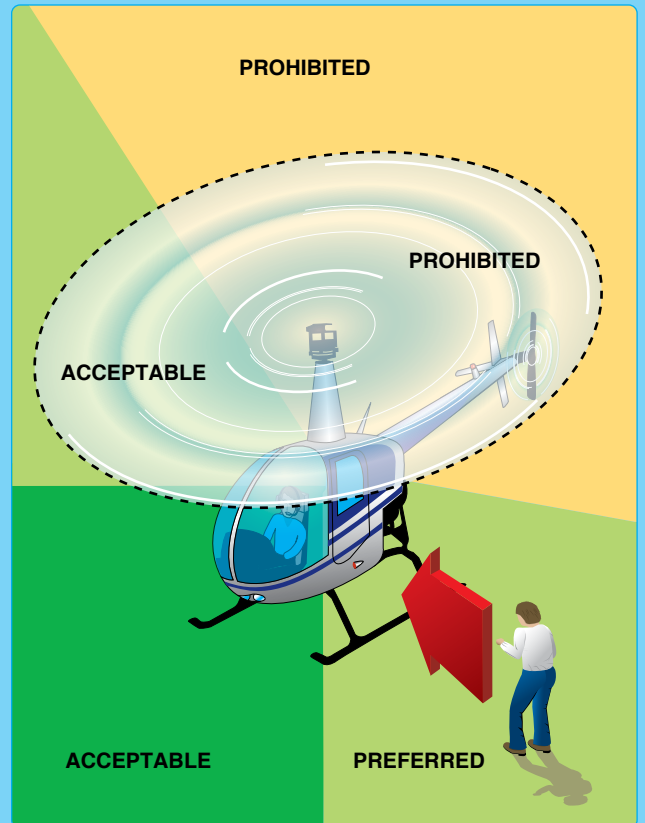
If blinded by swirling dust or grit, **STOP**—crouch lower, or sit down and await assistance.



If disembarking while helicopter is at the hover, get out and off in a smooth unhurried manner.



Do not approach or leave a helicopter when the engine and rotors are running down or starting up.



Proceed in a crouching manner for extra rotor clearance. Hold onto hat unless chin straps are used. **NEVER reach up or chase after a hat or other articles that blow away.**



Carry tools, etc., horizontally below waist level—never upright or on the shoulder.



Figure 8-3. Safety procedures for approaching or leaving a helicopter.

squinting.

8. If suddenly blinded by dust or a blowing object, stop and crouch lower; better yet, sit down and wait for help.
9. Never grope or feel your way toward or away from the helicopter.
10. Protect hearing by wearing earplugs or earmuffs.

Since few helicopters carry cabin attendants, the pilot must conduct the pretakeoff and prelanding briefings, usually before takeoff due to noise and cockpit layout. The type of operation dictates what sort of briefing is necessary. All briefings should include the following:

1. Passengers should be briefed and understand the proper use of seatbelts, doors, and headsets/intercom system.
2. The safe entry and exit paths (away from the tail rotor and within the pilot's view).
3. If possible, remove front passenger flight controls and ensure all passenger personal items, such as cameras and mobile phones are secure.
4. For over water flights, the location and use of flotation gear and other survival equipment that are onboard. Pilot instructions should include how and when to exit the helicopter should ditching or a water landing occur.
5. For flights over rough or isolated terrain, the pilot should brief all occupants regarding the location of maps and survival equipment.
6. Passengers should be informed as to what actions and precautions to take in the event of an emergency, such as the body position for best spinal protection against a high vertical impact (erect with back firmly against the seat back); and when and how to exit. Ensure that passengers are aware of the location of the fire extinguisher, survival equipment and, if equipped, how to use and locate the Emergency Position Indicator Radio Beacon (EPIRB).

When passengers are approaching or leaving a helicopter that is sitting on a slope with the rotors turning, they should approach and depart downhill. This affords the greatest distance between the rotor blades and the ground. If this involves walking around the helicopter, they should always go around the front—never the rear.

### **Pilot at the Flight Controls**

Many helicopter operators have been lured into a “quick turnaround” ground operation to avoid delays at airport terminals and to minimize stop/start cycles of the engine. As part of this quick turn-around, the pilot might leave the cockpit with the engine and rotors turning. Such an

operation can be extremely hazardous if a gust of wind disturbs the rotor disk, or the collective flight control moves causing lift to be generated by the rotor system. Either occurrence may cause the helicopter to roll or pitch, resulting in a rotor blade striking the tail boom or the ground. Good operating procedures dictate that, generally, pilots remain at the flight controls whenever the engine is running, and the rotors are turning.

If operations require the pilot to leave the cockpit to refuel, the throttle should be rolled back to flight idle and all controls firmly frictioned to prevent uncommanded control movements. The pilot should be well trained on setting controls and exiting the cockpit without disturbing the flight or power controls.

### **After Landing and Securing**

When the flight is terminated, park the helicopter where it does not interfere with other aircraft and is not a hazard to people during shutdown. For many helicopters, it is advantageous to land with the wind coming from the right over the tail boom (counterrotating blades). This tends to lift the blades over the tail boom but lowers the blades in front of the helicopter. This action decreases the likelihood of a main rotor strike to the tail boom due to gusty winds. Rotor downwash can cause damage to other aircraft in close proximity, and spectators may not realize the danger or see the rotors turning. Passengers should remain in the helicopter with their seats belts secured until the rotors have stopped turning. During the shutdown and postflight inspection, follow the manufacturer's checklist. Any discrepancies should be noted and, if necessary, reported to maintenance personnel.

## **Chapter Summary**

This chapter explained the importance of preflight and safety when conducting helicopter ground operations. Proper procedures for engine run-up, refueling, and ground safety were detailed and the responsibilities of the pilot when maintenance issues occur before flight.