PILOT PREP

ULTIMATE PART 107 EXAM

CHEAT SHEET

PASS
Guarantee

PILOT PREP

Part 107 Test CheatSheet

FAA Drone Pilot Guidelines and Regulations

- **Age Requirement:** Must be at least 16 years old to obtain a Remote Pilot Certificate.
- **Accident Reporting:** Must report to the FAA within 10 days of any incident causing serious injury or over $500 in property damage.
- **Certificate Renewal:** Complete online training course ALC-677 every 24 months to maintain an active Remote Pilot Certificate.
- **Aircraft Weight:** A "small" unmanned aircraft is defined as one weighing less than 55 pounds.
- **Scope of Part 107:** Applicable to civil/commercial drone operations. Does not cover public aircraft, model aircraft, or hobbyist activities.
- **Address Change Notification:** Notify the FAA of any change of address within 30 days.
- **Remote PIC Responsibility:** The Remote Pilot in Command is ultimately responsible and has final authority over the operation of the drone under Part 107.
- **Supervision of Non-Certificated Operators:** Non-certified individuals may operate a drone if supervised directly by a certificated Remote PIC who can take immediate control, often through a "buddy box" system.
- **Crew Requirements:** Crew members, including Visual Observers, must be physically and mentally fit to participate in operations. Impairment from hangovers or fatigue is not acceptable.

- **Medication and Health:** If unsure about the effects of medication, consult an Aviation Medical Examiner (AME). For more details, refer to the Aeromedical Factors chapter in the Pilot Handbook of Aeronautical Knowledge.
- **Certificate Penalties:** Recent drug or alcohol violations can lead to a suspension or denial of certification for up to a year.
- **Pre-Flight Risk Assessment:** Use the IMSAFE checklist to evaluate readiness before flight.

Guidelines for Flying Drones Over People

- **Operation from Moving Vehicles:** Operating a drone from a moving vehicle or aircraft is only permissible over sparsely populated areas.
- **Flight Over Individuals:** Unless flying a drone approved for Category 1-4 operations, it is prohibited to fly directly over any person not involved in the operation unless they are:
- (a) Actively participating in the operation.
- (b) Under a covered structure or inside a stationary vehicle that provides protection from a falling drone.

Unmanned Aircraft Categories for Flying Over People

Category 1:
- Drones must weigh 0.55 lbs or less, including attachments.
- Must not have exposed rotating parts that could cause lacerations.
- No FAA Means of Compliance (MOC) or Declaration of Compliance (DOC) is necessary.
- Cannot sustain flight over open-air assemblies unless equipped with standard Remote ID.

Category 2:
- Drones must weigh more than 0.55 lbs, must be labeled as Category 2, and must not have exposed rotating parts that could lacerate skin.
- Must not cause injury exceeding an impact of 11 foot-pounds of kinetic energy.

Category 3:

- Drones must weigh more than 0.55 lbs, must be labeled as Category 3, and must not have exposed rotating parts that could lacerate skin.
- Must not cause injury exceeding an impact of 25 foot-pounds of kinetic energy.
- Must not fly over open-air assemblies.
- Operations are restricted to closed or controlled access sites where all individuals are informed of the drone operation.
- Flight over people is limited to those directly participating in the operation or those under a covered structure or inside a stationary vehicle.

Category 4:

- Drones must possess an airworthiness certificate issued under Part 21.
- Must be operated according to the limitations in the approved Flight Manual.
- Must maintain records of maintenance, preventive maintenance, alterations, and inspections for a period of 1 year.
- Sustained flight over open-air assemblies permitted only if equipped with standard Remote ID.

Compliance and Labeling

- **Category Labeling:** Drones must be labeled clearly in English. The label must be legible, prominent, and permanently affixed. If the label becomes degraded, the remote pilot must replace it before operating over people.
- **Means of Compliance (MOC):** A method to demonstrate that the drone does not exceed injury severity limits upon impact, has no exposed rotating parts that could cause lacerations, and contains no safety defects.
  - An MOC is mandatory for Categories 2 and 3 and is subject to FAA review and possible rescission.
- **Declaration of Compliance (DOC):** Required for Categories 2 and 3, where the designer, producer, or modifier must declare that the drone meets safety requirements.
  - Records related to the DOC must be retained for at least 2 years after manufacturing has ceased.

Operational Considerations

- **Operations Over Moving Vehicles:** Restricted to Categories 1, 2, and 3. Drones must not maintain sustained flight over vehicles, only transient operations are allowed.

- **Remote ID Compliance:** Required for sustained flight over open-air assemblies in Categories 1, 2, and 4.

- **Environmental Conditions:** Part 107 does not specify a minimum distance for flying near people, but conditions such as wind, precipitation, and the presence of other obstacles must be considered to adjust safe operational distances dynamically.

- **Nighttime Operations:** Safety measures for flying over people are consistent, regardless of the time of day or night.

- **Manufacturer's Instructions:** Includes permissible modifications to keep the drone eligible for its designated operational category. Any modifications must use approved parts from the manufacturer's list to ensure compliance with operational standards.

- **Eligibility Across Categories:** A drone system may qualify for multiple categories as long as the Remote Pilot in Command can control and switch between configurations safely and appropriately.

Nighttime Drone Operations

- **Civil Twilight Definition:** Occurs twice daily: evening civil twilight from sunset to 30 minutes post-sunset, and morning civil twilight from 30 minutes before sunrise until sunrise.

- **Nighttime Visibility Requirements:** Drones operating during civil twilight or at night must have anti-collision lights visible up to 3 statute miles. The brightness of these lights may be adjusted for safety purposes.

- **Dark Adaptation:** It takes around 30 minutes for human eyes to fully adjust to the dark. Exposure to bright lights during this period will negate the adaptation and restart the process.

- **Lighting During Setup:** When preparing your drone and conducting pre-flight checks in the dark, use a red filtered light to preserve night vision.

Techniques for Identifying Objects at Night:

- Scan the environment from left to right in 30-degree segments, pausing briefly (2 to 3 seconds) to focus on specific objects.
- Employ off-center viewing by looking 10° around an object—using peripheral vision—rather than directly at it. Direct gaze should not exceed 2 to 3 seconds as objects may become invisible.

Factors Affecting Night Vision: Vision can be impaired by fatigue, colds, vitamin deficiencies, alcohol, stimulants, smoking, and medications. Smoking, in particular, significantly reduces night-time visual sensitivity.

Navigation Lights and Aircraft Direction:

- A red light on the left wing indicates the port side of an aircraft.
- A green light on the right wing signifies the starboard side.
- A white light at the rear means you are viewing the aircraft from behind.
- Seeing both red and green lights means an aircraft is approaching.
- A sole white light indicates the aircraft is moving away.
- Red and white lights together suggest the aircraft is crossing from right to left.

Visual Perception at Night:

- The eyes utilize light-sensitive cells called cones and rods: cones for color and detail in bright conditions, and rods for movement and low-light situations.
- At night, vision depends mostly on rods and peripheral viewing as the center of the visual field can develop a blind spot, especially at a distance, obscuring larger objects.

Visual Illusions and Effects:

- Autokinesis: A stationary light may seem to move if stared at for several seconds in darkness.
- Reversible Perspective Illusion: Difficulty in discerning whether an object is moving towards or away from you.
- Size-Distance Illusion: Misinterpreting the motion of a light based on its varying brightness, often perceived as moving closer or farther.

- Flicker Vertigo: Exposure to a flashing light between 4 and 20 cycles per second can induce nausea, vomiting, and vertigo.

Black-Hole Approach:

- Occurs during landings over unlit terrain or water, where the runway lights are the only light sources, potentially disorienting the pilot.

National Airspace System (NAS) Overview

- **Class B Airspace:** Surrounds major "Big City" airports, depicted by solid blue lines on charts, where specific airspace authorization is required.
- **Class C Airspace:** Encompasses "City" airports, shown with solid magenta lines, and also requires prior airspace authorization.
- **Airspace Altitude Indicators:**
- "110/SFC" indicates controlled airspace starting at the ground level up to 11,000 ft. Mean Sea Level (MSL).
- "110/20" delineates controlled airspace beginning at 2,000 ft. MSL and extending up to 11,000 ft. MSL.
- **Class D Airspace:** Includes smaller "Diminutive" or "Dime-Sized" airports, identified by dashed blue circles or line patterns, necessitating airspace authorization.
- "[25]" designates Class D airspace from the surface to 2,500 ft. MSL.
- "[-25]" indicates Class D airspace from the surface up to, but not including, 2,500 ft. MSL.
- **Operational Rules for Class D Airports:** When the tower is not operational, the airspace defaults to Class E surface area rules or combines Class E rules up to 700 feet AGL with Class G rules from the surface.
- **Class E Airspace:** Known as "Elemental" or "Everywhere," it constitutes controlled airspace:
- At the surface, marked by a magenta-dashed circle or line patterns.
- Starting at 700 ft. AGL, indicated by a broad, fuzzy magenta shading. Flying in this airspace does not require special authorization.
- Beginning at 1,200 ft. AGL is typically unmarked, transitioning to Class E above this altitude unless otherwise specified.

- **Class G Airspace:** Represents uncontrolled airspace, generally free from additional authorization requirements, unless influenced by special use airspace directives or NOTAM/TFR announcements.
- **Special Use Airspace Characteristics:**
  - **Prohibited Areas:** Noted by a "P" followed by a number; flight is completely forbidden.
  - **Restricted Areas:** Identified by an "R" and a number, highlighted with blue hash markings, where entry requires authorization due to potential hazards, such as military exercises.
  - **Warning Areas:** Marked with a "W," similar in nature to Restricted areas.
  - **Military Operations Areas (MOA):** Labeled "MOA" on charts, requiring pilots to ensure self-collision avoidance. Check if an MOA is active by referring to the sectional chart border and contacting the controlling authority.
  - **Alert Areas:** Denoted with an "A" and a number, alerting pilots to areas of high training activity or unusual aerial movements. Extreme caution is advised, and like in MOAs, collision avoidance is the pilot's responsibility.
- **Military Training Routes (MTR):**
  - Identified on charts as IFR (IR) or VFR (VR), followed by a sequence of numbers.
  - Routes with four digits signify operations below 1,500 ft. AGL, which could pose challenges for unmanned aircraft.
  - Routes with three digits indicate at least one segment is above 1,500 ft. AGL.
- **Temporary Flight Restrictions (TFR) and Notice to Air Missions (NOTAM):**
  - **TFRs:** Imposed to restrict air movements over specific areas during significant events, natural disasters, or VIP movements.
  - **NOTAMs:** Critical, temporary airspace details that are either too recent or not well-known enough to feature on charts.

Reading Sectional Charts

- Utilize the FAA's chart supplements available during the FAA Knowledge Exam, particularly the legend detailed right after the Table of Contents on page 1-1, which explains icons and numbers crucial for interpretation.
- **Geographic Markers and Measurements:**
  - **Equator and Prime Meridian:** Serve as the fundamental reference lines for latitude and longitude, respectively.
  - **Latitude and Longitude:** Increase or decrease in degrees and are subdivided into 60 minutes, noted as ticks on charts.
  - **Navigational Checkpoints:** Small magenta flags on charts denote visual reporting points where increased manned aircraft traffic is likely.
- **Altitude References:**
  - **Above Ground Level (AGL) and Mean Sea Level (MSL):** Distinctions between the literal altitude above the ground and the standardized elevation above sea level, used for atmospheric pressure measurements and altitude calibration.
  - **Isogonic Lines:** Indicate magnetic variations, essential for compass-based navigation.
  - **Victor Airways:** Depicted as thick, faded blue lines, resemble highways in the sky, classified as Class E airspace starting at 1,200 ft. AGL up to, but not including, 18,000 ft. MSL.

Airport Operations

- **Chart Supplement U.S.:** This essential publication, previously known as the Airport/Facility Directory, offers detailed information about airports.
- **Runway Numbering:** Runways at airports are numbered between 1 and 36, reflecting their alignment with magnetic north. For example:
  - Runway 9 aligns with 090° magnetic (eastward).
  - Runway 27 aligns with 270° magnetic (westward).
  - Runway 18 points south (180°), and Runway 36 points north (360°).

- **Runway Usage:** Pilots landing or taking off use the runway number that matches their magnetic heading. Runways serve dual directions; thus, Runway 9 becomes Runway 27 when approached from the opposite direction.

- **Traffic Patterns:** The standard traffic pattern at most airports is left-handed, meaning all turns are to the left unless specified otherwise.

- **Flight Patterns:** Aircraft ideally take off and land facing into the wind, utilizing prevailing winds to aid in operations.

- **Traffic Pattern Altitude:** Pilots should reach the appropriate altitude for the airport's traffic pattern, available in the Chart Supplement, before entering the pattern.

- **Pattern Entry:** The advised method to join an airport traffic pattern is at a 45° angle to the midpoint of the downwind leg at the established traffic pattern altitude.

- **Remote Pilot Considerations:** A Remote Pilot in Command (PIC) must avoid disrupting the traffic flow or operations at airports, heliports, or seaplane bases.

- **Right of Way:** Aircraft in distress have priority over all other air traffic.

- **Encountering Other Aircraft:** Drones should always yield the right of way to other types of aircraft such as helicopters, gliders, powered parachutes, and balloons.

- **Encounter Procedures:** If two fixed-wing unmanned aircraft of similar size meet, both should alter their course to the right to avoid collision.

- **Visual Observation Requirements:** Remote PICs must rely solely on their unaided vision—glasses and contacts permitted—to meet "See and Avoid" requirements. The use of first-person view cameras or binoculars is not allowed.

- **Scanning Techniques:** Proper scanning involves focusing on different sky segments for short periods to systematically cover the entire area efficiently.

Weather and Micrometeorology

- **Standard Conditions at Sea Level:** The norm is 15°C (59°F) for temperature and 29.92 inches of mercury (1013 millibars) for pressure. At these conditions, density altitude equals pressure altitude.
- **Density Altitude:** Represents the altitude at which the aircraft perceives it is flying. Higher density altitudes indicate thinner air, which can diminish aircraft performance.
- **Convective Currents:** Result from uneven heating of the Earth's surface, creating updrafts over warm surfaces like pavement or sand and downdrafts over cooler areas such as water or dense vegetation.
- **Building and Natural Obstructions:** Large structures disrupt wind flow, potentially causing rapid changes in wind direction and speed.
- **Wind Shear:** This phenomenon involves sudden changes in wind direction and/or speed over short distances and is notably hazardous at lower altitudes.
- **Temperature Inversion:** Occurs when air temperature increases with altitude, increasing humidity and reducing visibility due to fog or haze.
- **Phase Changes:** Evaporation is the transition from liquid to gas, while sublimation is the transition from solid to gas without becoming liquid.
- **Dew Point:** The temperature at which air reaches full saturation and can no longer hold moisture, leading to the formation of fog, dew, frost, clouds, or precipitation.
- **Frost Implications:** Detrimental to sUAS operations because it disrupts smooth airflow over wings or propellers, reducing lift.
- **Weather Reporting:** Pilots should familiarize themselves with METAR and TAF reports, which provide vital meteorological information.

Weather and Micrometeorology

- **Formation Conditions:** Require high humidity, unstable air, and an initial upward force. Begins with the cumulus stage, intensifies during the mature stage, and dissipates when air movement slows, spreading the cloud into an anvil shape.

- **Squall Lines:** Narrow bands of thunderstorms usually preceding a cold front.
- **Cloud Types and Aviation Hazards:**
  - Lenticular clouds signify strong winds and possible turbulence.
  - Cumulonimbus clouds are associated with thunderstorms and turbulent conditions.
- **Air Stability:** Unstable air is characterized by cumuliform clouds and clear visibility, while stable air features stratiform clouds and reduced visibility with continuous precipitation.

Drone Flight Operations

- **FAA Recommendations:** Maintain a minimum horizontal distance of 2,000 ft from tall structures such as radio and television towers to avoid their guy wires.
- **Emergency Procedures:** In any emergency, the primary rule is to keep control of your aircraft.
- **Battery Safety:** If a LiPo battery is dropped or dislodged from your unmanned aircraft due to an accident, it's crucial to assess any damage before attempting another flight.
- **Error Chain:** A sequence of judgment errors leading to an accident related to human factors is often called the error chain.
- **Aeronautical Decision-Making (ADM):** This is a structured approach to making the best decisions in response to situational variables.
- **Risk Management:** To break the final link in an error chain, a remote pilot should engage in thorough risk management.
- **Crew Resource Management (CRM):** Utilizes all available resources—human, technological, and informational—to secure a successful flight outcome.
- **Situational Awareness:** Overburdening oneself can cause a loss of situational awareness, a critical operational pitfall.
- **PAVE Model:** Use this model to systematically identify potential hazards.

- **Medical Advice for Pilots:** Consult an Aviation Medical Examiner if unsure about flying with an illness.
- **DECIDE Model:** This tool aids in continuous evaluation of operational hazards and risk management.
- **Handling Hazardous Thoughts:** Recognize, label, and counteract hazardous thoughts with appropriate responses:
  - **Anti-Authority:** "Don't tell me what to do." / **Antidote:** Follow the rules.
  - **Impulsivity:** "Do it quickly." / **Antidote:** Slow down and think.
  - **Invulnerability:** "It won't happen to me." / **Antidote:** Acknowledge risks.
  - **Machismo:** "I can do it." / **Antidote:** Avoid unnecessary risks.
  - **Resignation:** "What's the use?" / **Antidote:** Empower yourself to make a difference.
- **Airport Communications:** To monitor manned aircraft near airports without control towers, tune into the Common Traffic Advisory Frequency (CTAF).
- **UNICOM and MULTICOM:** Use these for air/ground communications at airports without control towers or Flight Service Stations.
- **Automatic Terminal Information Service (ATIS):** Provides continuous broadcast of aeronautical information at busier airports.
- **Time Coordination:** The FAA uses Coordinated Universal Time (UTC), also referred to as "Zulu," for all operations.

Remote Identification (Remote ID)

- **Functionality:** Remote ID enables drones to provide identification and location information, aiding FAA and other authorities in monitoring airspace safety.
- **Requirements:** Drones weighing over 0.55 lbs or operating under rules that necessitate registration must have Remote ID.
- **Standard Remote ID:** Applies to unmanned aircraft with integrated broadcast capabilities.

- **Remote ID Broadcast Module:** For older drones or those without built-in transmission capabilities, an attachable module is required to meet compliance.

- **FAA-Recognized Identification Area (FRIA):** Designated zones where drones without Remote ID can operate within visual line of sight.

- **Eligibility for FRIA Application:** Community-based organizations, educational institutions, and universities can apply to establish a FRIA.

- **Prohibitions on Certain Equipment:** The use of Automatic Dependent Surveillance-Broadcast (ADS-B) Out and Air Traffic Control (ATC) Transponders on unmanned aircraft is not allowed.

- **Operational Requirements:** If the Remote ID fails a self-test, the drone must not take off. Remote ID transmissions must be active from takeoff to landing and cannot be disabled during flight.

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