

Part 107 Exam Refresher Sheet

Refer to this after you have completed the lectures

Section 1 – Rules and Regulations

- Drone Registration is required
- Minimum Age to register is 13 years old
- Minimum Age to get a license is 16 years old
- Your license is good for 2 years
- If you move, you have 30 days to report your new address

- Max speed = 100 mph or 87 knots
- Max Height = 400 feet Above Ground Level
- You can fly 400 over a structure if it's part of your mission within a 400' boundary
- AGL = Above Ground Level
- MSL = Mean Sea Level
- You cannot fly over people
- Weight minimum = 0.55 lbs
- Weight Maximum = 55 lbs
- You can only fly one drone at a time
- You can fly from a moving vehicle if you are not driving
- You can fly from a moving vehicle in a sparsely populated area
- Drones must always give the right of way to everything else, even to other drones
- Always have the drone within "Line of Sight"
- Visibility must be 3 Statute Miles or greater
- You must be 500 feet below clouds
- You must be 2,000 feet from fog Horizontally
- You are not allowed to fly at night
- Civil Twilight = 30 minutes before sunrise and 30 minutes after sunset
- To fly in Civil Twilight, you need anti-collision lights that are visible for 3 SM
- Apply for a waiver at least 90 days before your planned mission
- Waivers will only be given if you can prove safety is maintained

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Section 2 – Managing the Crew

- The Remote Pilot in Command (PIC) is in charge of everything
- A Visual Observer's job to watch and communicate info back to the PIC
- A PIC can let someone else fly (The Person Manipulating the Controls)
- Scan the sky by systematically focusing on different areas for short intervals
- The PIC must ensure that objects carried on the drone are secure
- The PIC must always keep an eye on current weather conditions
- Crew Resources Management (CRM) = the effective use of all your resources
- Risk Management is about the PIC making smart decisions
- Macho = Watch this!
- Invulnerability = It won't happen to me.
- Anti-Authority = This stuff doesn't apply to me.
- Resignation – Oh well, there is nothing I can do.
- Impulsivity = Just do something!
- Do not drink alcohol at least 8 hours before a flight
- You need a Blood Alcohol level of less than 0.04%
- The FAA may suspend your license for up to 1 year for a Marijuana Conviction
- Reduce stress at home
- Fatigue can be recognized as being in an impaired state
- To deal with hyperventilation, slow your breathing, breathe into a bag or talk aloud

Section 3 - Emergency Procedures

- Always have a backup plan
- Inflight fires are always an “Emergency Situation”
- Fly Aways are always an “Emergency Situation”
- To avoid striking guy wires on a tower, stay 2,000 feet away
- You have 10 days to report an accident to the FAA
- Report if damage is over \$500 (not including the cost of the drone)
- Report if serious injury happens or someone loses consciousness
- Serious injury = hospitalization over 48 hours
- Serious injury = sutures or stitches are needed
- If you deviate from the regulations, report it to the FAA only if they ask for it

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Section 4 – Standard Procedures

- Pre-flight checklists are required
- The PIC must perform a pre-flight check before flying
- You must perform regular maintenance and keep a log of it
- Establish your own maintenance protocol if the drone manufacturer does not have one
- Things you need to have with you when you fly:
 - Your Remote Pilot's License
 - Aircraft registration paperwork
 - waiver paperwork (if applicable)
 - Maintenance Logs
 - Flight Logs

Section 5 – Airspace

- Lines of Latitude go Across and measure North/South
- Lines of Longitude are big circles and measure East/West
- Degrees – Minutes – Seconds are measured in a base of 60 (like a clock)
- Each small tick mark – 1 minute
- The 5th tick mark is a little larger
- The 10th tick mark is even bigger
- Class B = Big Airports / Solid Blue Line / Has Shelves / ATC permission is required to fly
- Class C = Congested Airports / Solid magenta Line / Has Shelves / ATC permission is required to fly
- Class D = Smaller Airports / Dotted Blue Line / No Shelves / ATC permission is required to fly
- Class E = Everywhere / Faded Magenta Line / Starts up at 700' AGL if inside the fade or 1,200' AGL if outside the fade / Do not fly here
- Class G = Ground / Uncontrolled Airspace / all the air from the ground up to the Class E airspace that is above us or the Classed airspace mentioned above
- Classed Airport shelves are measured in MSL
- Class E airspace is AGL

Section 6 – Special Use Airspace

- Prohibited Airspace = Never fly here
- Restricted Airspace = get a Hot / Cold determination first
- Warning areas = you can fly, just be careful
- Alert areas = you can fly, just be careful
- Military Operations areas = you can fly, just be careful
- Military Training routes present a hazard to drones because military aircraft could be flying below 1,500 feet here

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Section 7 – Airport Operations

- NOTAMS = Notices to Airmen and are general info that pilots might need
- Find them online
- TFRs – Temporary Flight Restrictions – found over sporting events or when Air Force One is around
- Runway Numbers follow the compass rose
- Airports typically use a Left pattern (they always make left turns)
- Pilots enter the traffic pattern 45 degrees to the downwind leg
- Towers are labeled with 2 numbers – the top is the MSL elevation, the bottom in parenthesis is the height of the tower in AGL
- Maximum Elevation Figures show the highest obstacle in each box ($12^5 = 12,500'$ MSL)
- The little red flags are VFR checkpoints and you can expect more traffic around them
- Towered airports are shown in Blue
- Non-towered airports are shown in Magenta
- The most comprehensive info on a given airport is provided by the US CHART SUPPLEMENT
- Common Traffic Frequencies are shown by a solid circle with a C
- The NTIA deals with privacy
- ATIS is a continuous broadcast of aeronautical info
- AWOS is automated weather

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Section 8 – Weather

- Clouds form when the dew point and temperature get close
- If the temperature is below freezing, ice will form
- Wind Shear = sudden drastic changes in wind
- The dangerous part of a thunderstorm is the “maturing stage”
- Fog forms when water cools somehow
- Radiation Fog = Warm ground + cool moist air. It hates wind
- Advection Fog = Warm air flowing over cold water (like in San Fran)
- Upslope Fog = air getting pushed up a mountain
- Steam or Precipitation Fog = hot pavement + rain shower, then water evaporates
- Stratus = layer
- Cumulo = White and puffy
- Nimbo = rain
- A standing lenticular cloud is almond shaped, forms over mountains, and is nasty
- Clouds or Fog form when water vapor condenses
- Stable air is characterized by stratus clouds, poor visibility, and continuous rain
- Unstable air is characterized by the presence of puffy clouds, good visibility, showers
- When Unstable air is forced upwards, clouds with considerable vertical development and turbulence can be expected
- You can get weather briefs from 1-800-wxbrief or www.1800wxbrief.com
- There are 3 types:
 - Standard WBs are the most complete
 - Abbreviated WBs only has updates to the standard
 - Outlook gives WBs a forecast
- METARS report current weather at an airport
- Airport Code / Date / Time in Zulu / Wind Direction / Wind speed / Visibility in SM / Clouds / Temperature and Dew Point / Altimeter Reading / Remarks
- TAF = Terminal Aerodrome Forecast = like a METAR only it includes a forecast

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Section 9 – Loading and Performance

- The 4 forces of flight = Lift / Drag / Gravity / Thrust
- The Center of Gravity = the imaginary point where the drone will balance if held up
- A forward CoG = higher stall speeds, slower cruise speeds, more stability
- An aft CoG – a faster cruise speed, less stability
- Stall Speed = the speed at which lift will fail
- Critical Angle of Attack = the point where lift is no longer generated and the airflow is separated
- Aircrafts loading instructions can be found in the Pilot's Operating Handbook or the UAS Flight Manual
- Low Density Altitude occurs at low altitudes
- High Density Altitude occurs at high altitudes
- When Density Altitudes goes up, performance goes down
- These things can degrade performance – high altitudes/high temperatures/high humidity/surface slopes/surface winds /high weight
- Load Factors are any extra forces we impose on the drone (adding more weight or subjecting it to a hard turn)
- To calculate the load factor, find the angle of bank in the chart, get the N load factor and multiply it by the original weight
- i.e. a 30 degree turn results in an N of 1.154. Multiple 33 x 1.154 to get 38 lbs.

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