



# Lights-Out

## A New Collision Avoidance Challenge



**See and Avoid**  
Part 91 states that when weather conditions permit, both IFR and VFR aircraft must maintain vigilance to see and avoid other aircraft.

(FAR 91.113)

Lights-out training involves military aircraft conducting training exercises at night, without exterior lighting.

Picture in your mind several military jets, possibly flying near-supersonic speeds at night, *with their exterior lights off*. Now picture a general aviation (GA) aircraft flying on the same night. Finally, picture the two aircraft types together in the same airspace *in the dark*.

This scenario is today's reality of a new military training exercise called Lights-out. Lights-out training involves military aircraft conducting exercises at night, without exterior lighting.

This training is necessary to ensure safe and efficient military operations, enabling pilots to avoid enemy detection and handle night emergencies more effectively. However, it is also GA's newest collision avoidance challenge.

Lights-out training will be conducted in select Military Operations Areas (MOAs) across the country. Participating Lights-out aircraft will come from active-duty U.S. Air Force, Air Force Reserve, and



**Lights-On**  
Part 91 states that position lights must be on from sunset to sunrise. (FAR 91.209)

the Air National Guard. A training exercise is not just a sea of fighter jets; transport aircraft, bombers, helicopters, and other types are also included.

Truth is, you are already familiar with the flight planning needed to safely share the sky with these aircraft, including the recommended procedures for operating in special use airspace. This Safety Advisor will help you apply that knowledge for the new and specific purpose of safely transiting the new world of Lights-out designated MOAs.

### **An Exception to Every Rule**

What about “position lights on” from sunset to sunrise? Just like GA pilots, military pilots must follow the operating rules of FAR Part 91. Of course, there are exceptions, and these come in the form of FAA exemptions. The U.S. Air Force received an FAA exemption to FAR 91.209, allowing night flight without external lighting illuminated.

Although this exemption may not appear to be in the best interest of safety, a number of safeguards have been implemented. The GA industry, including AOPA, worked tirelessly with the military and the FAA to reach an agreement allowing the military to train for vital missions while maintaining safe skies for everyone.



Figure 1: [www.aopa.org/asf/publications/sa21\\_moa.html](http://www.aopa.org/asf/publications/sa21_moa.html)

### **Quick Facts**

As part of the exemption granted by the FAA for military Lights-out operations, the military has agreed that:

- Military Lights-out operations will only be conducted in select MOAs (Figure 1).
- A local (L) notam will be issued at least 48 hours before Lights-out training exercises begin.
- The appropriate ATC facilities will be notified upon activation and termination of Lights-out operations.
- Continuous radar coverage will be provided to detect all nonparticipating (civilian) aircraft.
- When a civilian aircraft enters the active area of a Lights-out MOA, military aircraft will be notified immediately.
- If a civilian aircraft presents a conflict, Lights-out training operations will be modified, suspended, or terminated.



Military pilot wearing NVGs



NVG ground training

A modified operation might entail raising the floor of the training exercise to allow the civilian aircraft to pass under safely. A suspended operation requires the military aircraft to hold until the civilian aircraft is clear of the area. In the event an exercise is terminated, also referred to as a “knock-it-off,” military pilots turn on their external lighting and discontinue the exercise.

In abnormal or emergency situations, such as a loss of radar or communications capabilities or a Lights-out aircraft spilling out of the MOA, the U.S. Air Force will follow standard operating procedures to mitigate the hazard.

Since knowledge is the foundation of flight safety, the Aeronautical Information Manual (AIM) will be updated with procedural information and guidance on Lights-out operations for GA pilots. On an annual basis, the military will promote awareness and provide continuing education for GA pilots at airports surrounding Lights-out approved MOAs.

### **Darkness to Light**

As pilots, we understand the importance of learning new equipment *before* relying on it in critical situations. The primary purpose of conducting Lights-out training is to allow military pilots to train using Night Vision Goggles (NVGs) before engaging in true combat.

NVGs work by taking a tiny amount of existing light and amplifying it to enhance detail (see box below for more details). Military pilots using NVGs can still see other Lights-out aircraft, which is especially important in formation flying. Although we can't see military aircraft engaged in Lights-out training, NVG image-enhancement technology helps military pilots see us five-to-10 times better in the dark.

*Q. Why doesn't the military conduct more Lights-out training in warning areas?*

A. NVGs compare and contrast the reflective properties of objects, referred to as *albedo*, to provide visual contrast and detail. Therefore, the more varied the terrain, the more albedo differences within a scene and the more accurate image. The lack of albedo over water diminishes the overall effectiveness of NVG technology and Lights-out training.

Another reason warning areas are not the optimal location for Lights-out training is that the vast majority of actual combat missions are conducted over land, not water. The most effective training provides realistic visual cues, allowing pilots to train like they fight.

Due to the reflective properties of clouds and haze, military pilots will not use NVGs in these conditions. The reflections can lead to spatial disorientation.



## Military Operations Areas (MOAs)

Lights-out training operations were previously limited to restricted and warning areas, where GA pilots usually do not venture. Now the missions have expanded to approximately 130 Military Operations Areas (MOAs), where VFR GA flight is unrestricted. The Department of Defense (DOD) initially designated approximately 130 MOAs for Lights-out training. However, this number is subject to change; stay abreast of any changes by contacting the local Flight Service Station (FSS) during preflight and by requesting updates from ATC in flight.

## Aeronautical Charts

MOAs are identified by a hatched, magenta-colored border on Sectional, VFR Terminal Area, and Enroute Low Altitude charts. MOAs are not restricted airspace, and no permission – or even communication – is *legally* required to transit them. However, with increased military training activity, and especially with the new Lights-out training operations under way in select MOAs, attempting to fly through a Lights-out approved MOA without “talking and squawking” with the controlling agency is not recommended.

According to the *Aeronautical Information Manual (AIM)* section 3-4-5:

(a) MOAs consist of airspace of defined vertical and lateral limits established for the purpose of separating certain military training activities from IFR traffic. Whenever a MOA is being used, nonparticipating IFR traffic may be cleared through a MOA if IFR separation can be provided by ATC. Otherwise, ATC will reroute or restrict nonparticipating IFR traffic.

(b) Pilots operating under VFR should exercise extreme caution while flying within a MOA when military activity is being conducted. The activity status (active/inactive) of MOAs may change frequently. Therefore, pilots should contact any FSS within 100 miles of the area to obtain accurate real-time information concerning the MOA hours of operation. Prior to entering any active MOA, pilots should contact the controlling agency for advisories.



As you just read, MOAs were established to separate IFR traffic from the incredible speed and maneuverability of military aircraft. ATC is required to provide separation for IFR traffic, a tough task when a F-15 Eagle fighter jet flies at more than two *times* the speed of sound!

AOPA-recommended safeguards have been set up, but it's imperative that you, the GA pilot, understand how the system works. You are already taking the first step by reading this Safety Advisor.

Now that you know more about Lights-out training, review the following recommended procedures for rising to this new challenge on your next flight.

## Planning and Flying: Step-By-Step Preflight

✓ Plot your course to determine if your intended route will pass through a MOA.

✓ If the planned route takes you into a MOA, note the MOA's controlling agency and any other applicable frequencies specified on the chart.

Refer to the chart's special use airspace listing (Figure 2) to determine the altitudes of use, scheduled times of use and the controlling agency for the applicable MOA.

Find the frequency to the controlling agency in the communication box (Figure 3) adjacent to the MOA border on the chart. This information is also provided in the Airport/Facility Directory.

MOA NAME	ALTITUDE OF USE*	TIME OF USE†	CONTROLLING AGENCY**
BEAK A,B,C	12,500	0600-1800 MON-FRI	ZAB CNTR
BRONCO 1	8000	0700-2000 MON-FRI	ZFW CNTR
BRONCO 2	10,000	BY NOTAM	ZFW CNTR
BRONCO 3, 4	10,000	0700-2000 MON-FRI	ZFW CNTR
CATO	13,500	0800-2200 MON-SAT	ZAB CNTR
MDRENCI	1500 AGL	0600-2100 MON-FRI	ZAB CNTR
MT DORA EAST HIGH, WEST HIGH	11,000	BY NOTAM	ZAB CNTR
MT DORA EAST LOW, WEST LOW	1500 AGL TO BUT NOT INCL 11,000	BY NOTAM	ZAB CNTR
PECOS NORTH HIGH	11,000	0800-2000 MON-FRI	ZAB CNTR
PECOS NORTH LOW	500 AGL TO BUT NOT INCL 11,000	0800-2000 MON-FRI	ZAB CNTR
PECOS SOUTH HIGH	11,000	SR-SS MON-FRI	ZAB CNTR
PECOS SOUTH LOW	500 AGL TO BUT NOT INCL 11,000	INTERMITTENT BY NOTAM	ZAB CNTR
RESERVE	5000 AGL	BY NOTAM	ZAB CNTR
TABAN	500 AGL TO BUT NOT INCL 11,000	0800-2400 MON-FRI	ZAB CNTR
TALON HIGH EAST, HIGH WEST	12,500	SR-SS MON-FRI	ZAB CNTR
TALON LOW	300 AGL TO BUT NOT INCL 12,500	SR-SS MON-FRI	ZAB CNTR

\*Altitudes indicate floor of MOA. All MOAs extend to but do not include FL 180 unless otherwise indicated in tabulation or on chart.  
† - Other times by DoD NOTAM.  
\*\*ZAB-Albuquerque, ZFW-Fort Worth

Figure 2: Special use airspace listing

✓ Contact Flight Service (dial 1-800-WX-Brief) for a preflight briefing. When you reach the appropriate FSS, obtain all notams pertinent to the flight. Determine the status of the MOA in question – active or inactive. If it’s a night flight, find out if the MOA is approved for Lights-out operations.

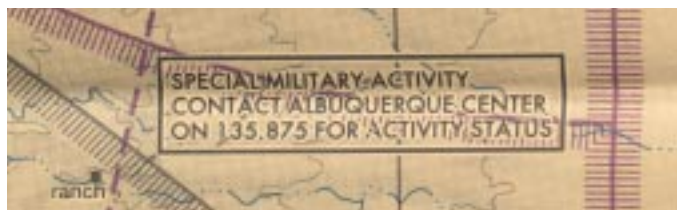


Figure 3: Communication box

Notams are the crucial link in the safety chain during preflight planning. Lights-out training will always be announced at least 48 hours in advance via a local (L) notam. Recall that local (L) notams are available only from the FSS nearest to the site of the notam, in this case within 100 nautical miles of the particular MOA.

A sample Lights-out local (L) notam (for illustration purposes only):

LIGHTS OUT OPERATIONS BY MILITARY AIRCRAFT IN VOLK EAST/VOLK SOUTH/VOLK WEST 20 MAY 23:45 UNTIL 21 MAY 01:15.

✓ Consider your course. Should a FSS briefer advise you of a “cold” MOA, by all means save yourself time and fuel by flying a direct route through the MOA. If you are advised of a “hot” MOA, consider

minimizing your exposure to the MOA. Remember to adjust your flight planning, including fuel requirements, as needed.

✓ Especially for a trip of this nature, the AOPA Air Safety Foundation recommends filing a VFR flight plan.

### In Flight

After gathering the necessary preflight information, follow the below tips for executing a flight that will penetrate a Lights-out approved MOA.

✓ Following departure, open your VFR flight plan (if filed).

✓ Monitor 121.5, if possible. Some military aircraft, such as the F-16, have the capability to contact civilians on VHF frequencies in emergency situations.

### Thorough Preflight

Before each flight, the PIC must become familiar with all available information concerning the flight. (Far 91.103)

### Wrong Number?

Pilots dialing 1-800-WX-Brief from a cell phone on a trip far from home may be surprised to hear their local FSS pick up. The phone system is designed to connect to the closest FSS based on the area code you are calling from. To obtain local (L) notams for the MOA in question, which would alert you to scheduled Lights-out operations, ask the briefer for the phone number to the appropriate FSS.

## Talk the Talk: Hot or Cold?

Sample request to FSS: "Cessna 4329 Kilo on VFR flight plan to Centerville Airport at 7,500 feet, requesting current status for Volk MOA." Common phraseology is "hot" for active and "cold" for inactive, which succinctly describes the status.



A view through Night Vision Goggles (NVGs)

✓ If your preflight briefing was hours ago, or you forgot to get information on Lights-out status during preflight, all is *not* lost. Contact a FSS within 100 nautical miles of the MOA in flight. The FSS will know the current status of Lights-out operations.

✓ Prior to entering the MOA, consider the use of *all* exterior lighting, including recognition, landing, and taxi lights, if installed. Additional aircraft lighting bolsters the "see" portion of the universal "see and avoid" mandate.

✓ Talk and Squawk. Verify the MOA's status with the controlling agency. Even if you learn that Lights-out training will be taking place, recognize that the exercise can be cancelled due to reduced NVG effectiveness caused by clouds or other weather, even if VFR conditions prevail.

If you chose not to file a VFR flight plan, contact the controlling agency as you approach the MOA and request traffic advisories, also known as VFR flight following. If the workload permits, the controller will request you squawk a discrete

transponder code to provide traffic advisories. Even when receiving VFR flight following, the pilot in command is *still* responsible for collision avoidance. If the workload does not permit flight following, at least the controller is aware of your intentions.

✓ As you transition the MOA, monitor ATC and respond accordingly.

✓ When exiting the MOA, ATC may hand you off to the controller responsible for the next sector or cut you loose entirely. If flight following service is terminated, reset the transponder to 1200. Continue to monitor available communication frequencies to help keep the "big picture" in focus.

## Talk the Talk: Extra Eyes

Contact the controlling agency to request VFR Flight Following: "Fort Worth Center, Cessna 4329 Kilo, VFR with request." After you hear the controller's acknowledgement, reply with "Cessna 4329 Kilo, Cessna 150 over Jackson City, 7,500 feet, VFR to Centerville Airport requesting flight following through Volk MOA."





## **Congratulations!**

You are better prepared to operate in the new world of Lights-out MOAs. The military and GA can share our national airspace in a safe manner while preserving the ability to accomplish our objectives.

While we have a right to the airspace, we have a responsibility to keep it safe!

## **Learn More about Lights-Out**

Get more details on this new collision avoidance challenge, including links to the AOPA Air Safety Foundation's newest online course, *Mission: Possible, Navigating Today's Special Use Airspace* and AOPA's official comments on the U.S. Air Force's FAA exemption, online at [www.aopa.org/asf/publications/sa21\\_links.html](http://www.aopa.org/asf/publications/sa21_links.html).

This Safety Advisor is available online at [www.aopa.org/asf/publications/sa21.pdf](http://www.aopa.org/asf/publications/sa21.pdf). For additional AOPA Air Safety Foundation publications, visit [www.asf.org](http://www.asf.org) and click on **Publications**.

## **Disclaimer**

The information contained in this Safety Advisor is perishable. Because future regulations and information affecting Lights-out operations may supercede the contents of this Safety Advisor; pilots should stay abreast of pertinent rules and information to ensure flight safety.



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