

# Night Operations



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## Regulatory Requirements

- Effective **4/6/2021**, the FAA requires Remote Pilot applicants to be knowledgeable on night operations.
- The initial exam may contain night operations question starting **4/6/2021**. This part of the course will prepare you for these new questions.

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## Looking for Recurrent Training?

If you are already a certified Remote Pilot looking for Recurrent Night Training in order to qualify for the new 2021 night rules, you must:

- ▶ Take the **mandatory free FAA Recurrent Training** available 4/6/2021 at [www.faa.gov](http://www.faa.gov) (full link below the video)
- ▶ As an **option and in addition**, you can take this training (more interactive than the FAA training) but you also **MUST** take the official FAA training.

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## Flying at Night Requirements

- In order to fly at night **on or after 4/21/2021**, you must:
  - ▶ Have passed an initial knowledge exam after **4/6/2021**, or
  - ▶ Have completed the FAA training available online for free after **4/6/2021**.
- Your sUAS must be equipped with a lighted **anti-collision light visible at least 3 SM** (with a flash rate sufficient to avoid a collision).
- Same light requirement for operating during civil twilight.

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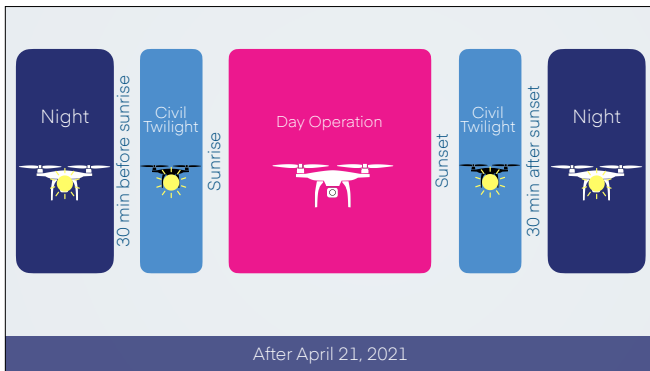
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## Are You a 107.29 Daylight Waiver Owner?

- If your waiver was issued prior to **4/21/2021** will expire on **May 17, 2021**.
- Be sure to complete the training before it expires!

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## Vision in Flight

- **Primary** method of orientation (responsible for 80% of flight information received).
- Works similar to a **camera** focusing light through a lens.
- Sends signals to the brain via an **optic nerve**.
- Subject to **visual illusions** and contains blind spots.

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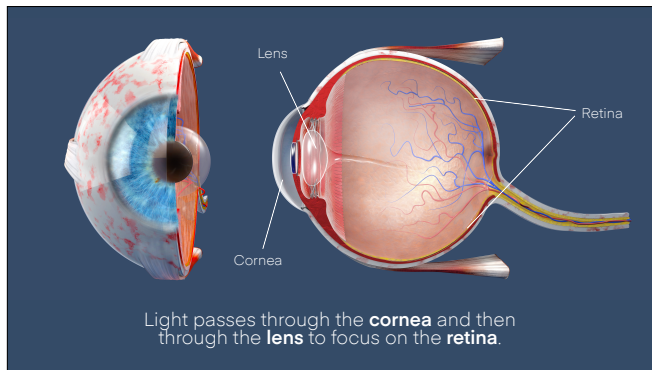
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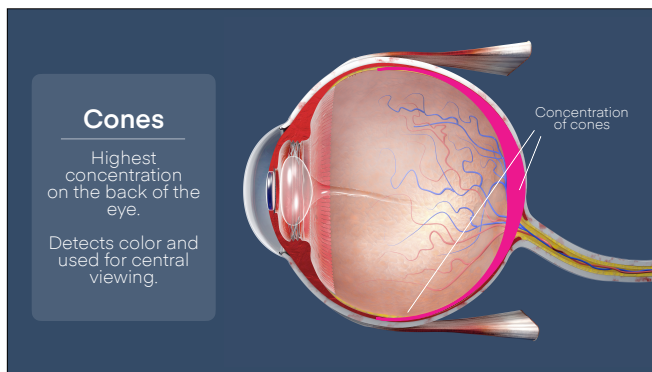
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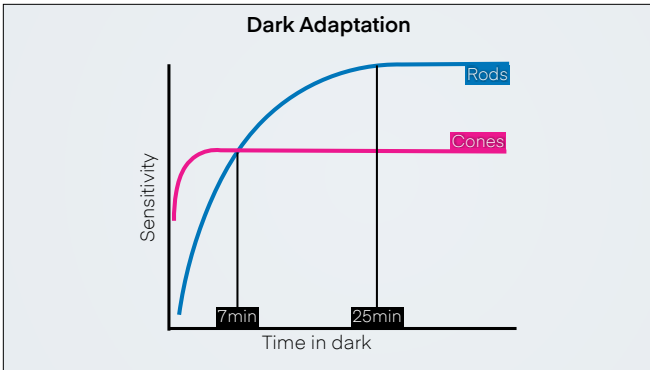
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- ### Night Vision Protection
- Watching a bright object after becoming adapted **resets** the adaptation process.
  - You can help adaptation by
    - ▶ wearing **sunglasses** if inside a bright building,
    - ▶ **avoiding to stare** at bright light, such as strobe lights when you turn them on,
    - ▶ if flying from high altitudes, consider using **supplemental oxygen** to improve vision.

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- ### Night Vision Protection
- Turn the **brightness down** on your displays before the mission.
  - Use a **red/green flashlight** instead of a white one.
  - Keep your flashlights/headlights low to **not blind your team** mates.
  - Avoid starring at **car lights, street lights,** or other bright lights.

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## Coping With Stress

- Night operations can be more **fatiguing** and **stressing** than day operations.
- Understand the additional stressors can help you cope with them:
  - ▶ **Drugs/alcohol** can degrade visual acuity and slow reaction time, impair decision making,
  - ▶ **Exhaustion** can divide attention and slow reaction time,
  - ▶ **Tobacco use** decreases visual sensitivity at night due to carbon monoxide increase

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## Distance Estimation & Depth Perception

- **Distances and depth perceptions** are difficult to judge at night.
- During the day, **shadows, colors, textures** give us an idea of depth and distances.
- At night, objects appear **uniform** and are difficult to discern.

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## Night Vision Illusions

- Autokinesis
- False Horizon
- Reversible Perspective Illusion
- Flicker Vertigo

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## Autokinesis

- Caused by **staring at a single point of light** against a dark background (sounds familiar??)
- After 8-10 seconds, the light may **appear to move**.
- Try to focus on objects at various distances to help your eye focus properly on the lit object.
- **Try not to stare** during your scanning for more than 10 seconds.

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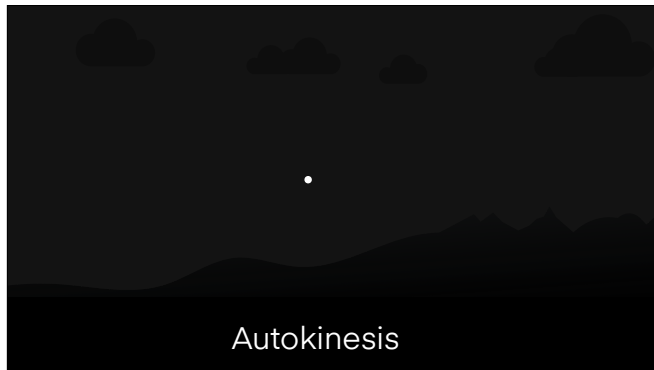
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## False Horizon

- Occurs when the **natural horizon is obscured** and other lights.
- **City lights** can cause false horizon although it is more prominent when flying than when on the ground.
- It can be caused if you are on the beach **flying over the water**. Boats on the water may create a false horizon.

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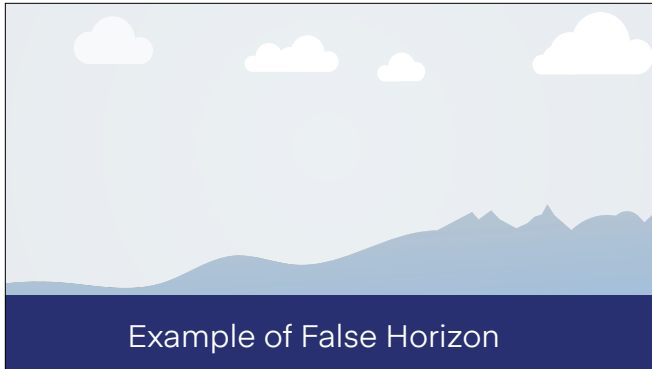
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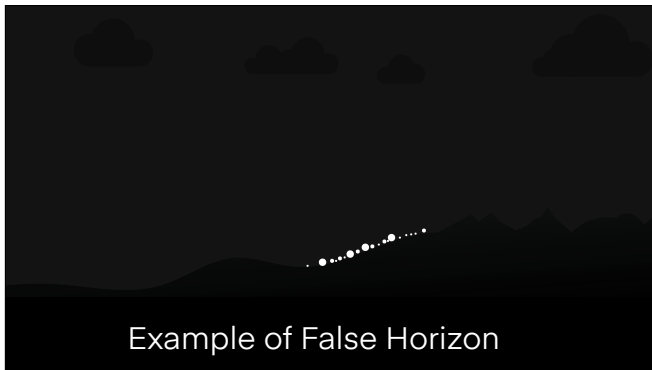
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**Reversible Perspective Illusion**

- An aircraft may appear to be **moving away** when it is in fact approaching.
- **Observe** how the aircraft lights are moving in relationship to the horizon.

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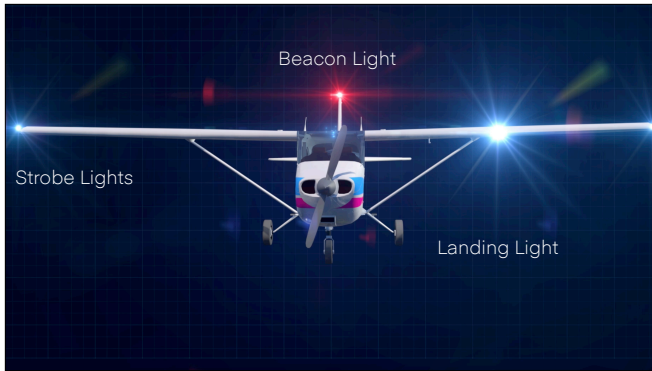
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### Flicker Vertigo

- Flashing lights (with a frequency of 4 to 20 cycles per second) can produce nausea, vomiting, and vertigo.
- Using the proper scanning technique and not staring is key to avoiding flicker vertigo.

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### Tips for Operating at Night

- **Planning**, planning, planning!
- Plan for **emergencies** and brief your crew.
- **Charge** your strobe lights and have a backup.
- Determine what potential **obstacle(s)** may be in the way by using sectional charts and other resources available.
- Plan a **day visit** to see the site if possible and note hazards.
- Know the landmarks that will be **lit**.

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### Tips for Operating at Night

- Set the **RTH altitude** appropriately.
- Your drone camera will likely be of **very little use** during flight.
- Rely on your **telemetry** for distances and height.
- Remain within **Visual Line of Sight** (more than ever).
- Know the height of the **tall obstacles** in the area.
- Consider adding **flood lights** (LumeCube) to light up the area as you fly.

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### Tips for Operating at Night

- Use a **visual observer** if you think it's required.
- **Block off the area** where you will operate. People might be hard to see.
- Figure out how you will **avoid flying over people** since you may not see them.
- **Continue to monitor for traffic**. Know which frequency is in use when the tower is closed.
- Because tower is closed **doesn't mean** the AIRPORT is closed.

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## If You Lose VLOS at Night

If you lose visual line of sight with your UAS at anytime...

- ▶ It could be behind an **obstacle**,
- ▶ You could have entered a **cloud/fog**,
- ▶ It could have **crashed** into terrain or a structure,
- ▶ The **anti-collision lights** could have failed or fallen off.

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## If You Lose VLOS at Night

What to do next:

- ▶ **Stop** moving forward immediately.
- ▶ **Verify** that you still have a connection with the UA
- ▶ If safe and legal, start to **climb** until you see the aircraft lights
- ▶ If you are utilizing a **VO**, ask them to walk towards the last known area
- ▶ **Listen** for the aircraft noise to try to locate it.
- ▶ Determine if the **anti-collision** lights are still functioning. **RTH** if necessary.

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## About Your Strobe Light

- Ensure they are rated to be visible for at **least 3SM**.
- You can use **any color**, any **number**.
- They are **not designed to help you see** the UAS, they are designed for the UAS to be **visible to other aircraft**.
- Put at least one on **top**.

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## Submitting Night Requests

- No requests are necessary to fly in **uncontrolled airspace**.
- If flying in **Class B, C, D, or E2**, you will need to request approval via the FAA Drone Zone.
- LAANC is currently **not available** for night flights.

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## Which Airspace Am I in?

- Many controlled airports are only controlled **when tower is in operation**.
- Determine what the airspace becomes **after** the tower is closed.
- Remember: you need approval to fly in **Class B, C, D, or E2**.

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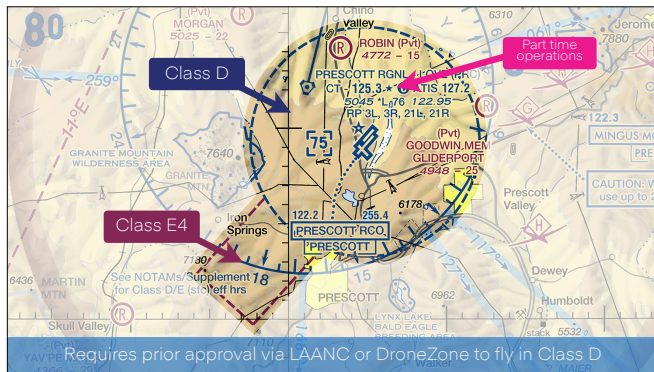
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**PRESCOTT RGNL - ERNEST A LOVE FLD (PRC/KPRC) 7 N UTC-7 N34°39.29' W112°25.15' PHOENIX**  
 5045 B TPA—See Remarks Class I, ARFF Index A NOTAM FILE PRC MON Airport H-41, L-8F  
 RWY 03R-21L: H4846X150 (ASPH-PFC) S-63, D-80, 2S-101, 2D-100 IAP AD

PCN 8 F/D/Y/T MIRL 0.9% up SW  
 RWY 03R: REIL, PAPI(P4L)—GA 4.1° TCH 45', Thid dsplcd 380', Road, Rgt ttc.  
 RWY 21L: MALSR, PAPI(P4L)—GA 3.0° TCH 55', Rgt ttc.  
 RWY 03L-21R: H4846X60 (ASPH) S-12.5 PCN 2 F/D/X/T MIRL 0.8% up SW  
 RWY 03L: PAPI(P2L)—GA 3.0° TCH 35', Thid dsplcd 811', Rgt ttc.  
 RWY 21R: PAPI(P2L)—GA 3.0° TCH 48', Rgt ttc.  
 RWY 12-30: H4408X75 (ASPH) S-12.5 PCN 10 F/C/M/T MIRL 0.6% up SE  
 RWY 12: REIL, PAPI(P2L)—GA 4.24° TCH 52', Thid dsplcd 150'.  
 RWY 30: REIL, PAPI(P2L)—GA 3.6° TCH 44'.

**LAND AND HOLD - SHORT OPERATIONS**

LOG RWY	HOLD - SHORT POINT	AVBL LOG DIST
RWY 21L	12-30	5904

**RUNWAY DECLARED DISTANCE INFORMATION**

RWY 03L: TORA-4846 TODA-4846 ASDA-4846 LDA-4037
<del>RWY 03R: TORA-7610 TODA-7610 ASDA-7610 LDA-7240</del>
RWY 12: TORA-4408 TODA-4408 ASDA-4408 LDA-258
<del>RWY 21L: TORA-7819 TODA-7819 ASDA-7819 LDA-619</del>
RWY 21R: TORA-4846 TODA-4846 ASDA-4608 LDA-4608
RWY 30: TORA-4408 TODA-4408 ASDA-4258 LDA-4308

SERVICE: S4 FUEL 100LL, JET A LGT Rwy 30 PAPI unusable byd 3 NM. After 0500Z-ACTIVATE MALSR Rwy 21L, REIL

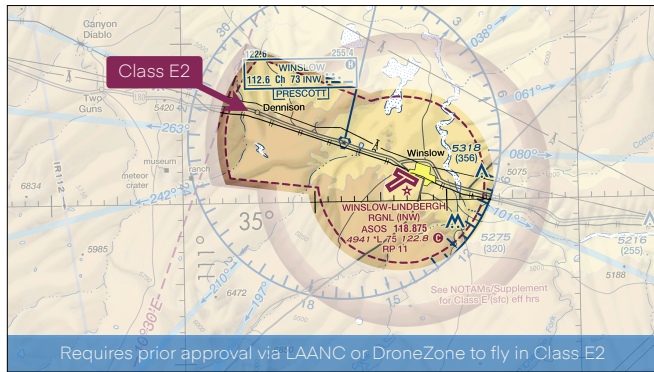
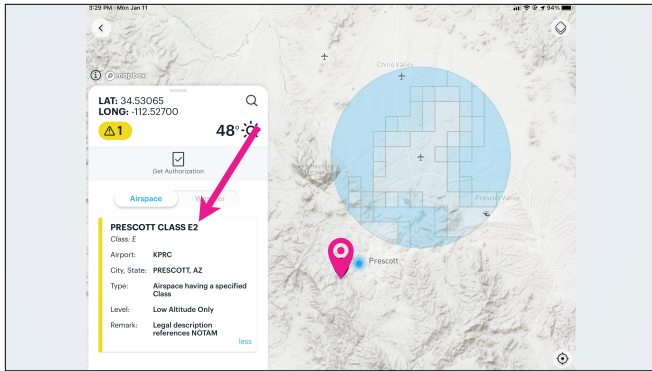
Becomes Class E2

Becomes Class E2 (now part of the primary airspace)

Requires prior approval via DroneZone to fly in Class E2 after tower closes

LAT: 34.64467  
 LONG: -112.4976

3 KPRC Class D 52°



<b>WINSLOW-LINDBERGH RGNL (NW)(KINW)</b> 1 W UTC-7 N35°01.31' W110°43.35'	<b>PHOENIX</b>
4941 B NOTAM FILE INW MON Airport	<b>H-4K, L-8G</b>
<b>RWY 04-22:</b> H7499X150 (ASPH) S-50, D-80, 2S-102, 2D-125	<b>IAP</b>
MIRL 0.8% up SW	
<b>RWY 04:</b> Pave.	
<b>RWY 22:</b> REIL VASIV4L—GA 3.0° TCH 40'. Thid displcd 1262'. Tree.	
<b>RWY 11-29:</b> H7100X150 (ASPH) S-60, D-70, 2S-89, 2D-110 MIRL	
0.4% up NW	
<b>RWY 11:</b> REIL VASIV4L—GA 3.0° TCH 36'. Tree. Rgt ttc.	
<b>RWY 29:</b> VASIV4L—GA 3.0° TCH 28'. Thid displcd 344'. Fence.	
<b>RUNWAY DECLARED DISTANCE INFORMATION</b>	
<b>RWY 04:</b> LDA-7499	
<b>RWY 11:</b> LDA-7100	
<b>RWY 22:</b> LDA-6236	
<b>RWY 29:</b> LDA-6756	
<b>SERVICE:</b> FUEL 100LL, JET A Lgt ACTIVATE REIL Rwy 11 and Rwy 22, MIRL Rwy 04-22 and Rwy 11-29—CTAF. WASH Rwy 11 and Rwy 22 ovr continuously.	
<b>AIRPORT REMARKS:</b> Attended 1400-0100Z. After hrs svc call 928-587-2630. Rwy 11-29 outer 35' on each side extremely rough due to vegetation growing in the numerous cracks. Southwest corner of Forest Service ramp ctsd. Landing fee for commercial aircraft. Overnight bedown fee.	
<b>AIRPORT MANAGER:</b> (928) 289-2422	
<b>WEATHER DATA SOURCES:</b> ASOS 118.875 (928) 289-0134.	
<b>COMMUNICATIONS:</b> CTAF/UNICOM 122.8	



## Thank You for Watching

- Remember that this course **does NOT replace** the FAA training that is required to be completed on [www.faa.gov](http://www.faa.gov)
- Reminder: In order to fly at night without a waiver, after **3/16/2021**, be sure to complete either:
  - ▶ An **initial written exam** (UAG) after 3/1/2021, or
  - ▶ The **free online recurrent training** after 3/1/2021

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## Next Up...

Maintenance & Inspections



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